

**CAUSES OF PROJECT DELAY AND COST
OVERRUN OF MEGA PROJECTS IN
PENINSULAR MALAYSIA**

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CAUSES OF PROJECT DELAY AND COST OVERRUN OF MEGA PROJECTS IN
PENINSULAR MALAYSIA

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ABSTRAK

Isu atau permasalahan mengenai projek pembinaan yang tidak menepati anggaran masa serta anggaran kos yang ditetapkan adalah isu yang biasa dihadapi oleh organisasi dalam industri pembinaan projek khususnya dalam pembinaan projek-projek mega atau projek berskala besar. Isu ini cenderung untuk menjadi sebab dominan yang menyebabkan masalah dalam sesuatu projek pembinaan. Kedua-dua isu ini secara amnya dianggap sebagai isu kompleks dan berisiko dalam pelaksanaan projek pembinaan mega. Selain itu, banyak kajian mengenai permasalahan ketidaktepatan masa dan kos dalam industri atau bidang pembinaan projek telah dilakukan sama ada di Malaysia mahupun negara-negara luar dan berdasarkan pemerhatian, didapati bahawa permasalahan ini merupakan masalah yang biasa berlaku khususnya di negara-negara membangun seperti Malaysia. Oleh itu, faktor-faktor yang berkemungkinan menyumbang ke arah masalah ketidaktepatan anggaran masa serta kos dalam pembinaan projek mega perlu serta penting untuk dikenalpasti dalam usaha bagi mengelakkan serta mengatasi permasalahan ketidaktepatan anggaran masa serta kos dalam pembinaan projek mega di Semenanjung Malaysia. Data yang diperolehi daripada kajian ini yang menggunakan Skala Likert, dianalisis menggunakan Indeks Penting Relatif (RII). Kajian mendapati bahawa tiga kedudukan tertinggi bagi punca berlakunya masalah ketidaktepatan anggaran masa dalam menjalankan pembinaan projek mega yang ditentukan oleh keseluruhan responden adalah kesilapan semasa pembinaan oleh kontraktor, kelewatan dalam pembayaran oleh pemaju dan masalah kewangan. Sementara itu, faktor bagi isu ketidaktepatan anggaran kos untuk projek mega pula mendapati bahawa tiga kedudukan tertinggi adalah dari segi pengurusan tapak iaitu kelewatan jadual projek, anggaran masa tidak tepat serta anggaran kos dan pemantauan yang tidak mencukupi.

ABSTRACT

Project delay and cost overrun are two most commonly issues happen which tend to cause troubles in any construction project, especially the mega construction project. These two issues are generally regarded as the most problematic, complex, and risky issues encountered in a mega construction project. Many studies in Malaysia and also from the other countries point out that the issue of project delay and cost overrun are most commonly happen in developing countries includes Malaysia. Therefore, the identification or establishment of the causes that will lead to project delay and cost overrun in megaprojects is necessary and vital in order to put an effort in avoiding or overcoming this problem. This is corresponds to the main objective of this study which is to study the causes of the project delay and cost overruns in megaprojects in Peninsular Malaysia. The data acquired from the survey used a Likert Scale and analysed using Relative Important Index (RII).The study found that the three highest ranking for the causes of project delay of megaprojects by overall respondents are mistakes during construction by contractors, delay in progress payment and financial difficulties. While the causes of cost overrun for megaprojects declaring the three highest ranking is from the aspect of site management which are schedule delay, inaccurate time and cost estimated and inadequate monitoring and controlling.

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LIST OF ABBREVIATIONS

KLIA	Kuala Lumpur International Airport
MRT	Mass Rapid Transit
SMART	The Stormwater Management And Road Tunnel
MARA	Majlis Amanah Rakyat
PKK	Pusat Khidmat Kontraktor
CIDB	Construction Industry Development Board
RII	Relative Important Index

CHAPTER 1

INTRODUCTION

1.1 Background Study

In recent years, Malaysia has gone through a rapid growth of economy. Following the growth of the country economy, infrastructure developments as well as the urbanization are both at the booming state. In other words, the Malaysian construction industry is one of the driving forces of Malaysian economic. Malaysia's construction industry plays an important role in generating wealth and improving the quality of life for Malaysians through the translation of government's socio-economic policies into social and economic infrastructure and buildings. Apart from that, the Malaysian construction industry also has other important role in Malaysia such as providing job opportunities for approximately 800,000 people.

In construction industry, it required much manpower to establish the industries such as labour, design team, developer and others. The construction industries also creating multiple affect to the other industries such as manufacturer, financial and others. Many industries will be involved to establish a construction. Each industry has their own responsibility. Despite a challenging 2017, it is clearly can be seen that the construction industry in Malaysia has experienced a steady growth, supported by on-going infrastructure projects. The private sector and local contractors continued to propel construction activity in the country. Even with a sluggish property market, more residential projects are commenced this year. This can be proven by a finding in internet which stated that the project value for new construction works in Malaysia depicts an increasing value which is from RM 140 billion in 2015 to RM 230 billion in 2016. This is followed by the amount of RM 170 billion in 2017 which shows a slight of decreasing trend.

According to (Hoai, Lee, & Lee, 2008) , there are many problems have arisen during the construction projects implementation. This includes two main concerns which are project delay and cost overruns. Along with delay and cost overruns, there are some frequently faced consequences. Like other countries, Malaysia also in the midst of facing a serious and worrisome issue of project delay and cost overrun in construction industry where only 46.8% of public sector project and 37.2% of private sector projects were completed within the stipulated budget.

Hence, this study is carried out to find the root causes of time delay and cost overruns arising during construction phase of megaprojects in Peninsular Malaysia. Causes of time and cost extensions can result from all phases of projects, works, and circumstance. However, major troubles usually thrive during construction phases.

1.2 Problem Statement

There are a lot of perspective from the researchers about the serious and worrisome issue of project delay and cost overrun in construction industry. For instance, citing from (Najjar, 2008), he stated that poor time and cost performance are critical issues facing by today's construction industry in Malaysia, due to construction companies failed to achieve project objective in the targeted time and targeted cost.

Other than that, the critical issues facing by Malaysia is due to lack of concern by project manager in the construction issues; and there are less of studied on the impact of the cost overrun factors to the project delay, lack of updated information about how cost overrun factors can bring impacts to the project delay in different stages (Ibrahim, Abdullah, Sohu, Nagapan, & Richard, 2010)

The statements above can be concluded as both cost overrun and project delay are issues that are directly can lead a project to failure. If the problems are untreated, it will bring anticipated and unexpected impact to the company as well as the construction industry (Mohamad, 2010). Consequently, both project manager as well as contractor should pay a serious attention to overcome it.

The construction of megaprojects in Malaysia is in their booming state since years ago. Megaprojects are projects that are extremely a large-scale investment project. It usually would cost more than USD 1 billion or RM 4 billion. However, there are still projects which cost less than RM 4 billion and still can be considered as mega, it depends on the context. Megaprojects usually will attract a lot of public attention as they usually give high impacts towards community, environment and budget. Some of the megaprojects in Peninsular Malaysia includes Kuala Lumpur International Airport (KLIA), Petronas Twin Tower, Mass Rapid Transit (MRT), Penang Bridge, Stormwater Management and Road Tunnel (SMART Tunnel) and East Coast Expressway.

Megaprojects basically need an extra care in the term of project development process. This is to decrease any possibility that might happen such that the optimism bias which is able to cause delays as well as cost overrun when expensive projects are built. Due to the complexity of a megaproject, it literally becomes a measurement of success. However, the construction of a megaproject often faces many sorts of problems and among the major problems could be the project delay and cost overrun. Seldom megaprojects are completed on time and on budget.

Referring to the Focus Malaysia article Issue 273 written by Joseph Wong, he discussed on the Stormwater Management and Road Tunnel (SMART Tunnel), one of Malaysia megaproject and he specifically emphasized about the cost overrun for the project. Abdullah (2010) stated that more than 90% of large MARA construction projects experienced delay since 1984. Endut et al. (2009) studied on time performance of megaprojects in Malaysia. The study found that only 18.2% of the public sector projects and 29.45% of private sector projects had 0% delays while the average percentage of time overrun for other projects was 49.71%. He also reported that more than 50% projects face cost overrun.

Accordingly, this study is attempted to highlight the causes of the project delay and cost overruns in the megaproject construction industry in Peninsular Malaysia and to investigate which party in the construction industry who plays the most impactful role to the issue. Hence, it can help all parties involved to understand the importance of cost and time in a project, alleviate financial and time related issues in the effort to make the megaprojects successful.

1.3 Research Objectives

This study is aimed to achieve three objectives:

- RO1. To study the causes of the project delay and cost overruns in megaprojects in Peninsular Malaysia.
- RO2. To identify the most impactful role and most influential aspect that leads to the issue of project delay and cost overruns respectively.
- RO3. To analyse the most significant cause of project delay and cost overrun in megaprojects in Peninsular Malaysia.

1.4 Scope of Study

The scope of this study is highlighted on the causes that may lead to the issues of project delays and cost overruns which may happen in the construction of megaprojects. The focus on this study is also to identify which party in the construction organizational who plays the dominant role in controlling these issues. This study will only cover the megaprojects in the area of Peninsular Malaysia where most of Malaysia's megaprojects take place. The data collected for this study is mainly from the questionnaires survey and interviews meanwhile the targeted respondent will be the clients, consultants and contractors who are registered with the Pusat Khidmat Kontraktor (PKK) and registered grade 3 to 7 contractors with Construction Industry Development Board (CIDB).

1.5 Significance of Study

The issue of cost overrun and project delay in the construction industry of megaprojects has been discussed since decades ago. Unfortunately, it meets no ends. First and foremost, in order to overcome certain problems, the most vital thing to know is definitely the causes to the problem.

Hence, this study is attempted to find the root cause that will lead to the issue of project delays and cost overruns in megaprojects in Peninsular Malaysia. In addition, with the awareness of all parties involved during the progress of the construction about the causes to the issue it will literally help in the effort to overcome and minimize the issue from occurring or happening to any upcoming megaprojects.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

In this chapter, the literature reviews were reviewed accordingly, and it is published for the importance of this research. It established definitions of cost overruns and project delays, the causes and solutions for the issues. This is in order to get a comprehensive and inclusive designation or indication in various aspects of the definition from various sources to ensure that our understanding upon the definition and the causes that lead to the issue of cost overruns and project delays is reliable and valid, yet encouraging us to broaden our minds and expand our horizons so that we are able to see cost overruns and project delays in a general way or a general term. This chapter plays a very significant role to the first objective, which is to study the causes of the project delays and cost overruns in megaprojects in Peninsular Malaysia. Next, it will generally identify which party in the construction organization plays the most vital role that can lead to the issue and analyse the major cause of project delay and cost overrun in megaprojects in Peninsular Malaysia. Lastly, relevant ways to minimize or reduce this issue in the industry are identified in order to help the organization to curb with the issues.

The aim of this literature review is to understand and interpret the causes of cost overruns and project delays. For this reason, this section includes the results and findings of different cases of studies and views related to the cost overruns and project delays in the mega or public construction project by previous researchers. The causes that lead to the occurrence of the issue of cost overrun and project delays are presented. The cost overruns and project delays causes are able to give a huge impact to the

project. Therefore, the responsibility and awareness of the parties in the construction organization are important and needed in the effort to reduce or overcome this problem and to ensure the megaprojects able to run smoothly without any disturbances.

Cost overruns and project delays are mostly likely to happen in most of the mega construction project. Consequently, this heated issue is assumed as a common problem in the construction of megaproject either in Malaysia or even in other developed and developing countries. Apart from that, the magnitude of the project delays and cost overruns may be diverging considerably and accordingly to the size of the project. A high-range size project is distinctly possible or has a bigger chance to face high cost overruns and thus will give a very high consequence on the construction of the project. If the project is quite a small project, the cost overrun incurred is minimal thus it has a minimal impact to the construction project. The construction organization must identify the major causes to this problem and hence predict what will happen to the construction industry if this issue meets no ending. Then, they need to alleviate and try to find the possible solutions in order to help minimize and avoid delays and cost overruns issue in any construction of megaproject.

2.2 Project Life Cycle

The life cycle of a construction project is the prediction of the flow for the project. A project life cycle consists of four stages which are initiation, planning, execution and closure. Project life cycle can help deliverables the client's need and requirements.

Project Initiation

The first phase in the Project Management Life Cycle as it involves starting up a new project. The project can start by defining its objectives, scope, purpose and deliverables to be produced. In addition, project manager will also put together a project team, define early milestone, and earlier burger proposal. (Project Management Institute, 2008)

Project Planning

Once define the project and assemble the project team, the project manager will ready, enter in depth of the project planning phase. (Project Management Institute, 2008)

Project Execution

The project team can begin executing the project against their assigned task. (Project Management Institute, 2008)

Project Closure

Project closure involves delivering the final product or services to the customers, handing over project documentation. (Project Management Institute, 2008)

2.3 Megaprojects in Peninsular Malaysia

2.3.1 Definition of Megaprojects

Malaysia as a developing country is being driven forward by immense mega-construction projects. A megaproject is not only a gigantic chance, it likewise displays a colossal scope of complex procurement challenges. According to the Oxford Handbook of Megaproject Management (Management, n.d.), it stated that the megaprojects are large scale, complex ventures which they usually take many years to develop and build and involving many public and private stakeholders and significantly affect millions of people. Other than that, a more general definition is megaprojects are projects characterized by a large investment commitment, more complexity especially in organizational terms have a long-lasting effect on the economy, the environment, and society. Megaprojects will usually attract a lot of public attention because of substantial impacts on communities, environment, and budgets, and the high costs involved. Megaprojects can also be defined as initiatives that are physical, very expensive, and public.

2.3.2 List of Megaproject in Malaysia

1957–1963

- The Parliament Building
- Stadium Merdeka
- Stadium Negara
- Parliament House
- National Museum

1963–1970

- Subang International Airport
- National Mosque
- National Monument
- East–West Highway

1971–1980

- Kuantan Satellite Earth Station
- Temenggor Dam
- Karak Highway
- KOMTAR Penang

1981–1990

- North–South Expressway
- Penang Bridge
- Kenyir Dam
- Petronas petroleum and gas refinery in Kerteh, Terengganu
- Sultan Ismail Power Station in Paka, Terengganu

1991–1999

- Peninsular Gas Pipeline
- Kuala Lumpur International Airport
- Petronas Twin Towers
- Kuala Lumpur Tower
- Putrajaya
- Malaysia–Singapore Second Crossing
- National Sports Complex
- Menara Alor Star

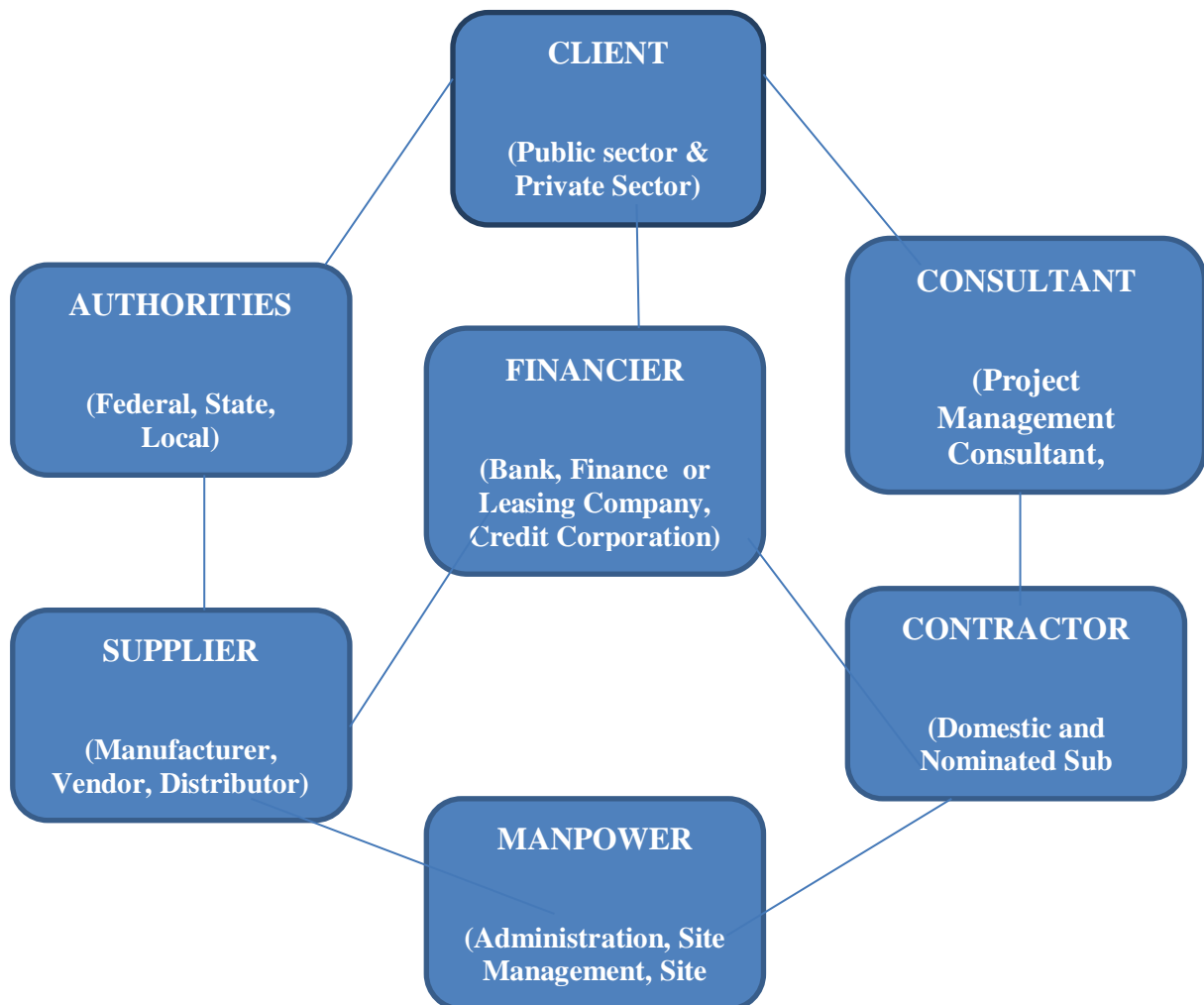
2000–2009

- KL Monorail
- Stormwater Management and Road Tunnel (SMART Tunnel)
- Southern International Gateway
- East Coast Expressway (Phase 1)
- Sultan Abdul Halim Muadzam Shah Bridge (Penang Second Bridge)

2010–2020

- Kuala Lumpur International Airport 2 (KLIA 2)
- East Coast Expressway (Phase 2)
- KVMRT Line 1 (Sungai Buloh–Kajang MRT Line)
- LRT extension
- West Coast Expressway

2.4 Parties Involved in Construction Industry



2.5 Cost Overrun

2.5.1 Definition of Cost Overrun

Cost overrun can be defined as when the project objectives are not achieved within estimated budget. Besides, cost overrun is the excess of actual cost over budget. Cost overrun is the ratio of contract amount to the original contract award amount. This calculation can be converted to a percentage for case of comparison (Jackson, 1990).

Moreover, (Singh, 2009) stated that "Delays and Cost overruns in infrastructure Project: An Enquiry into Extents, Cause and Cures" Ram Singh say media reports proliferate on cases of delayed postponements and unreasonable cost overruns in foundation ventures. Just few ventures get conveyed in time and inside the financial plan. Cases of successful on undertaking usage, like development of the Delhi Metro Rail are few and seem just far in the middle. In fact, the issue of time and cost overruns in India is across the board and extreme. However, not very many observational examinations exist regarding the matter. Indeed, even rarer are the investigations in view of finished ventures. Subsequently, the degrees and the causes behind postponements and cost invades have different issues identified with deferrals and costs overwhelms in publicly supported infrastructure projects.(Katre, 2016)

Apart from that, cost overrun can be characterized as the expansion balanced deviation amongst acknowledged and evaluated cost, may give some data about the nature of the choice to attempt the task being referred to. The finding that transitional cost invades tend to increment as the basic gauge vulnerability falls appears to be incongruent with arbitrary mistake and may be more in accordance with lacking endeavours to refresh costs or with vital distortion. (Oglend, n.d.)

2.5.2 Causes That Lead to Cost Overruns

In a research, (Ubani, Okorochoa, & Emeribe, 2013)examined a few factors that impact cost overrun of development tasks, for example, lacking undertaking arranging, delay in development change in extent of the venture, arranging and usage, supple of crude materials and gear by contractual workers, asset requirement: control, reserves, related helpers, outside exchange not prepared and delay in basic leadership by government, disappointment of particular organizing bodies.

Causes of cost overruns is the change orders are generally due to factors such as design, unexpected site conditions, increase in project scope, weather conditions, and other project changes. Besides that, factors of cost overruns change orders in are the developed regression models may be used to estimate the extent of future cost overruns, time delay of any future project given its project characteristics and any available contract details. (Shete & Kothawade, 2016)

Some cost increases had been stated as being unavoidable because of changes within the fitness provider's statutory necessities, building guidelines and a new liability for tax however different increases might have been avoided. these consists of increase due to freeze layout, huge design adjustments, delay to the constructing works, a large variety of disputes and claims and the insolvency of principal works package contractors.

Lack of management systems and lack of ability to prevent cost increment leads to need of effective cost management system and cost control system. To avoid this problem, the important steps are to identify and understand the causes and factors responsible for this and perhaps we can devise a contingency plan in order to alleviate and curb these risks. (Memon, Rahman, Asmi, & Azis, 2011)

The factors that cause overruns in construction of ground water projects and found that according to the contractors and consultants, monthly payments difficulties was the most important cost overrun factor, while owners ranked poor contractor management as the most important factor. Besides that, material procurement, poor technical performances, and escalation of material prices are also the factors that affect the cost overruns. (Memon et al., 2011)

The study shows that cost overruns increase in the construction of private residential projects and found out that cost increase was greater than the total cost. A major factor contributing to the cost overruns was the inadequacy of money and time allocated to the design phase. Moreover, the material related problems and again owner's financial constraints, inadequate planning, unpredictable weather conditions and fluctuations in the cost of building materials in Kuwait. (Memon et al., 2011)

In Malaysia, the factor that affects the cost overruns is the contractor's poor management and supervision. Inadequate contractors experience shortage of site workers, incorrect planning and scheduling by contractor and frequent design changes with change in the scope of the project were more significant factors affecting construction cost. This leads to increment of cost of the project (Memon et al., 2011)

(Peeters & Madauss, 2008) stated that the biggest factor that contributes to overruns of budget is inaccurate estimation of original or initial cost of a project. It is because of technical problems on how to estimate project costs and also not enough project information in the early stage of project which results in the cost increment of the project.

Seven principal factors were the slowness and lack of constraint, incompetence, design, market and estimate, financial capability, government and workers. These was compared the causes of construction time and cost overruns in Asia and Africa by (Le-Hoai, Lee, & Lee, 2008)

Besides that, corruption and bribery, political interests, poor site management, delay in site mobilization, rigid attitude by consultants, extra work without approvals and frequent changes during execution are the mostly happened to the cost performance in Pakistan. (Nawaz, Shareef, & Ikram, 2013)

Meanwhile, (Rosenfeld, 2014) undertook a root analysis of construction-cost overruns and identified 15 universal root causes such as premature tender documents, too many changes in owner's requirement and unrealistic tender prices were featured.

Housing project projects in the Klang Valley which were completed in 2000 to 2009 with a contract value of more than RM5 million are indicating that there is a most serious factor and contributes to surplus costs due to an inaccurate cost estimation problem. In addition, the most significant impact is the mistake of designing a project. (A.S.Ali & S.N.Kamaruzzaman, 2010)

2.6 Project Delay

2.6.1 Definition of Project Delay

Delay can be defined as time overrun of extension of time to complete the project. Construction delay is something that cannot avoided especially in government

agencies in Malaysia. The delay is a situation when the actual progress of a construction project is slower than the planned schedule or late completion of the projects.

Delay is one of the major problems in the construction project. Time overrun either beyond date specified in a contract are called construction delays. In other words, the delays exceed initial time and cost estimates. (Owalabi et al., 2014)

Delays caused by the client such as late submission of drawings and specifications, continuous change of orders and incorrect site information generates claims from both the main contractors and sub-contractors which many times entail lengthy court battles with huge financial problems. Delays caused by contractors can generally be concluded to poor managerial skills. Lack of planning and a poor understanding of accounting and financial principles have led to many a contractor's downfall. (Prakash Rao, June 2014)

(Abdullah, Rahman, & Azis, 2010) has made a survey of on delay on Majlis Amanah Rakyat (MARA) one of government agencies in Malaysia. MARA management procurement construction project phenomenal issues of delayed has been argument for a long time. Eighteen causes have been identified. The respondents are person who work as consultants such as executive, resident engineers, and clerk of work and client, MARA itself consists of directors, project officers and engineers. The studies has conclude that cash flow and financial difficulties faced by contractors, contractors' poor site management and ineffective planning and scheduling by contractors are the main cause of the delay.

Delay can be defined as time overrun of extension of time to complete the project. Construction delay is something that cannot avoided especially in government agencies in Malaysia. The delay is a situation when the actual progress of a construction project is slower than the planned schedule or late completion of the projects. (Hamzah, Khoiry, Arshad, Tawil, & Che Ani, 2011)

Delays happen in most construction projects, whether simple or complex. Construction delay could be defined as the time overrun either beyond the contract date

or beyond the date that the parties agreed upon for delivery of a project. (Sweis, Sweis, Abu Hammad, & Shboul, 2008)

Delays can be taken to be "incident" that effect an undertaking's advancement and delay project activities. Project that postponements might be caused by awful climate, inaccessibility of assets, outline or design delays and so on. As a rule, project defers result from activities that have both outer and interior circumstances and end results connections (Al-najjar, 2008). Cost overrun is the excess of actual cost over budget.

2.6.2 Causes That Lead to Project Delay

According to (VYAS, 2013), he identified that the causes of delay in mega construction projects. The main cause of delay where related to design, user changes, weather, sitecondition, late deliveries, economic condition and increasein quantity. The study suggested special factors will helpindustry practitioners in minimizing contract disputes.Delay has strong relationship with failure in ineffectiveperformance of contractors.

Besides, factors affecting construction are heavy rains and floods have the most significant role in delays in construction projects compared to other factors such as customer failure. (Kaliba, Muya, & Mumba, 2009)

(Odeh & Battaineh) studied the causes of construction delays in traditional contracts in Jordon, using a questionnaire survey. The study illustrated that contractors felt labour productivity to be the most important delay factor. However, inadequate contractor experience was the most important delay factor to consultants. All parties generally agreed on the ranking of the individual delay factor. They agreed that inadequate contractor experience, owner interference and financing or work were among the top five most important factors (Adnan Enshassi, Jomah Al-Najjar, Mohan Kumaraswamy, Vol 14 No 2, 2009)

In Malaysia a study of delay factors and their impacts on construction projects completion in the Malaysian construction industry was carried out by (Sambasivan

&Soon). Their result showed a list of 28 different causes. Amongst these causes were; contractor improper planning, contractor poor site management, shortage of material, inadequate labour supply, equipment unavailability and failure, lack of communication amongst project participants and mistakes during the construction projects. There are many causes and might differ from country to country and from circumstances to circumstances.

(Ogunlana et al) reported that were distinct problems that caused delays in the construction industry of Nigeria. Three factors were classified into 3 groups namely; firstly problems of shortages or inadequacies in industry infrastructure which are mostly supply of resources, secondly problems caused by clients and consultants and thirdly problems caused by contractor's incompetence or knowledge and experience deficiencies.

Delays are evidently frequent problems in the construction industries of many developed and developing countries. The factors leading to time overruns (delays) in construction project in the Gaza Strip. Additional special contributors to delays here, the relative perceptions of contractors, consultant and owners, resulting in short term and long term delays due to unforeseen risks. The lack of materials in markets, and delays in materials delivery to the site also contribute to the cost increment of the project and delays the project's flow. (Enshassi, Al-Najjar, & Kumaraswamy, 2009)

Financial difficulties faced by the contractor were considered to be the first and most frequent causes of delay in building projects in Jordan from the viewpoint of the contractor and second most important the owner and the consultant. Most Jordanian residential contractors are independent, small in size to underbidding rivals to win contracts. Besides that, the contractor has little access to credit facilities. The cause above will affect the cash flow problems later. Moreover, the contractor indirectly blames of the financial difficulties on the owner. (Sweis et al., 2008)

Poor planning and scheduling of the project by the contractor and both the owner and the consultant is major delay cause of projects. Other causes that lead to project delay is the shortage of technical professions in the contractor's organization,

insufficient coordination among the parties by the contractor and ineffective quality control by the contractor. These show that all party must participate and try to communicate and resolve any disputes in construction phase to make the project run smoothly without any mistake due to the changes of orders in construction industry. (Sweis et al., 2008)

“Causes and Effects of delay in Iranian Construction Projects”, the survey was conducted to identify the causes and a questionnaire with 28 causes and 6 effects for delays are taken for this investigations. The ten major factors which affected the time take for construction by client, consultants and contractors are revealed. (Pourrostan & Ismail, 2012)

(Kaliba et al., 2009) mentioned that contractors, consultants and clients should ensure that they have the right personnel with appropriate qualifications to manage their projects efficiently. It is better if construction manager have experience and qualifications in project or construction management in order to anticipate the incoming problems and risks that might happen during the construction phase.

The actual site conditions of a project are not usually determined until excavation is completed. It is sometimes possible that site conditions are overlooked. When the initial review of site is ongoing, conditions have changed due to change of weather conditions or sub-soil conditions. The unexpected conditions on sub surface sometimes require fundamental redesign or project with high expense and time taken is increasing. Changes of site conditions become a problem for machinery and supplies to move in and out of the site. (A.S.Ali & S.N.Kamaruzzaman, 2010)

In addition, researchers have recognized that factors of influencing project time-line delays are delay in payments, long financial process, form of contract irregulars and ambiguities, economics problems, material procurement equipment unavailability, poor supervision, construction mistakes and poor coordination on site. Each factor have their significant roles in time overruns in construction projects.

One that has contributed to delays in major construction projects is economic and political instability. (Trembath, 2015) In Iran, in particular the 'foreign supply chain' is a negative impact on construction projects. First, excavation equipment must be imported from abroad, where 'restrictions' deteriorate in civil engineering. Second, economic instability leads to fluctuations in the local exchange rate. This is because unstable currencies compare with international currencies. Hence, the price of the plant will increase substantially from the predetermined price estimate. This is one reason or factor affecting the main delay and the negative impact on a construction.

2.7 Suggested Solutions

In order to overcome this never-ending issue, there are a few suggestions on the steps or ways to help in the effort of reducing or minimizing the causes that will lead to the issue of project delay and cost overruns.

(Peeters & Madauss, 2008) found out some approach to avoid cost overruns. In any development project, there must be contain certain amount of risk. Therefore, a risk management function needed to be performed by project manager to determine and reduce the risk of the particular project. The aim of risk management is to minimize any risk that might result failure to meet the project requirement.

To get the effective cost planning relates the design of facilities to their cost, need the full account of quality, risks, likely scope changes, utility and appearance, the cost of a project is planned to be within the economic limit of expenditure that noted by (Dominic & Smith, 2014).

CHAPTER 3

METHODOLOGY

3.1 Introduction

This chapter discussed about the methodology of the research. Methodology is the explanation of the steps during the case study or survey being conducted. This explanation of methodology is more systematic and in the theoretical analysis. It is important to provide better understanding about the research process. Appropriate research design and research methodology will assist to achieve the objective of the study and to generate information. Every measure taken must be appropriate and relevant to the related topic of study. Three approaches have been throughout this study to gather reliable and relevant data. The approaches are literature reviews, handling out of questionnaire and reviewing the effective strategic formulation method.

3.2 Flow Process

Figure 3.1 represent the flow process of methodology for this study.

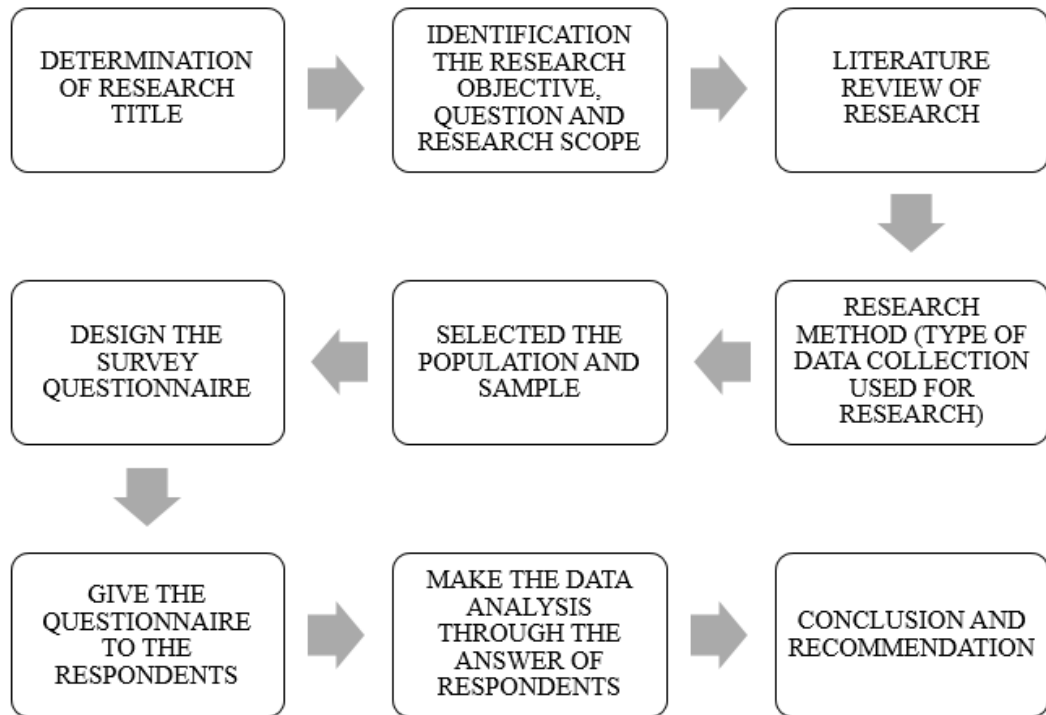


Figure 3.1 Flow Process of Methodology

3.3 Study Area

This study will be focusing on the construction companies which are located around the area of Peninsular Malaysia. Survey was conducted among the construction companies that were registered with CIDB Malaysia and had experience in handling a megaproject within the Peninsular Malaysia before. The findings of this study could help in improving or instilling the awareness among all the parties involved and contributes to the image of construction industry especially in Peninsular Malaysia.



Figure 3.2 The Region of Peninsular Malaysia

3.4 Data Collection

The target population included civil engineering and buildings construction firms in Peninsular Malaysia. The consultants, contractors, project managers and developers of various organization companies are being targeted for this study. The details of various stakeholders and total numbers of were collected through internet. These details were considered as size of population to decide sample size of study. Questionnaires will be distributed and the analysis of these questionnaires will help in calculating the Relative Importance Index for each causes. The data will be collected to determine the most influential causes on the project delay and cost overrun by explorative questionnaire to the respondents involved in daily activities of construction firms in various regions in the Peninsular Malaysia. The questionnaire is designed so that respondents can give the rank to their answers based on their opinions. The analysis of these data was done by a method named relative importance index (RII) method.

3.5 Questionnaire Design

The causes and the solutions of cost overrun and project delay in megaprojects were first reviewed and identified through any pertinent or relevant literature review and by conducting a survey on finding the most significant causes which may lead to the occurrence of this issue by seeking opinions or views from experienced construction practitioners in the province. The questionnaire was divided into several sections which are Section A, Section B and Section C. For the Section A of the questionnaire, it addressed general information related to the respondents in order to analyze data in relation to construction megaproject in Malaysia. The general information in Section A consists of respondent background, type of organization, the position of the respondent, working experience, range of size of the project and also whether the respondent has an experience regarding the issues cost overrun and project delay before.

Section B and Section C in the questionnaire was about the data collection pertaining specific features of the projects that were identified as having potential affecting the cost variance or the delay of the project. Section B extracted responses regarding the causes that lead to the issue of cost overrun. Other than that, Section C was basically concerned on the causes that lead to the issue of project delay in megaproject of Peninsular Malaysia. Both sections were at various key stakeholders in construction project which are contractor, consultants, client and government. The causes included in this section are the top 10 most significant causes that had been highlighted during the initial study for this research. A 5-point Likert Scale from the range 1 to 5 (extremely agree to extremely not agree) option was applied in both sections.

3.6 Data Analysis

The raw data of the questionnaire was gathered from the structured questionnaire survey that was carried out within the construction practitioners in the industry. The general information of the respondents was collected in the Section A of the questionnaire. For Section B and Section C, the data of the causes influencing the cost overrun and project delay of the megaproject was identified and examined. Hence, the importance index was used to rank the most significant causes of both the major issues of this study which are cost overrun and project delay of the megaprojects. The data gathered from the questionnaire survey was then analysed descriptively through a hierarchal assessment of the causes of cost overrun and project delay related to megaprojects and also the correlation between the causes.

3.7 Method of Analysis

The hierarchal assessment of the causes of cost overrun and project delay were carried out by studying the ranking of the most significant causes. The hierarchal assessment was examined and analysed based on Relative Important Index (RII) value.

Relative Importance Index Method

Relative Importance Index Method is used to determine the relative importance of the various causes of cost overrun and project delays. The same method is going to be adopted in this study within various groups such as contractors, project engineers, owner and site supervisor. The five-point scale ranged from 1 (very little degree affect) to 5 (very high degree affect) is adopted and transformed to relative importance indices (RII) for each factor as follows:

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Introduction

This chapter discussed about the results and discussion of the questionnaire survey of the study which concerning the causes which lead to the most discussing and worrisome issue in the field of construction industry which are cost overrun and also project delay. Besides, this chapter also focusing on describing the respondent's attributes or features in addition to the discussion of the causes that influencing the cost overrun and project delay of the megaproject in Peninsular Malaysia. The questionnaire was divided into three sections which are Section A, Section B and Section C. Section A was dominantly delineated in order to impart the general information about the respondents which includes the type of organization, the position of the respondent, working experience, the project size and also whether the respondent has experience the issue of cost overrun and project delay while handling any of the megaprojects in Peninsular Malaysia. Other than that, Section B and Section C were designed to get information on the most significant and influenced causes which might lead to cost overrun and project delay during the construction of megaproject in Peninsular Malaysia respectively. Moreover, a few possible solutions were also suggested by the construction players as the initiative to overcome or reducing the occurrence of these issues.

4.2 Mode of Data Collection

For this study, the mode used for the data collection is using questionnaires. Questionnaires are stand-alone instruments of data collection that will be managed or directed to the sample subjects either through mail, phone or online. The option of mode is conducted by the extent to which each has differential administrative and resource burdens. These comprise the financial costs of executing the survey in each mode and the time taken to complete fieldwork. The most commonly used modes of data collection in this study was that the data was collected through email and online (Google Docs) where the questionnaires were emailed or distributed by link to some of the chosen construction company that have an experience in handling mega projects within the Peninsular Malaysia. Then, the data were analysed by using Microsoft Excel software.

4.3 Response Rate

During the completion of this survey, there are 80 questionnaires were distributed to a varying construction companies to the targeted respondents. The questionnaires were completed by knowledgeable and skilled consultants, contractors, engineers and project managers based around Peninsular Malaysia. From the 80 questionnaires distributed, 63 responses have been received. The rate of responses of this survey was 78.75%. The response rate will be clarified more vivid and detailed in the following Table 4.3 and Figure 4.3 below.

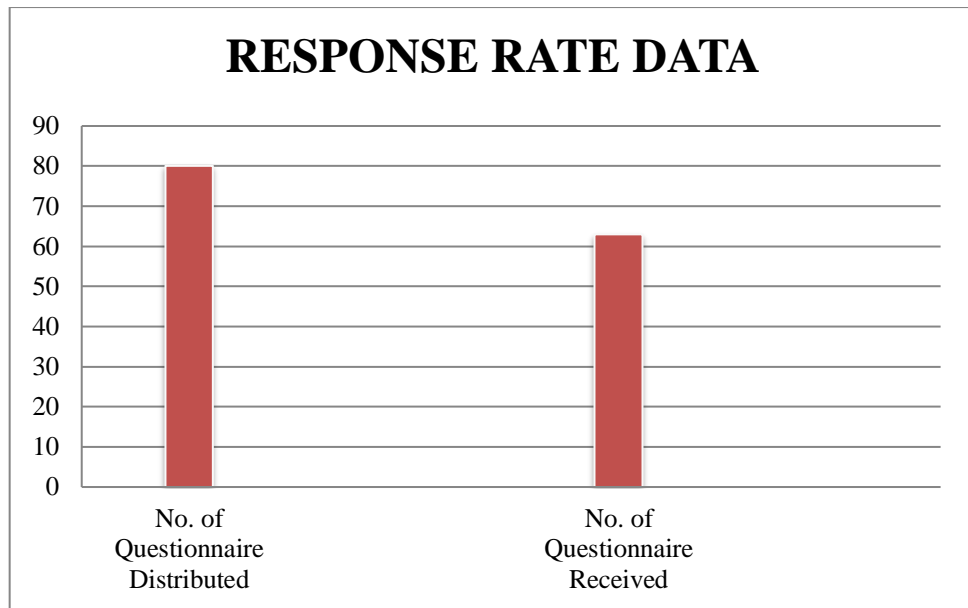


Figure 4.3 Response Rate Data

Description	Count
No. of Questionnaire Distributed	80
No. of Response Received	63
Response Rate (%)	78.75

Table 4.3 Response Rate Data

4.4 Section A: General Information

Section A part of the questionnaire is dominantly designed to impart the general information of the respondents. This is because the questionnaires were distributed from various or different types of background and competence. Based on the survey conducted, it was noticeable that most of the respondents that took part or engaged in this survey had several years of experience in handling different types of mega construction projects. This is in order to show that whether the respondents were competent enough and capable to participating in the survey. The characteristics of the respondents participated in this survey are visualized in Table 4.4.1, Table 4.4.2, Table 4.4.3, Table 4.4.4 and Table 4.4.5.

4.4.1 Type of Organization

The background or organization of the respondents working with was examined in this survey through a demographic question which has been provided in Section A of the questionnaire. Almost half of the respondents participated in this survey which is 46 percent (29) of them were working with the contractor organization. Besides, there were about 39.7 percent (25) of the respondents were from consultant organization and followed by the government organization with 12.7 percent (8). The least respondent organization is the client with 1.6 percent which only one respondent came from the client organization. The summarized data of the type of organization of respondent is summarized in Table 4.4.1 and Figure 4.4.1.

Item	Frequency	Age (%)	Cumulative (%)
Government	8	12.7	12.7
Client	1	1.6	14.4
Consultant	25	39.7	54.1
Contractor	29	46	100
Total	63	100	-

Table 4.4.1 Type of Organization of Respondent

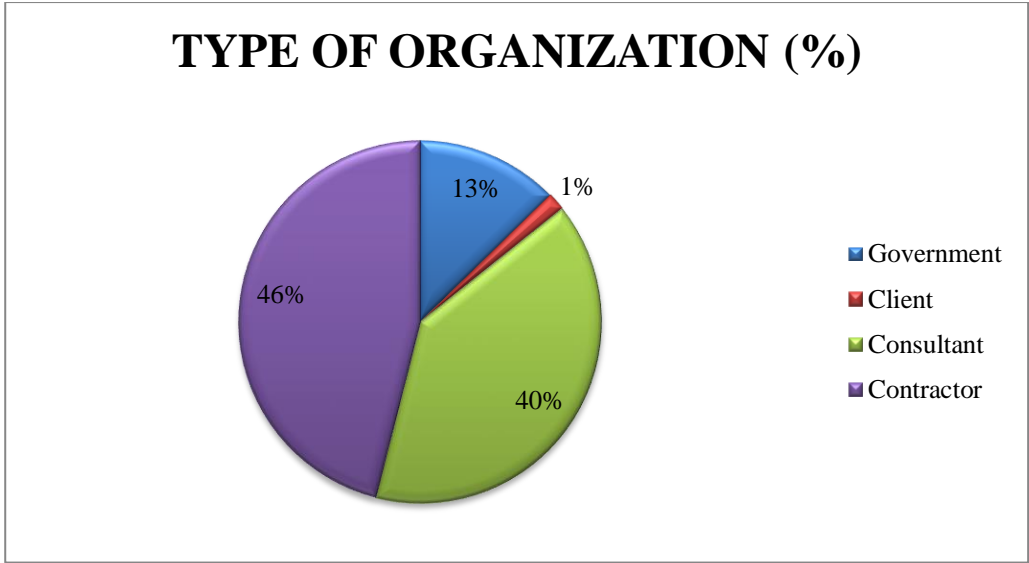


Figure 4.4.1 Percentage of Respondents' Type of Organization

4.4.2 Position of Respondent

From the survey conducted, the position of the respondent was executed by a question in the Section A part of the questionnaire. A total percentage of 47.6 (30) as the main position of the respondent that participated in this survey were dominated by the project manager. Other than that, contractor with 30.2 percent which was 19 of the respondent and then followed by the engineer position which has the least number among the respondent which was 22.2 percent with 14 counts of the number of respondents. The data of the position of the respondents in the organization have been summarized in as follows.

Item	Frequency	Age (%)	Cumulative (%)
Engineer	14	22.2	22.2
Project Manager	30	47.6	69.8
Contractor	19	30.2	100
Others	-	-	-
Total	63	100	-

Table 4.4.2 Position of Respondent in Organization

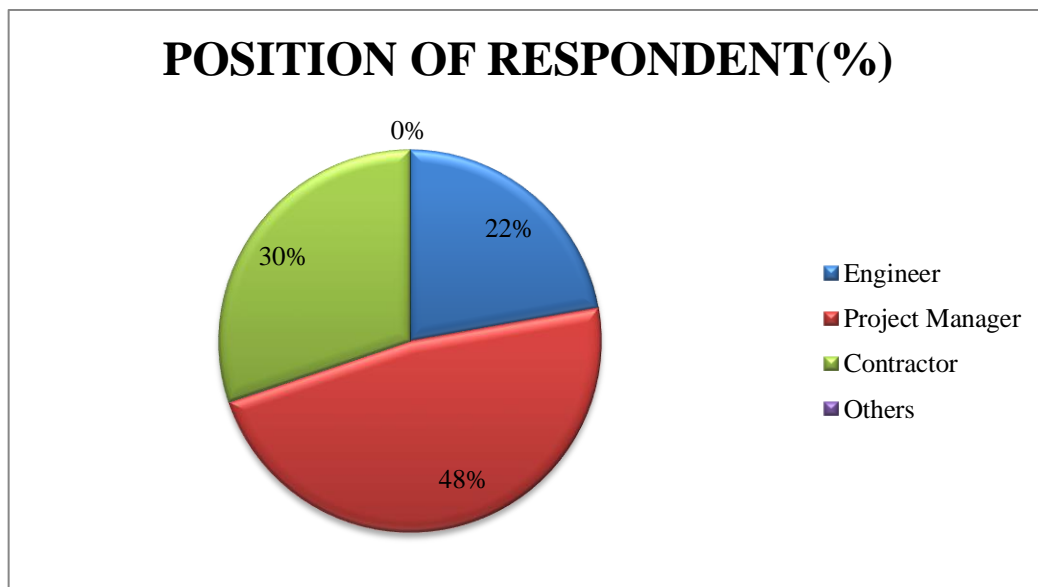


Figure 4.4.2 Percentage of Respondent Position

4.4.3 Working Experience of Respondent

From this study, the working experience of the respondent was also being as one of the demographic characteristic of the respondent. It could be identified that most of the respondent which was the total number of 33.3 percent (21) respondent has the working experience of 11 to 15 years in handling the mega construction project followed by the respondent with 6 to 10 years working experience with 25.4 percent (16). Then, there was 22.2 percent with 14 number of respondent has a working experience of 1 to 5 years followed by respondent with 16 years and above working experience with 10 number of respondent which was 15.9 percent. The least range of the respondent working experience was 3.2 percent (2) which was respondent with less than one year experience. The data of the relevant working experience of respondent have been summarized in as follows.

Item	Frequency	Age (%)	Cumulative (%)
Less than 1 year	2	3.2	3.2
1 - 5 years	14	22.2	25.4
6 - 10 years	16	25.4	50.8
11 – 15 years	21	33.3	84.1
16 years above	10	15.9	100
Total	63	100	-

Table 4.4.3 Working Experience of Respondent

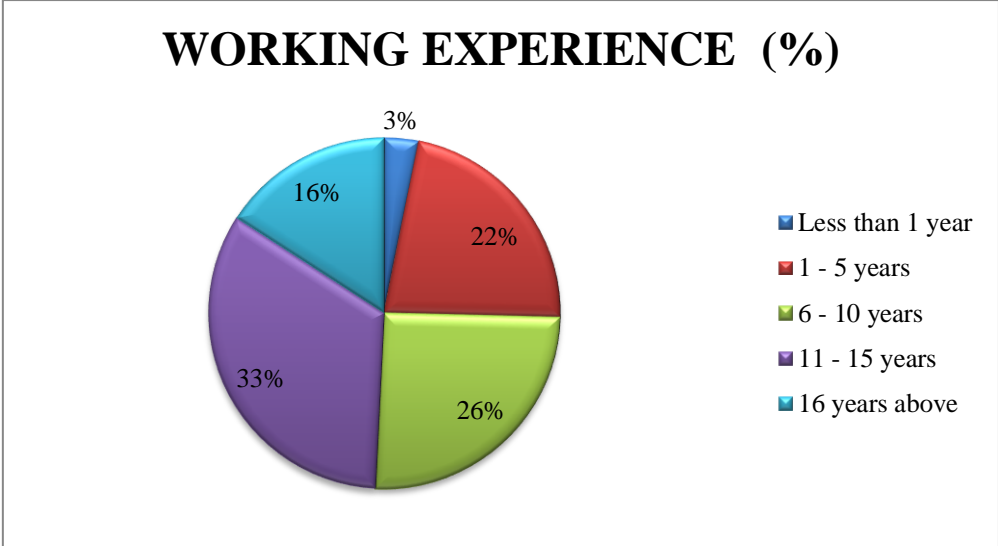


Figure 4.4.3 Percentage of Respondent Working Experience

4.4.4 Cost Overrun and Project Delay Experience

From the survey, a question in the Section A part of the questionnaire had found about the cost overrun and project delay experience faced by the respondents. A total percentage of 90.5 which is 57 of the respondents had chosen “Yes” as their answer and “No” for the remaining 9.5 percent (6) of the respondents. Other than that, none of the respondents chose the option “Maybe” had chosen as their answer. This portrays that most of the respondents were qualified to answer this questionnaire as most of them had experienced the issue of project delay and cost overrun during the handling of the mega projects. The data of the cost overrun and project delay experience by the respondent have been summarized in as follows.

Item	Frequency	Age (%)	Cumulative (%)
Yes	57	90.5	90.5
Never	6	9.5	100
Maybe	0	0	100
Total	63	100	-

Table 4.4.4 Respondent experience regarding the issues

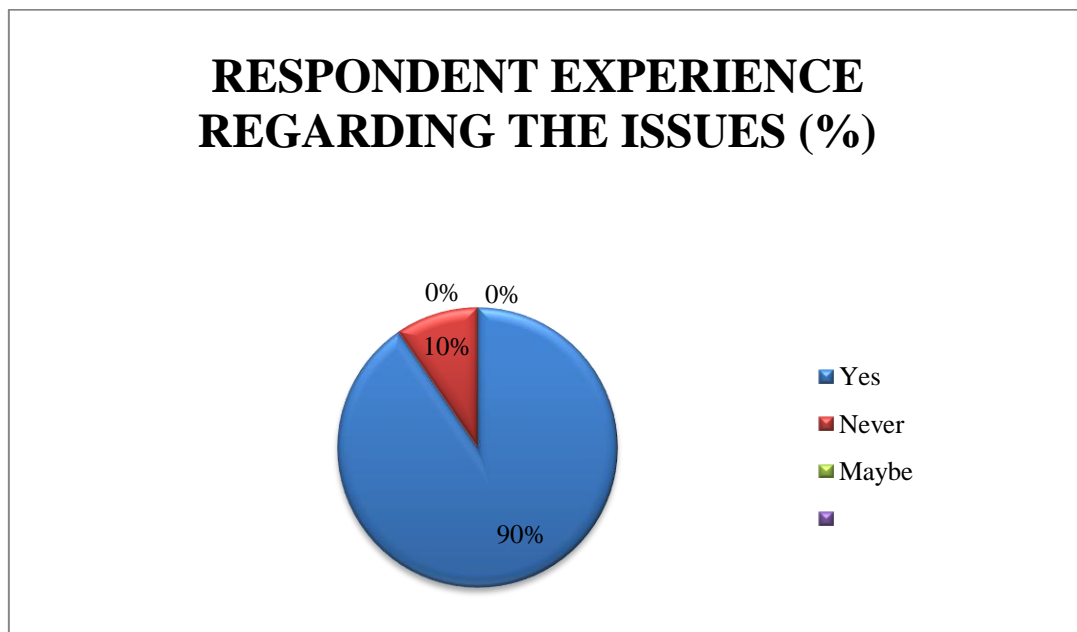


Figure 4.4.4 Percentage of the respondent experience to the issue

4.4.5 Size Range of Project

Based on this survey, the size range of the project handled by the respondent was executed by a question in the Section A part of the questionnaire. This is a crucial part as the objective of this study is on the mega construction project. Hence, the projects that not meet the minimum cost of megaproject will be considered as invalid. A total percentage of 98 with 62 numbers of respondents had chosen the size of project which is more than 4 billion and it did meet the criteria of a mega construction project. In conclusion, all the response received from the respondents was valid. The data of the size range of project handled by respondent have been summarized in as follows.

Item	Frequency	Age (%)	Cumulative (%)
101 – 500 million	0	0	0
501 - 999 million	0	0	0
1 – 3 billion	1	2	2
More than 4 billion	62	98	100
Total	63	100	-

Table 4.4.5 Size of project handled by respondent

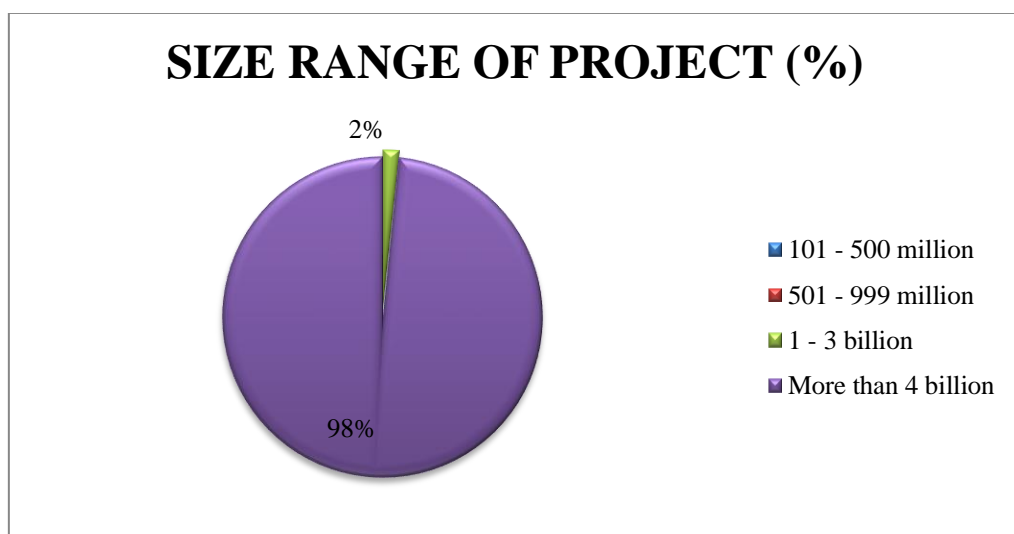


Figure 4.4.5 Percentage of the size of project handled by respondent

4.5 Section B: Causes Influencing Project Delay

This part will portray the results and discussion of the causes that influencing the project delay of the mega construction project industry in Peninsular Malaysia. This survey was conducted to fulfil the aims or objectives of this study that were created at the beginning of the study thesis which are to study the causes of the project delay and cost overruns in megaprojects in Peninsular Malaysia, to identify which party in the construction organization plays the most vital role that can lead to the issue of project delay and cost overruns and also to analyse the major cause of project delay and cost overrun in megaprojects in Peninsular Malaysia. Section B of the questionnaire consists of a total number of 10 most significant causes which had been shortlisted during the preliminarily study of this research. The causes consist of the responsibility from different role of the construction players. The data obtained from this section were analysed by using Relative Important Index (RII) method. The RII was used to rank the different causes. The RII is then beingclassified based on the RII classification table as shown in Table 4.5.

Scale	Level of Significant	RII
1	Not significant at all	$0.0 \leq RII \leq 0.2$
2	Slightly significant	$0.2 < RII \leq 0.4$
3	Moderately significant	$0.4 < RII \leq 0.6$
4	Significant	$0.6 < RII \leq 0.8$
5	Most significant	$0.8 < RII \leq 1.0$

Table 4.5 Classification of RII

The value acquired from the method of Relative Importance Index (RII) formula will evaluated the significant of each cause and thus the causes can be ranked based on the RII value obtained. Literally, the value that close to 1 can be categorized as more significant cause that will influence the issue of project delay in mega construction project compared to the lower value of RII which was close to 0.

Table 4.5.1 Overall result of the causes influencing the project delay in mega construction project in Peninsular Malaysia

Causes of Project Delay	Rate					Relative Importance Index (RII)	Rank	Group
	1	2	3	4	5			
Mistakes during construction	0	0	12	37	14	0.82	1	Contractor
Delay in progress payment	0	0	12	35	16	0.81	2	Client
Financial difficulties	0	0	11	38	14	0.80	3	Contractor
Ineffective planning and scheduling	0	3	15	31	14	0.78	4	Contractor
Frequent change orders during construction	0	3	8	45	7	0.78	5	Client
Delay in performing inspection and testing	1	3	15	30	14	0.77	6	Consultant
Late in reviewing and approving design documents	1	9	20	25	8	0.70	7	Client
Inflexibility of consultant	2	5	26	24	6	0.69	8	Consultant
Inadequate experience of consultant	3	10	17	26	7	0.68	9	Consultant
Poor qualification of the contractor's technical staff	1	11	21	22	8	0.67	10	Contractor

4.5.2 Causes Influenced by Client

Table 4.5.2 Rank of causes related to client

Causes	RII	Percentage (%)	Rank
Delay in progress payment	0.81	35.37	1
Frequent change orders during construction	0.78	34.06	2
Late in reviewing and approving design documents	0.70	30.57	3
AVERAGE	0.76	100%	Significant

Table 4.5.2 portrays that the respondents ranked the delay in progress payment from the client as the most influencing or significant cause with relative importance index value which were close to 1. This issue is commonly happened in the mega construction industry. Delay in paying construction contractors has impacted negatively on the effectiveness of the contractor and as such affect project delivery schedule. Failure to pay contractors for work executed might lead to the contracting firm being insolvent. This research is a form of quantitative research and it a cross-sectional research survey which is a combination of descriptive and explanatory research design. Moreover, the impact of delayed payment is delay in project progress which affects the schedule of work and leads to cost overrun and extension of time. In the nutshell, clients should seek co-investors for support on financial commitment. It was recommended that the stakeholders should work as a team in the execution of project to avoid bottlenecks usually encountered in agreeing contractors' payment. The causes were then followed by the frequent change orders during construction at the second rank and late in approving and reviewing design document by the client was ranked last with the relative importance index value of 0.78 and 0.70 respectively.

4.5.3 Causes Influenced by Contractor

Table 4.5.3 Rank of cause related to contractor

Causes	RII	Percentage (%)	Rank
Financial difficulties	0.80	26.14	2
Mistakes during construction	0.81	26.47	1
Poor qualification of the contractor's technical staff	0.67	21.90	4
Ineffective planning and scheduling	0.78	25.49	3
AVERAGE	0.78	100%	Significant

Table 4.5.3 depicts that the mistakes during construction made by the contractors was ranked first by the respondents with 0.81 and close to 1. This was then followed by the financial difficulties faced by contractor was placed in the second rank with 0.80 relative importance index value. There was only a slight difference between these two causes which shows that these causes related to contractor were really worrisome. From the study of previous researchers, it was noticeable that contractor of mega construction projects were usually tends to do mistakes during construction stage or in preliminary stage such as soil investigation. These problems were usually happened to contractor that is still new in handling a mega construction project. Based on the article written by Greg Fry, the most common contractor mistakes include overestimating or underestimating cost and time of the project, hiring incompetent sub-contractors and also not scheduling the regular safety trainings. Besides, other causes consisted were ineffective planning and scheduling and poor qualification of the contractor's technical staff.

4.5.4 Causes Influenced by Consultant

Table 4.5.4 Rank of cause related to consultant

Causes	RII	Percentage (%)	Rank
Delay in performing inspection and testing	0.77	35.98	1
Inadequate experience of consultant	0.68	31.78	3
Inflexibility (rigidity) of consultant	0.69	32.24	2
AVERAGE	0.71	100%	Significant

Table 4.5.4 shows that the respondents had chosen the delay in performing inspection and testing as the top rank of the causes of delays of mega construction projects in Peninsular Malaysia related to the responsibility of consultant with relative importance index value of 0.77 which is the most closeto 1. It was knowable that certain aspects of megaprojects require inspection and testing before further activities could be conducted. Usually, consultants and clients' staffs were tasked with the responsibility of coordinating such exercises. Delays in these impede project progress hence it will lead to the issue of project delay. However, over inspection could be another issue too. Inspectors or consultants are required to track the work performance of the project through periodical monitoring. This is because too frequent inspection will become a distraction to the contractors, and hence could affect the contractors' progress. Other than that, the inflexibility or the rigidity of the consultant was ranked second in the list followed by inadequate experience of consultant in handling mega construction project with the relative importance index values of 0.69 and 0.68 respectively.

4.5.5 Major Party Influencing Project Delay

Table 4.5.5 Rank of Party Influencing Project Delay

Role	Average RII	Rank
Contractor	0.78	1
Client	0.76	2
Consultant	0.71	3

Table 4.5.5 delineates the summarized data or results of the three major stakeholders which are client, contractor and consultant. In order to meet one of the objectives that has been created in the beginning of this study, the total value of relative importance index values of each causes related to the party was calculated to get the average and the value of average RII which is close 1 depicts that it is the most significant role that has the biggest and most impactful influence to the issue of the project delay in the construction of mega projects in Peninsular Malaysia. Based on the table above, it can be concluded that the contractor was in the top rank of the list with 0.78 average value of relative importance index followed by the client and consultant which has the average relative importance index value of 0.76 and 0.71 respectively. To summarized, it can be said that the major or the most impactful role that will affect the project delay issue in the mega construction industry is the contractor.

4.6 Section C: Causes Influencing Cost Overrun

This part of the questionnaire consists of results and discussions of the causes that influencing the cost overrun of the mega construction project industry in Peninsular Malaysia. This survey was carried out to meet the aims or objectives of this study that were identified at the beginning of the study thesis which are to study the causes of the project delay and cost overruns in megaprojects in Peninsular Malaysia, to identify which aspect in the construction gives the most vital impact that can lead to the issue of cost overruns and also to analyse the major cause of cost overrun in megaprojects in Peninsular Malaysia. Section C of the questionnaire consists of a total number of 10 most significant causes influencing cost overrun of the megaproject in Peninsular Malaysia which had been shortlisted during the preliminarily study of this research. Like Section B, the causes listed consist of the responsibility from different role of the construction players. The data obtained from this section were analysed by using Relative Important Index (RII) method and classified as section 4.5.

Table 4.6 Overall result of the causes influencing the cost overrun in mega construction project in Peninsular Malaysia

Causes of Cost Overrun	Rate					Relative Importance Index (RII)	Rank	Group/Aspect
	1	2	3	4	5			
Schedule delay	0	0	8	30	25	0.85	1	Site Management
Inaccurate time and cost estimated	0	0	3	44	16	0.84	2	Site Management
Inadequate monitoring and controlling	0	2	5	37	19	0.83	3	Site Management
Cash flow and financial difficulties by contractors	0	2	7	43	11	0.80	4	Financial Management
Poor financial control on site	0	2	5	44	11	0.79	5	Financial Management
Mistakes and Errors in design	11	4	12	37	9	0.79	6	Design and Documentation
Frequent design changes	0	1	17	33	12	0.78	7	Design and Documentation
Incompetent sub-contractor	0	6	14	30	13	0.76	8	Site Management
High cost of labor payment	1	3	14	37	8	0.75	9	Financial Management
Delay Preparation and approval of drawings	4	5	23	27	4	0.67	10	Design and Documentation

4.6.1 Causes Influenced by Site Management

Table 4.6.1 Rank of cause related to site management

Causes	RII	Percentage (%)	Rank
Inadequate scheduling and monitoring	0.83	25.30	3
Incompetent sub-contractor	0.76	23.17	4
Schedule delay	0.85	25.91	1
Inaccurate time and cost estimated	0.84	25.61	2
AVERAGE	0.82	100%	Most Significant

Table 4.6.1 portrays that the respondents has chosen schedule delay as the most influencing cause that will lead to the issue of cost overrun in the construction of mega projects in the aspect of site management. This is because the value of the relative importance index is the closest to 1 which is 0.85. This is followed by inaccurate time and cost estimated which ranked as second in the list with 0.84 value of RII. There is only a slightly difference between those causes. Projects are usually having administrators, office workers, supervisors and other overhead costs such as insurance and equipment rental that will keep accumulating as long as the project is not finished. When delay occurs, the total overhead costs will tend to increase. When a project faces a significant delay in the completion date, the overhead can be reduced by decreasing staff and reducing the costs caused by elements that are not needed. The final, delayed leg of the project has to be analysed and ensure that the project organization only keeps what is required for the last section.

4.6.2 Causes Influenced by Financial Management

Table 4.6.2 Rank of cause related to financial management

Causes	RII	Percentage (%)	Rank
High cost of labour payment	0.75	32.05	3
Cash flow and financial difficulties	0.80	34.19	1
Poor financial control on site	0.79	33.76	2
AVERAGE	0.78	100%	Significant

Table 4.6.2 depicts the ranking of the causes influencing the cost overrun of the mega projects in Peninsular Malaysia in the aspect of financial management. The table above also outlines that the cash flow and financial difficulties was chosen by the respondents as the most significant cause with relative importance index of 0.80 and close to 1. The commonly happen situation in the field of mega construction industry were that funds not adequately released during relevant phases of projects' execution. Milestones payments are not made on time due to organizational lapses or bureaucracy. Moreover, inadequate cash flow leads to delay in delivery of materials and equipment to the site and delay in payment of workers' salaries which also can affect the performance and the progress of works. The delay in the project will automatically leads to the issue of cost overrun of certain projects. Other causes include poor financial control on site and high cost of labour payment.

4.6.3 Causes Influenced by Design and Documentation

Table 4.6.3 Rank of cause related to design and documentation

Causes	RII	Percentage (%)	Rank
Frequent design changes	0.78	34.82	2
Delay preparation and approval of drawings	0.67	29.91	3
Mistakes and errors in design	0.79	35.27	1
AVERAGE	0.75	100%	Significant

Table 4.6.3 shows the ranking of the causes influencing the issue of cost overrun in mega construction project in the aspect of design and documentation. The respondents have chosen mistakes and errors in design as the top rank with the value of relative importance index of 0.79. This portrays that the mistakes and errors in design has the potential to give a huge impact to the issue of cost overrun in mega construction project. It can be because of mega projects are usually got too much works to be done. Hence, there is a higher possibility for having mistakes and errors in the design and documentation process. The ranking is followed by other causes that influencing the cost overrun of mega project issue which are frequent design changes and also the delay preparation and approval of drawings with the value of relative importance index of 0.78 and 0.67.

4.6.4 Most Impactful Aspect Influencing Cost Overrun

Table 4.6.4 Rank of Group Influencing Cost Overrun

Group	Average RII	Rank
Site Management	0.82	1
Financial Management	0.78	2
Design and Documentation	0.75	3

Table 4.6.4 represents the summarized data or results from three aspects which are site management, financial management and design and documentation. In order to meet one of the objectives that has been created in the beginning of this study which is to find the major cause influencing the project delay and cost overrun of mega projects in Peninsular Malaysia, the average value of relative importance index of each causes related to each aspect was calculated and the average of the RII value that is within the range of 0.8 and 1.0 depicts that it is the most significant aspect and has the most impactful influence to the issue of the cost overrun in the construction of mega projects in Peninsular Malaysia meanwhile the value in the range of 0.6 to 0.8 is classified as significant. Based on the table above, it can be concluded that the aspect of site management was in the top rank of the list with 0.82 average value of relative importance index followed by the financial management and design and documentation which has the average relative importance index value of 0.78 and 0.75 respectively. Hence, it can be concluded that the most impactful aspect or the most influencing aspect that will affect the cost overrun issue in the mega construction industry is the site management aspect.

CHAPTER 5

CONCLUSION

5.1 Introduction

This chapter will briefly discuss about the conclusion and the recommendation based on the objectives created in the beginning of this study. Project delay and cost overrun are two most commonly issues happen which tend to cause troubles in any construction project, especially the mega construction project. These two issues are generally regarded as the most problematic, complex, risky and frequently issues encountered in a mega construction project. Many studies point out that the situation is more severe in developing countries like Malaysia. Therefore, the identification or establishment of the causes that will lead to project delay and cost overrun in megaprojects is necessary in order to avoid or overcome this problem. This is corresponds to the objectives of this study which are to study the causes of the project delay and cost overruns, to identify the most impactful role and most influential aspect that leads to the issue of project delay and cost overruns respectively and to analyse the most affecting cause of project delay and cost overrun in megaprojects in Peninsular Malaysia.

To achieve the objectives of this study, this thesis research had utilized the quantitative approach by using questionnaire survey as research instruments. The parties involved in mega construction projects were asked to recognize and rate the possible causes of the project delay and cost overrun of megaprojects in Peninsular Malaysia. The data then collected using questionnaires and being analysed using the Relative Importance Index (RII) Method. The analysis was carried out using Microsoft

Excel and lead to some findings that answer the objectives of this study. The most significant cause to the issue of project delay is the mistakes during construction and the most influential role that tends to give an impact to the issue is the contractor. Next, for the cost overrun in megaprojects issue, the most significant cause to the issue of cost overrun is the schedule delay while the most influential group that tends to give an impact to the issue is the aspect of site management. Therefore, based on the findings of this study, there are several recommendations for the ways to overcome these issues in the future.

5.2 Objective 1

The findings of this section of study were discussed in the literature reviews part of the thesis. There were several causes highlighted which includes the design, unexpected site conditions, increase in project scope, weather conditions, and other project changes. Other than that, change orders in are the developed regression models may be used to estimate the extent of future cost overruns, lack of management systems and ability to prevent cost increment and time delay of any future project. Besides, monthly payments difficulties, material procurement, poor technical performances, and escalation of material prices are also the factors that effects the cost overruns based on the findings from the literature reviews. In addition, contractor's poor management and supervision, inadequate contractors experience shortage of site workers, incorrect planning and scheduling by contractor and frequent design changes with change in the scope of the project were more significant factors affecting construction cost and delays.

5.3 Objective 2

The findings of this section of study depicts that different roles of construction players will influence the issue of project delay of mega construction project in Peninsular Malaysia. Three groups which are clients, contractors and consultants being the variables for this section in complying one of the objectives of this study which is to identify the most impactful role that leads to the issue of project delay of megaprojects. The finding discovers that the role that tends to be the most impactful role of this issue is the "contractor" group which ranked first by the respondents. Other than that, the second rank is "client" group followed by "consultant" group being the last in the ranking. Furthermore, this section of study also discovers the most significant or major cause of project delays in mega construction projects which is mistakes during construction which is in the top of the ranking by respondents followed by the delay in progress payment and financial difficulties in the second and third position of the ranking respectively.

5.4 Objective 3

The findings of this section of study portrays that different aspect of construction management tends to give influence to the issue of cost overrun of mega construction project in Peninsular Malaysia. Three aspects which are site management, financial management and design and documentation being the variables for this section in fulfilling one of the objectives of this study which is to identify the most influential aspect that influence the issue of cost overruns of megaprojects. The finding identify that the aspect that tends to be the most influential aspect to this issue is the “site management” group or aspect which ranked first by the respondents. Moreover, the second rank is “financial management” group followed by the “design and documentation” aspect or group being the last in the ranking. Other than that, this section of study also help to identify the most significant or major cause of cost overruns in mega construction projects which is the schedule delay which is in the top of the ranking chosen by respondents followed by inaccurate time and cost estimated and inadequate monitoring and controlling in the second and third position of the ranking respectively.

5.5 Recommendation

The following suggested recommendations are discovered in order to overcome, minimize or control the occurrence of the issue of project delays and cost overruns in the construction of megaprojects in Peninsular Malaysia. These recommendations are identified based on the results that has been analysed and distinguished through the findings of this study. The most influential cause of project delay in megaprojects is the mistakes during construction stage and the suggested way to overcome this cause is that the client needs to find and do a background research before selecting contractor for the project in order to hire a competent and experience contractor. Other than that, for the second most influential cause which is delay in progress payment by the client, the way to overcome it is contractors should follow up constantly with client regarding payment, have proper understanding of requirements with regards to payment, do mutual discussion of problems with client to address problems in a timely manner and proper use of payment provisions in the standard form of contract. Then, the third chosen cause

by the respondent is financial difficulties. Contractors need to have enough cash to manage this problem. Going for an open business line of credit will help to manage bills and save their reputation. Other than that, some of the recommendations of studies that can be done are about what are the mistakes that commonly done by the contractors during construction stage which tends to lead to the project delay issue and also how a schedule delay affect the cost overrun issue in construction industry.

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APPENDIX A
SAMPLE QUESTIONNAIRE

QUESTIONNAIRE

I am currently a final year student taking Bachelor in Civil Engineering at Universiti Malaysia Pahang. I am carrying my final year project on the causes of cost overrun and project delay in megaprojects in Peninsular Malaysia. Therefore, I kindly request your participation in this study by filling out and/or answering the questionnaire below.

We assure you that the information collected will be kept confidential.

Thanks for your cooperation.

Section A : General Information

1. Please state the organization which you work.
 - a) Government
 - b) Client
 - c) Consultant
 - d) Contractor
 - e) Others : _____

2. What is your position in the organization?
 - a) Engineer
 - b) Project Manager
 - c) Contractor
 - d) Others : _____

3. How many years of experience do you have in the construction field?
 - a) Less than 1 year
 - b) 1-5 years
 - c) 6-10 years
 - d) 11-15 years
 - e) 16 years and over

4. Have you experience the issue of cost overruns and project delays before?
 - a) Yes
 - b) No

5. What is the range of the size of the project?
- a) 101 – 500 million
 - b) 501 – 999 million
 - c) 1 – 3 billion
 - d) More than 4 billion

Section B : Causes Influencing Project Delay

Please indicate the significance of each factor by ticking the appropriate boxes. Add any remarks related to each factor on the last column.

1 - Strongly disagree 2 - Disagree 3 - Neutral 4 - Agree 5 - Strongly agree

No.	Causes of Project Delay	1	2	3	4	5
1	Delay in progress payment					
2	Financial difficulties					
3	Mistakes during construction					
4	Frequent change orders during construction					
5	Inflexibility of consultant					
6	Delay in performing inspection and testing					
7	Late in reviewing and approving design documents					
8	Ineffective planning and scheduling					
9	Inadequate experience of consultant					
10	Poor qualification of the contractor's technical staff					

Section C : Causes Influencing Cost Overrun

Please indicate the significance of each factor by ticking the appropriate boxes. Add any remarks related to each factor on the last column.

1 - Strongly agree 2 - Agree 3 - Neutral 4 - Disagree 5 - Strongly disagree

No.	Causes of Cost Overrun	1	2	3	4	5
1	Inadequate monitoring and controlling					
2	Incompetent sub-contractor					
3	Schedule delay					
4	High cost of labor payment					
5	Frequent design changes					
6	Cash flow and financial difficulties by contractors					
7	Delay Preparation and approval of drawings					
8	Inaccurate time and cost estimated					
9	Poor financial control on site					
10	Mistakes and Errors in design					

In your opinion, what are the suggested solutions to overcome this issue?

APPENDIX B