



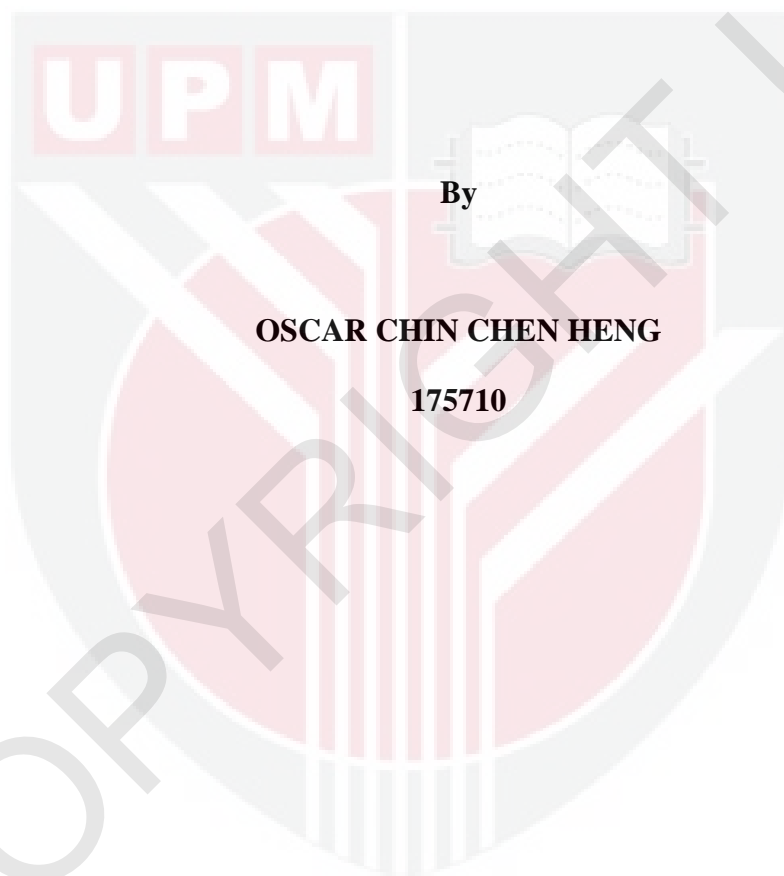
UNIVERSITI PUTRA MALAYSIA

***FINANCIAL MANAGEMENT SYSTEM FOR SMALL AND MEDIUM
CONTRACTOR***

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**FINANCIAL MANAGEMENT SYSTEM FOR SMALL AND MEDIUM
CONTRACTOR**



By

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**Report Submitted to the Faculty of Engineering, University Putra
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ABSTRACT

Cost overrun and construction delay are identified to be the main problems in construction industry. These problems in the construction industry is not only faced by developing countries, but worldwide. The problematic scenario also happens to construction industry in Malaysia. This is especially true in small and medium construction company. This study aim to study the common contributing financial related factors that caused cost overrun and construction delayed and try to mitigate the effect. Next, a financial management system is proposed to minimize the problems occurring due to the financial related factor. There were two method used in this study to obtain all information required for the development of the financial management system. The first being the literature review where the data collected were obtained from external sources such as journals and books. The second method is through questionnaire. Questionnaire is distributed to Contractor Company of Grade 5. The data is then analyze through statistical method. The financial management system is developed based on questionnaire data analysed to fulfil the need of contractors. The financial management system developed incorporate cost control and schedule control as to deal with cost overrun and construction delay.

ABSTRAK

Lebih kos dan kelewatan pembinaan dikenal pasti sebagai masalah utama dalam industri pembinaan. Masalah-masalah dalam industri pembinaan bukan sahaja dihadapi oleh negara-negara membangun, tetapi seluruh dunia. Senario bermasalah ini juga berlaku dengan industri pembinaan di Malaysia. Hal ini berlaku terutama dalam syarikat pembinaan kecil dan sederhana. Kajian ini bertujuan untuk mengenal pasti faktor berkaitan kewangan lazim yang menyebabkan lebih kos serta kelewatan dalam pembinaan dan cuba untuk mengurangkan impaknya. Seterusnya, sistem pengurusan kewangan dicadangkan untuk mengatasi masalah lebih kos serta kelewatan dalam pembinaan yang berlaku disebabkan oleh faktor kewangan yang dikaji. Terdapat dua kaedah yang digunakan dalam kajian ini untuk mendapatkan maklumat dalam membina sistem pengurusan kewangan ini. Yang pertama adalah kajian literatur di mana data diperolehi dari sumber luar seperti jurnal, buku dan internet. Kaedah kedua adalah melalui soal selidik. Soal selidik diedarkan kepada syarikat kontraktor Gred 5. Data ini kemudiannya dianalisa melalui kaedah statistik. Sistem pengurusan kewangan dibina berdasarkan data soal selidik yang dianalisis untuk memenuhi keperluan kontraktor. Sistem pengurusan kewangan yang dibina akan menggabungkan kawalan kos dan kawalan untuk menangani lebih kos dan kelewatan dalam pembinaan.

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APPROVAL SHEET

This project report was prepared and submitted by **Oscar Chin Chen Heng (175710)** entitled "**FINANCIAL MANAGEMENT SYSTEM FOR SMALL AND MEDIUM CONTRACTOR**". The project report has been accepted as partial fulfillment of the requirement for the **Bachelor of Engineering(Civil)**.

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I declare that the project report is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously, and is not concurrently, submitted for any other degree at University Putra Malaysia or at any other institutions.

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LIST OF ABBREVIATIONS/NOTATIONS/GLOSSARY OF TERMS

D - Delay

C - Cost overrun

LP1 (Late Payment 1)- Client's poor financial management

LP2 - Withholding of payment by client

LP3 - Contractor's invalid claim

LP4 - Consultant delay the valuation and certification of interim payment

LP5 - Inaccuracy of valuation for work done

LP6 - Insufficient documentation for valuation

LP7 - Involvement of too many parties in the process of honouring certificates

LP8 - Heavy workloads of consultant to carry out evaluation for work done

LP9 - Contractor's misinterpretation of client's requirement of variation order

CM1 (Cash flow management 1) - Contractor handles too many projects at one time

CM2 - Contractor's instable financial background

CM3 - Unqualified contractor underbidding the project

CM4 - Lack of regular cash flow forecasting

CM5 - Poor credit arrangement with creditors and debtors

CM6 - Capital lock-up

MI1 (Market instability 1) - Increment of interest rate in repayment of loan

MI2 - Inflation of material prices, labour wages and transportation costs
transportation costs

MI3 - Increment of foreign exchange rate for imported materials and plants

IF1(Insufficient Financial Resources 1) - Difficulties in obtaining loan from
financiers

IF2 - Allocation of government budget not in place

CHAPTER 1

INTRODUCTION

1.1 Introduction

This chapter summarizes the context of the study through a general introduction of financial management related issues in construction industry. The study begins with the background of current financial management system in Malaysia, research that has been done on the subjects, and major construction issue that has financial related factors. This thesis further continue by looking into the research objective, research methodology, scope and limitation and research justification are addressed. This chapter will provide a brief outline for this thesis proposal.

Financial management can be defined as an implementation of general managerial ideas to the extent of making decision that will affect the financial.(Howard and Upton, 1953). It is also defined as an integral part of overall management which concerned with the efficient use of capital funds (Paramasivam & Subramaniam, 2009).

Capital funds refer to money that's provided in terms of both equity(stock) and debt(bonds) to a business. It is provided by lenders and equity holders. Both equity and debt are put to use as operating capital. Bond and equity holders would expect to earn something back as exchange. It can be in the form of dividends, stock appreciation, and interests.

Hence, it is important for a company to have a good financial management to ensure the company can keep on profiting and provide assurance to share holders that a company is stable and growing (Investopedia, 2010).

Financial management is carry out universally for 2 purposes. The purposes are wealth maximization and profit maximization. Basically, any economic and commercial activities are done for gaining profit. These include activities done by construction company, to gain profit. In measuring business efficiency for this matter of interests, profits are usually used as the technique. The conventional method is profit maximization, aiming to maximize the matter of interests. The modern method is wealth maximization, aiming to improve in the field of the business concern. The other name for wealth maximization are net present worth maximization or value maximization. In business field, this aim and objectives are widely accepted concept.

Many everyday decisions affect a company's financial health. The difference between a marginally profitable and a very profitable company is good financial management. Business schools teach the fundamental principles of financial management; however, because of the many unique characteristics of the construction industry, the usefulness of these financial principles as taught by

business schools is limited. To be useful, these principles must be adapted specifically to the construction industry.

A good financial management in construction industry will help an organization to (Usman, 2015):

- Ensure efficient use of assets and funds.
- Attain goal and commitments to stakeholders.
- Become more accountable to donors and other stakeholders
- Prepare for long-term financial sustainability.
- Gain advantage in competition for increasingly scarce resources.
- Earn trust and confidence of partners, beneficiaries and funding agencies.

1.2 Background of Study

The major consideration in designing a simple financial management tool for small and medium contractor is that the tool to be developed must fit for their needs. These can be done by firstly identifying the current issue in construction industries that share common financial related factors. Two major issues in construction industry has been identified and selected for the purpose of this research. Namely project delay and cost overrun.

Currently, there has been a lot of research done on factors that can cause both the problems. Each with their own sub factors which will be discuss further in Chapter 2. However none of the research has directly discuss about the solutions for the issues.

For instance, **delays in construction projects** has been identified to have financial-related factor as among the most essential factors that caused it (Alaghbari, 2007).

There are 35 common causes of **cost overrun** identified happening globally in construction industry based on review of previous research, categorized into seven groups, with financial related factor being one of it (Adnan, Al-Najjar, & Kumaraswamy, 2009; Le-Hoai, Lee, & Lee, 2008).

Despite all this issues having many other factors that can contribute to it, only financial related factor is being targeted for this research as financial related factor can be found in the issues and to be narrow down the scope of study. No solutions has been directly proposed for the factors arise might due to each sub factors under financial related factors has different way to solve it.

Hence, this thesis will narrow down on the more severe sub factors under financial factor that cause the two problems. This can be identify through questionnaire survey and a simple financial management tool will be developed to try solving the targeted sub factor.

The performance of the tool develop should be able to measure and evaluate. It is important to obtain some clear, well articulated performance models or set of performance.

1.3 Problem statement

A number of researchers have studied on the capability and capacity of the small and medium sized contractors. It is identified that financial management deficiencies were widespread amongst SME contractor (Thwala & Mofokeng, 2012). Cheng et al (2010) commented that small and medium sized construction companies have less adequate management skills, so they are incapable to secure large-scale projects as

these projects involve management of many areas, including resources, finance and safety.

There is a general agreement among researchers and industry personals that one of the major contributing factors for project work delay are due to financial related factor. Poor financial management lead to delay in construction phrase. (Hamzah, Roshana & Wong, 2009)

Amongst the academic researchers and construction industry practitioners, cost overrun had become a global issues as projects frequently completed exceeding the estimated budget. Various contributing factors had being identified leading to cost overrun with financial related factor being one of it. 46.8% of the public sector and 37.2% of the private sector projects in Malaysia are completed within the stipulated budget. (Endut, Akintoye, & Kelly, 2009)

1.4 Objective

By considering the problem and related issue, there will be study conducted aim to provide comprehensive discussion in financial management and issue related for small and medium contractor.

In order to achieve the aim, three objectives have been developed:

- To identify the current financial management plan/system in Construction.
- To identify the financial related factor that cause delay and cost overrun for small and medium contractor.
- To proposed a simple financial management solution for Small and medium contractor that will minimize the risk of contractor from experiencing the problems due to the targeted factor.

1.5 Scope and Limitation

The scope of study are as follow:-

- The scope of studies will focussed on only small and medium contractors with data collected from Selangor's contractor. Selangor is chosen as it has the largest economy in Malaysia in terms of gross domestic product (GDP). In 2010, Selangor contribute to RM 128.815 billion (roughly USD 42 billion) making up 23% of the total GDP of Malaysia. Hence Selangor is chosen as a sample population representing small and medium size contractor in Malaysia.
- The scope of studies will focussed on only small and medium contractors with data collected from Local contractor, G5. G5 contractor are contractors who tender for a contract not exceeding not exceeding RM5,000,000.00. It's must consist of a minimum of 1 technical person(company owner, director, or full-time employee) that is either a diploma holder (minimum 5 years experience) or A degree holder (minimum 1 year experience). It is chosen as small and medium contactor representative as the tender limit is higher, so more project can be tender by them.
- Historical data for this study rely on projects that has been completed within the past 15 years.
- The targeted group is contractor of grade G5.
- Due to time constrained of the study, the project and organization are selected based on purposive sampling.

1.6 Significance of Study

By conducting this study, it will prove that these problems do exist in Malaysia. Research had been done in the past that specified on factor of project delay, and cost overrun for small and medium contractor. However only a few study has focussed solely on financial problem in construction industry and proposed a solution which can be taken by contractor due to the targeted financial problem. A thorough understanding in current trend is necessary to aid and promote a good financial practice among contractor in Malaysia.

This study would further increase awareness among contractors on the importance of having a good financial management hence reducing the occurrence of delay and cost overrun due to targeted factor. A thorough understanding on current trend is necessary to aid contractor in develop a simple tool for financial management.

1.7 Summary

Chapter one presented the background of study. The problem statements, research objectives, scope and limitation, and the research justification were identified for the purposed of introducing this study.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter discussed the general concept of financial management in construction industry and also the uses of financial management towards the completion of construction project. In addition to that, this chapter will also describe the common construction problem that has financial related factor as one of its contributing factors. Then, the common financial related factor itself will be discussed in detail. This chapter also describe the factors that were considered in developing the financial management tool towards the end of this research.

2.2 Difference of Financial Management in Construction and other Industry

The utilization of a company's financial capitals is the simple interpretation of financial management. Financial management includes the utilization of money as well as assets—for instance machinery and labours. The financial status of a company is affected by many everyday decisions (Peterson, 2009).

Compared to companies from other industries, construction companies are considerably different as well as facing many unusual difficulties and challenges. In spite of the fact that construction industry is also creating a product as do production plants - roads, buildings, bridges and other structures construction are unlike production of most others products. Therefore, if a financial management fundamental is to be applied into construction industries from other product producing industries, modifications are needed due to special attribute of a construction industry. Without modifications, the fundamentals is not applicable in construction industry(Peterson, 2009).

When comparing the management of a construction company and a production company. Four elements that lead to the need of different management can be observe. The elements are discussed as followed:

2.2.1 Project Oriented

Product by a production company is process oriented while products by a construction industry is project oriented. A production company may produce a variety of products, but the variations are usually defined and narrowed. However, for construction companies, the products are more significantly different. For instance, a bridge construction company. The products may be the same due to the company niche. But the projects will be different as projects will be done at different locations. A project in different locations will have different site condition and also affect the labour and material availability(Peterson, 2009).

A production company produces its products which are usually similar in one place and has the products sold to variety of people from other locations. However, in

construction industry, the projects are built specifically for an owner on a specific location. For production company, the production cost can be easily identified as the number of products they have are limited and the production is repeatedly produced. However, the fixed construction cost in construction industry are required to be given by the contractor even before the company start building the product. Most of the time, the product has never been built by the company or it has not been built using the local group of subcontractors and suppliers at that particular places(Peterson, 2009).

Construction industry are among the few industries with most of the products being project oriented. Construction projects make up most of the products produced by a construction company. For that reason, the precise construction cost for every project taken and constructed must be recorded. With the input, the cost of the current project can be controlled. Besides, the input will also be useful in future projects bidding as different construction projects required a different mix of labours, materials, and equipments. With more input of components' cost in construction. more accurate price can be put when bidding for projects(Peterson, 2009).

2.2.2 Decentralized Production

The work of a production company is performed at a centralized locations. A fixed location is chosen where the production plants is to be set up together with the machinery required for the production. The working location for a production plant's employees remain the same for a long time. However, for construction industry, the work is decentralized. After a construction project is done, the employees and machineries moved to a new location. Tracking of the employees and machineries are necessary to ensure the correct cost is charged for the job(Peterson, 2009).

2.2.3 Payment Terms

For production company, the buyer need to pay for item as soon as the items is received or expected to pay the full price within a definite number of days if it is ordered. However, for construction companies, as the project progressed, monthly progress payment is made by owner to the contractor. Construction projects are normally in the form of long terms contracts. Furthermore, the owners sometimes withhold retentions resulting in unusual cash flows and the necessity of changes to accounting to deal with the retentions. Retention is a sum of money postponed or delayed from being paid to contractor by the owner to ensure the contractors continue doing the work(Peterson, 2009).

2.2.4 Heavy Use of Subcontractors

In production company, the product will be produced from start to end by itself. Usually, there will be no necessity to subcontract the work to a subcontractors. However, reliance of subcontractors are normal in construction industries. By using a subcontractors, a construction company is able to understand the subcontractor's financial assets during the construction process. The finances of a construction company is hugely impact by the usage of subcontractors. Due to all these special attributes, clear understanding on the financial management and the way financial management fundamentals being applied to construction industry are important. If someone managing finance of a company are to used the tools that they learned from business courses, it must be modified to cope with these special attributes before it is applicable and deemed useful to construction manager(Peterson, 2009).

2.3 Financial related problem

Bad financial management and lack of capital had being recognised to be one of the main contributing factors for failure in construction, this is in accordance to the research done previously on financial factors that caused construction projects' failure (Mazlan, 2010). Failures in the construction industry not only faced by developing countries, but worldwide. The failure scenario also happens to construction industry in Malaysia. The failure rate of the construction companies in Malaysia is also high. According to the Construction Industry Development Board, Malaysia (CIDB), from January 2006 to August 2008 a total of 11,321 construction companies was classified under dormant and bankrupt. There are very few listed successful contractors in Malaysia and most of the construction projects cannot be completed within the original schedule. The failure sources are directly related to financial factors. In a case study done (Suberi, 2010), it was found that most of Bumiputera construction companies did not have sufficient cash capital to finance their construction works, enjoyed low profit margin from the construction project and were highly dependent on debt capital to finance their construction costs. There was lack of monitoring system for the cash flow and project costs. Without effective financial practices, construction companies are putting their self up to failure.

2.3.1 Delay

Delay can be defined as a situation when the contractor and the project owner jointly or severally contribute to the non-completion of the project within the original, stipulated or agreed upon contract period (Aibinu and Jagboro, 2002). Ozdemir (2010) asserted that the construction industry has a very poor reputation for coping with delays. Delay analysis is generally either ignored or performed subjectively by simply adding a contingency. As a result, many major projects fail to meet scheduled deadlines. In a construction project, in which time truly equals money, the management of time is critical (Duran, 2006), thus predicting a likelihood that schedule delay plays a key role in overall project success (Luu et al., 2009). The foremost concern of every contractor is to ensure that the highest possible performance level is achieved in construction project delivery. Developing countries, such as Saudi Arabia (Assaf, Al-Khalil and Al-Hazmi, 1995), Malaysia (Yong, 1988) and Nigeria (Okpala and Aniekwu, 1988; Elinwa and Buba, 1993; Mansfield, Ugwu and Doran, 1994), suffer construction time overruns.

A construction project is commonly acknowledged as successful when it is completed on time, within budget, in accordance with the specifications and to stakeholders' satisfaction (Majid, 2006). Project success can be defined as meeting goals and objectives as prescribed in the project plan, while a successful project means that the project has achieved its technical performance, maintained its schedule and remained within budgetary constraints (Frimpong, Oluwoye and Crawford, 2003).

2.3.2 Cost Overrun

Socio-economic growth of a country highly depends on construction industry as it provides necessary infrastructure such as roads, hospitals, schools and other basic and enhances facilities. Also, it contributes significantly to the country's Gross Domestic Product (GDP). In Malaysia, the construction sector has been consistently contributing to the strong economic growth of 5.8% in 2009 and subsequently 8.7% in 2010 as against the overall GDP growth. Under the 10th Malaysia Plan, a total sum of RM230 billion has been allocated for development and another RM20 billion for facilitation fund which is intended to create impetus in driving demand for the construction sector. Out of RM230 billion allocation, 60% (RM138 billion) was for physical development in the construction sector. As much as RM20 billion facilitation funds were allocated for attracting private sector investment (Mansor, 2010). Besides providing these funds, the construction industry is seen as facing a lot of challenges such as delay in completing projects in time, expenditure exceeding the budget, defects, and over dependent on foreign workers. Of these challenges, cost overrun is specifically a critical issue.

Cost is amongst the major considerations throughout a project management life cycle and is considered as prime factor of success. However, it is uncommon to see project completed within the estimated cost (Azhar, Farooqui, & Ahmed, 2008). As in Malaysia, it is reported by (Endut, Akintoye, & Kelly, 2009) only 46.8% of the public sector and 37.2% of the private sector projects in Malaysia are completed within the stipulated budget.

In today's construction industry, cost overrun is very common phenomenon worldwide. This problem/issue is critical and needs to be more understood and alleviated (Angelo & Reina, 2002). In a study on 8000 projects, (Frame, 1997) found

that only 16% of the projects satisfied the three fundamental criteria of project success i.e. completing project on time, meeting the budgeted cost, and meeting quality standard, while in a global study on cost overrun issue in transport infrastructure projects covering 258 projects in 20 nations, (Flyvbjerg, Holm, & Buhl, 2003) concluded that 9 out of 10 projects faced cost overrun. (Azhar et al., 2008) studying construction projects in Pakistan found that a minimum cost overrun recorded was 10% of the estimated cost. Further, the authors mentioned that this trend is sometimes more severe in developing countries where cost overrun sometimes exceeds 100% of the anticipated cost of the project. In Uganda, there was cost overrun of more than 100% of the contract price in the Northern-by-pass project as reported by (Apolot, Alinaitwe, & Tindiwensi, 2011). In Nigeria, (Omorieg & Radford, 2006) reported that the minimum average percentage of cost escalation was 14%. In Portugal, construction projects faced a minimum of 12% of cost overrun (Moura, Teixeira, & Pires, 2007).

2.4 Common Financial Related Factor

Sambasivan and Soon (2007) have developed 28 well-recognised construction delay factors in construction and categorised them into eight major groups. These are client-related factors, contractor-related factors, consultant-related factors, material-related factors, labour- and equipment-related factors, financial-related factors, contract-related factor and external factors. Among others, a financial-related factor is one of the most critical factors that cause delays in construction projects (Alaghbari *et al* , 2007). The statement is supported by Sweis *et al* (2007) stating that in Jordan, financial difficulties faced by many contractors cause delay in construction projects. This is because of the many changes that are made by project clients during

construction. As a result, it increases the construction cost in which contractors have to procure the material and equipment beyond their normal boundaries. In addition, delay in paying contractors will subsequently jeopardise contractor's cash flow. Delay in payment resulted in the slow progress on site, as many sub-contractors and suppliers are subjected to financial difficulties; hence, no material is delivered to the site.

A similar trend can be seen in the Malaysian construction industry. According to Ahmed *et al* (2003) and Wa'el Alaghbari (2005) , the possible financial-related factors that lead to delays in Malaysian construction projects are financial problems of clients such as delayed payments, financial difficulties and economic problems; financial and cash flow problems of contractors; and external factor of poor economic conditions such as currency and inflation rate. In addition, difficulties in obtaining loans (Arditi *et al*,1985) and short of funding are adverse financial-related factors that were identified in previous works.

Based on the 19 possible causes for financial-related project delay, they can be divided under four different subcategories, namely late payment, poor cash flow management, insufficient financial resources and financial market instability. All the sub-problems are closely related to each other and will cause a significant impact on projects delays. A description of each of the financial-related causes for delay follows.

From review of articles on cases worldwide, Ismail, Aftab and Ahmad (2013) have developed 35 well-recognised construction delay factors in construction and categorised them into seven groups namely contractor's site management related factors, design and documentation related factors, financial management related

factors, information and communication related factors, human resource related factors, non-human resource related factors, project management and contract administration related factors. (Le-Hoai, Lee, & Lee, 2008) found that poor site management and supervision, poor project management assistance, financial difficulties of owner, financial difficulties of contractor & design changes were the most significant causes of cost overrun construction industry.

Hence, the shared financial related factors that cause both delays and cost overrun are identified. This factors will be further discussed in the following subtopic.

2.4.1 Late Payment

Late payment is defined as failure of a paymaster to pay within the period of honouring of certificates as provided in the contract (Harris and McCaffer, 2003). The parties involved in the process of payment claim such as client, contractor, superintending officer, architect, quantity surveyor, banker and other construction players may cause a payment to be delayed. A delayed payment by a party who is involved in the process of payment claim may have an influence on the supply chain of payment in whole. According to the Construction Industry Working Group on Payment (2007) , problems in payment at the higher end of the hierarchy will lead to a serious knock-on cash flow problem down the chain of contracts. The identified underlying causes of late payment include (1) client's poor financial and business management, (2) withholding of payment by client, (3) contractor's invalid claim, (4) delay in valuation and certification of interim payment by consultant, (5) inaccuracy of valuation for work done, (6) insufficient documentation and information for valuation, (7) involvement of too many parties in the process of honouring

certificates, (8) heavy workloads of consultant to carry out evaluation for work done and (9) contractor's misinterpretation of client's requirement of variation order.

2.4.2 Poor Cash flow Management

Cash flow management is defined as a process of monitoring, analysing and adjusting projects' cash flow (Ward, 2014). According to Ward (2014), the most important aspect of cash flow management is to avoid extended cash shortages that are caused by having too great a gap between cash inflows and outflows. As in the case of *Dawnays Ltd v FG Minter Ltd* (1971), Lord Denning famously said that cash flow is the lifeblood of the construction industry, and (Construction Industry Working Group on Payment, 2007) ease of cash flow is an essential element in delivering a successful project. Thus, a well-managed cash flow is important to enable the delivery of a successful project by performing a cash flow analysis on a regular basis to identify cash flow problems (Ward, 2014). In analysing the cash flow of a project, cash flow forecasting is an essential method to head off cash flow problems. It is then important to develop and employ strategies that will maintain an adequate cash flow for the project. Therefore, a well-managed cash flow will improve the project's cash flow and subsequently improve the timely performance of a project. Conversely, a poorly managed cash flow represents the opposite. The underlying causes to poor cash flow management can be categorised as (1) contractor handles too many projects at the same time, (2) contractor's instable financial background, (3) unqualified contractor underbidding the project cost, (4) lack of regular cash flow forecasting, (5) poor credit arrangement with creditors and debtors and (6) capital lock-up.

2.4.3 Insufficient Financial Resources

According to Kaming *et al* (1997) , one of the most important factors causing delays in high-rise projects in Indonesia is the shortage of resources. In addition, Noulmanee *et al* (1999) investigated the causes of delays in highway construction in Thailand and concluded that one of the main causes of delays is the insufficient resources of an organisation. A survey by Ubaid (1991) concluded that the contractor's resources are the major measures on the contractors' performance that cause delays. The resources include financial resources, human resources, material resources and equipment resources. However, only the financial resources are focused in the research, as Abdul-Rahman *et al* (2006) addressed that lack of funds may affect the project's cash flow and lead to delay in site possession, which consequently causes delays in the project as whole. The factors that would cause insufficient financial resources are (1) difficulties in obtaining loan from financiers and (2) allocation of government budget not in place.

2.4.4 Financial Market Instability

According to Ahmed *et al* (2003) and Wa'el Alaghbari (2005), the external factor of poor economic conditions such as currency and inflation rate would significantly give impact to project's cash flow, and hence affect the timely performance of the project. The underlying causes to financial market instability, which will then lead to cash flow problems in construction project include (1) increment of interest rate in repayment of loan, (2) inflation of material prices, labour wages and transportation costs and (3) increment of foreign exchange rate for imported materials and plants.

CHAPTER 3

METHODOLOGY

3.1 Introduction

This chapter will present the methods and procedures which will be implemented in this study. Methodology is defined as a process of research to obtain relevant data and information for reliable research results. In this study, the methodology consists of three main procedures which are preliminary study, data collection and data analysis. There will be a discussion and will be concluded with the knowledge acquired from the discussion. The method and procedure stated here will act as guidance and checking to ensure that this study is done according to the exact research objective and aim.

3.2 Surveys

Survey is the research methodology used to collect data during field study in which a specifically defined group of individual are asked to answer a number of identical questions. While it may be difficult to provide a concise definition of a survey, there are three typical central features of surveys (Robson, 2002):

1. The use of a fixed, quantitative design;
2. The collection of a small amount of data in standardized form from a relatively large number of individuals;
3. The selection of representative samples of individuals from known populations.

3.2.1 Rational Of Survey Method

Questionnaires were the simplest method to collect data from a targeted respondent. A well-designed questionnaire that was used can effectively gather information on both the overall performance of the test system as well as information on specific components of the system.

Questionnaires instrument was chosen as the method of collecting primary data. Questionnaire is a self-report data-collection instrument filled out by research participants (Burke & Larry, 2000). The content and organisation of a questionnaire will correspond to the researcher's research objectives. There are questions that comprises of yes and no questions and open-ended questions. Questionnaires are given to project manager(contractor) in different contractor company.

The questionnaire is designed based on the objectives of the study. Questionnaires would be distributed to significant respondents that were identified earlier. It is significant for researchers to consider the issue of the number of the respondents and

who will be included in the research (Sarantakos, 2005). The sample in this research consist of 100 participants that work in a construction company/industry.

From literature review, it is observed that data collection done for previous research has been using similar method which is questionnaire survey hence it is chosen.

Table 3.1: Previous related research which used similar data collection method

AUTHORS	RESEARCH	METHOD USED
Henry, Ammar, Roy (2003)	Evaluation of construction Cash flow management approaches in contracting organisations	Questionnaire survey
James, Thomas (2010)	Company Failure in the Construction Industry: A Critical Review and a Future Research Agenda	Questionnaire survey
Yap (2013)	Causes of Abandoned Construction Projects in Malaysia	Interview, questionnaire survey with open ended question
Hamzah, Roshana, Wong (2009)	Financial-related causes contributing to project delays	Interview, questionnaire survey
Aftab, Ismail, Ade (2012)	The Cause Factors of Large Project's Cost Overrun: A Survey in the Southern Part of Peninsular Malaysia	Interview, questionnaire survey

3.2.2 Advantages and Disadvantage of Questionnaire survey

Milne(1999) identified the advantages and disadvantages of data collection through questionnaires.

Advantages of questionnaires:

- The response are gathered in a standardised way, so questionnaires are more objective, certainly more so than interviews.
- Generally, it is relatively quick to collect information using a questionnaire. However in some situations, they can make a long time not only to design but also apply and analyse(discussed in disadvantages of questionnaires).
- Potential information can be collected from a large portion of a group. This potential is often not realised, as returns from questionnaires are usually low. However return rates can be dramatically improved if the questionnaire is delivered and responded to in class time.

Disadvantage of questionnaires:

- Questionnaires are standardised so it is not possible to explain any points in the questions that participants might misinterpret.
- Open-ended questions can generate large amounts of data that can take a long time to process and analyse.
- Respondents may answer superficially especially if the questionnaire takes a long time to complete.

3.3 Research Procedure

Basically, there are three stages to complete this study. The stages are as being discussed below:

3.3.1 Stage 1 - Preliminary Study

The problem area of research is identified at the first stage. Some considerations needed are level of expertise, interest, magnitude, measurement of concepts and theory, availability of data and literature review.

3.3.1.1 Literature Review

The literature review was done through Internet, various construction management text books, and engineering journals. It is aimed at reviewing information on financial management related problems, causes of these problems, and improvement methods to establish the problem area.

3.3.1.2 Selection of Independent Variables

Stepwise selection techniques is used for questionnaire model building. It is a regression design with a single dependent variable that has been described in numerous sources.

Stepwise, which uses a combination of forward and backward selection, is more commonly used than either forward or backward. Predictor variables are entered as they are in forward selection, but at each step the variables are evaluated to see if any variables can be removed. (Freedman, 1983). The few top variables were then identified from each past research and selected for the initial forms of pilot questionnaires.

3.3.2 Stage 2 - Data Collection

Data will be collected from where it will draw inference and conclusion for model development. The method used to collect data in this study is questionnaire survey and interview. A questionnaire survey will be carried out to gather information from professionals who are involve in the construction industry. It is to get the opinion and understanding from experienced respondents regarding the financial management in construction.

3.3.2.1 Questionnaire Development

The following guidelines is used in preparing questionnaire (Fowler, 1993; Hunt, 1995; Fellows & Liu, 1997):

- Keeping the respondent's interest level and attention at a maximum
- Making the respondent's task as easy and simple as possible;
- Likert scale was used. The likert scale is a wisely used instruments in measuring opinions, beliefs and attitudes (Devellis, 1991)

Fowler (1993) explains that when self-administered questionnaire is used, it would be better to have closed questions. The question can be answered by simply tick the box or circling the proper response from a simple format. Hence, a closed questionnaire was found to be suitable in this study since it enables respondent to quickly answer the questions laid out in the questionnaire form.

As this questionnaire was determined to be self-administered, it was realized that it should be self-explanatory without needing any clarifications regarding the questions.

Hence, a covering letter and a separate page of introduction describing the aim and objectives of the research were attached to the questionnaire.

An extensive survey of relevant literature and previous studies was conducted. These information was used to develop the first draft of questionnaire. The questionnaire was initially piloted, completed by a small sample of respondents. After validating the respondent's recommendations that were solicited through the pilot testing, the final questionnaires were developed.

3.3.2.2 Pilot Study

The term 'pilot studies' refers to mini versions of a full-scale study (also called 'feasibility' studies), as well as the specific pre-testing of a particular research instrument such as a questionnaire or interview schedule. A pilot test provides the researcher an opportunity to identify confusing and ambiguous language, and to obtain information about possible patterns of results (Wiersma & Jurs, 2005).

Pilot studies are a crucial element of a good study design. Conducting a pilot study does not guarantee success in the main study, but it does increase the likelihood of success. Pilot studies fulfill a range of important functions and can provide valuable insights for other researchers. There is a need for more discussion among researchers of both the process and outcomes of pilot studies.(Teijlingen & Hundley, 2002)

According to Isaac & Michael (1995); Hunt (1995); Fellows & Liu(1997), all the questionnaire should initially be piloted, completed by small sample of respondents. The piloting will test whether the questions are intelligible, easy to answer, unambiguous and so on.

As for this pilot testing, the undergraduate student and some contractors will be asked to answer the questionnaire and then, they are requested to give their advice or recommendation to improve the survey form. Through their feedback, there will be an opportunity to improve the questionnaire and determining the time required for answering the questions.

3.3.2.3 Determining The Size Of The Sample

The results will be reported as means (averages) of the sample responding, the Renckly's equation formula will be used:

$$n = \frac{NZ^2(0.25)}{(d^2 * (N - 1)) + (z^2 * 0.25)}$$

Where n = sample size required

N = Total population size [Known]

D = Precision Level [usually 0.05 or 0.10]

z = Number of standard deviation units of the sampling distribution

correspond

For this research, the total population , N is 777 (contractor Grade G5 in Selangor (CIDB,2016), and the questionnaire is designed to obtain data with a 90% confidence level and +10 percent precision level (d = .10 , Z = 1.6449), then: n=62.29. Hence, a representative sample of 63(62.29 rounded up) would be sufficient to satisfy the risk level. However, considering not all questionnaires will be return, it's decided that 100 number of questionnaires will be send out.(justify based on research). According to (Punch, 2003), response rate based on mail survey can varies from 50%-70% depends on how it is administered.

Inspection of the formula shows that the required sample size will increase most rapidly if:

- The confidence level (Z factor) is increased, or
- Precision level (d) is made smaller.

3.3.2.4 Sampling

The sample comprises of project clients/owners and project managers that are experienced in carrying out financial management for construction project. (Kumar, 2005). The rationale for choosing these sample types is due to different companies working under different circumstances. Therefore, the questionnaires will be distributed randomly among the participants working in different construction companies. Reason being, this can minimize any bias towards any particular company.

3.3.3 Stage 3 - Data Analysis

Data that collected from main contractor and questionnaires were analysed and tested for the reliability of the data using Critical Packages for Social Sciences (SPSS) software. The data will be analysed using frequency analysis, mean score analysis and one-sample t-test analysis. (SPSS Inc.,1995)

3.3.3.1 Data Analysis By Using SPSS for Linear Regression

Linear regression analysis estimates the coefficients of a linear equation, involving one or more independent variables, that best predict the value of the dependent variable. We will analyse the overview of the respondents background and then

identify which of the factors have the highest frequency contributing to financing control. This is done using the Frequency Distribution Analysis. (SPSS Inc.,1995).

3.3.3.2 Statistical Packages for Social Sciences (SPSS) software

SPSS is among the most widely used programs for statistical analysis in social science. It is used by market researchers, health researchers, survey companies, government, education researchers, marketing organizations and others. The original SPSS manual (Nie et al., 1970) has been described as one of "sociology's most influential books". In addition to statistical analysis, data management (case selection, file reshaping, creating derived data) and data documentation (a metadata dictionary is stored in the data file) are features of the base software.

3.3.3.3 Test Reliability of Data

The collected data from the questionnaires were checked on the reliability test to find Cronbach's Alpha value. Cronbach's alpha is the most common measure of internal consistency ("reliability"). It is most commonly used when there are multiple Likert questions in a survey/questionnaire that form a scale, and it can be used to determine if the scale is reliable. (Joseph & Rosemary, 2003)

Alpha is an important concept in the evaluation of assessments and questionnaires. It is mandatory that assessors and researchers should estimate this quantity to add validity and accuracy to the interpretation of their data.(Tavakol & Dennick, 2011)

This analysis is aimed at testing if the results are reliable or not. The reliability tests were performed on scales of each factor using Cronbach's α . The computation of Cronbach's α in measuring internal consistency of items in scale and/or responses to question that were designed to represent a construct, is given by the equation:

$$Cronbach \alpha = \left(\frac{k}{k-1} \right) \left(1 - \frac{\sum V_i}{V_t} \right)$$

where

K : number of items in scale;

V_i: variance of score in each question;

V_t: total variance of overall score on the entire test.

The tabulated data are then analysed according to their ranking on relative importance index and mean value. Cronbach's alpha is a test reliability technique that requires only a single test administration to provide a unique estimate of the reliability for a given test. Cronbach's alpha is the average value of the reliability coefficients one would obtain for all possible combinations of items when split into two half-tests. (Joseph & Rosemary, 2003). They provide the following rules of thumb as shown below:

Table 3.2: Reliability Coefficients Range

Reliability coefficients	
>0.9	Excellent
>0.8	Good
>0.7	Acceptable
>0.6	Questionable
≥0.5	Poor
<0.5	Unacceptable

3.3.3.4 Pearson's Correlation Factor

The Pearson correlation coefficient is a measure of the strength of the linear relationship between two variables. It is referred to as Pearson's correlation or simply as the correlation coefficient. If the relationship between the variables is not linear, then the correlation coefficient does not adequately represent the strength of the relationship between the variables.

Pearson's r can range from -1 to 1. An r of -1 indicates a perfect negative linear relationship between variables, an r of 0 indicates no linear relationship between variables, and an r of 1 indicates a perfect positive linear relationship between variables.

The closer the value of r gets to zero, the greater the variation the data points are around the line of best fit and the less likely the group of data are related. Values and correlations are as follow:

- High correlation: .5 to 1.0 or -0.5 to 1.0.
- Medium correlation: .3 to .5 or -0.3 to .5.
- Low correlation: .1 to .3 or -0.1 to -0.3.

3.3.3.5 Frequency Analysis

Frequency analysis is used to analyze the rate of repetition for certain matter, affair, incident, business, and case that have frequent occurrence. The choice of answer with the highest rate of occurrence indicates that the answer is the choice of majority of respondents' towards the matter. being studied. Then, the result of analysis is interpreted into percentage form. Frequency analysis supplies techniques that help to condense large data sets using tables, graphs and summary measures which is suitable to accomplish the second objective of this study. Consequently, frequency statistics is of immense important since it provides efficient and effective methods for analyzing and summarizing data collected from the questionnaire survey.

Mean is obtained by dividing the sum of all values by the number of values in the data set. Mean has the advantage that its calculation includes each value of the data set which is useful for comparing the means from the data set.

$$\text{Mean} = \frac{\text{Sum of all values}}{\text{Number of values}}$$

On the other hand, the standard deviation is the most preferred used measure of accuracy, where the values of a frequency distribution are located in relation to the mean. It gives additional information to judge the reliability of the measure. A lower value of the standard deviation for a data set indicates that the values of the data set are spread over a relatively smaller range around the mean. A large value of standard deviation for a set of data is spread over a relatively larger range around the mean which is less represent the data as a whole (Richard, 1998).

$$\text{Standard deviation} = \sqrt{\text{Variance}}$$

$$= \sqrt{\frac{\sum(x - \bar{x})^2}{n - 1}}$$

Sampling distribution of the t statistic depends upon the degree of freedom (df) of the t . The outcome of the t test provided basis for drawing conclusion about the effect of an independent variable in a measurement, and therefore for deciding whether a research hypothesis is or is not supported by the data set. The one-sample t test employs the formula below (Richard, 1998).

$$t = \frac{\bar{x} - u}{s\bar{x}}$$

Due to only one sample mean is involved in this test; the statistic is called one sample t test to distinguish it from a t test involving two sample mean (Harold, 1989). The value of t is also sensitive to sample size because the calculation of s involves the sample size, N .

3.3.4 Methodology Flow Chart

Figure 3.1 shows the flowchart framework study of this research

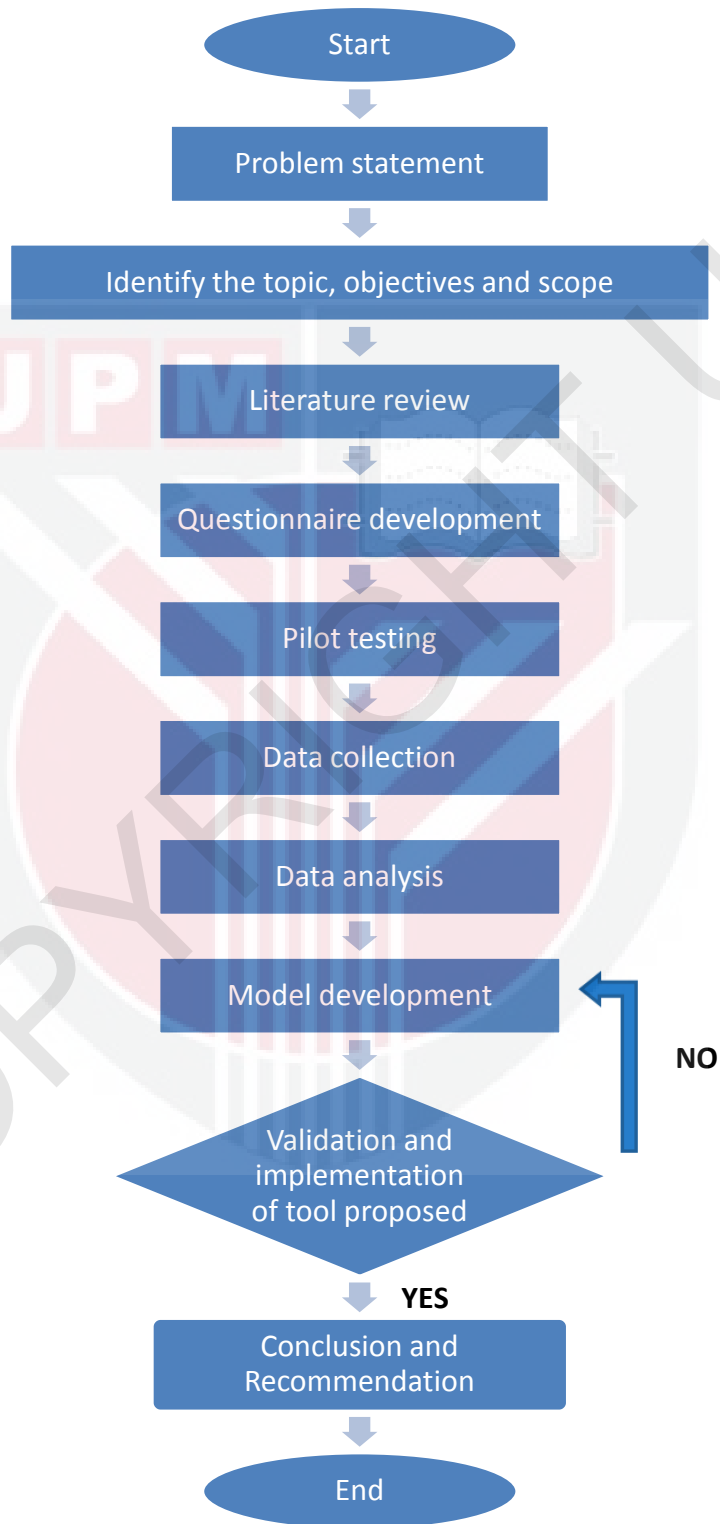


Figure 3.1: Methodology of flowchart

CHAPTER 4

ANALYSIS AND DISCUSSION

4.1 Introduction

This chapter will discuss the outcomes of the analysis on the data collected through questionnaire survey. The analytical methodologies adopted to analyze the data collected from the survey have been discussed in Chapter 3. The methods used to analyze the questionnaires are frequency analysis, Cronbach's alpha and Pearson correlation. Firstly the collected data were checked by a reliability test to find Cronbach's Alpha value. The tabulated data is then analyzed according to their ranking or mean value and standard deviation. The results are analyze according to their ranking or mean value or standard deviation. The results are analyzed using SPSS statistical software. The data obtained from the questionnaires survey is based on the response from contractors.

4.2 Analysis of the questionnaire survey

The questionnaires were distributed to 100 respondents. However only 38 have completed the questionnaires. The response rate enables statistical analysis to be performed and conclusions to be made. Saunders et al., (1997) considers the interval of 30-50 percents to be a reasonable rate for delivery and collection of questionnaires. Al-Yousif (2001) mentioned that the number of responses for mailed questionnaires are always less than 100% except for some cases. The questionnaires were analysed with Microsoft Excel by utilizing the frequency distribution analysis method and One-Sample test by SPSS. These results will be utilized in the model development of the Enhancement of the financial management tool.

4.2.1 Respondents' Experience In Construction Industry

The table 4.1 and figure 4.1 represented the Statistical results for the Respondents' Working Experience.

Table 4.1 Statistical results for the respondents' working experience

	Frequency	Percentage	Cumulative Percentage
0-5 years	15	39.5	39.5
6-10 years	6	15.8	55.3
11-15 years	5	13.2	68.4
16-20 years	9	23.7	92.1
More than 20 years	3	7.9	100
Total	38	100	

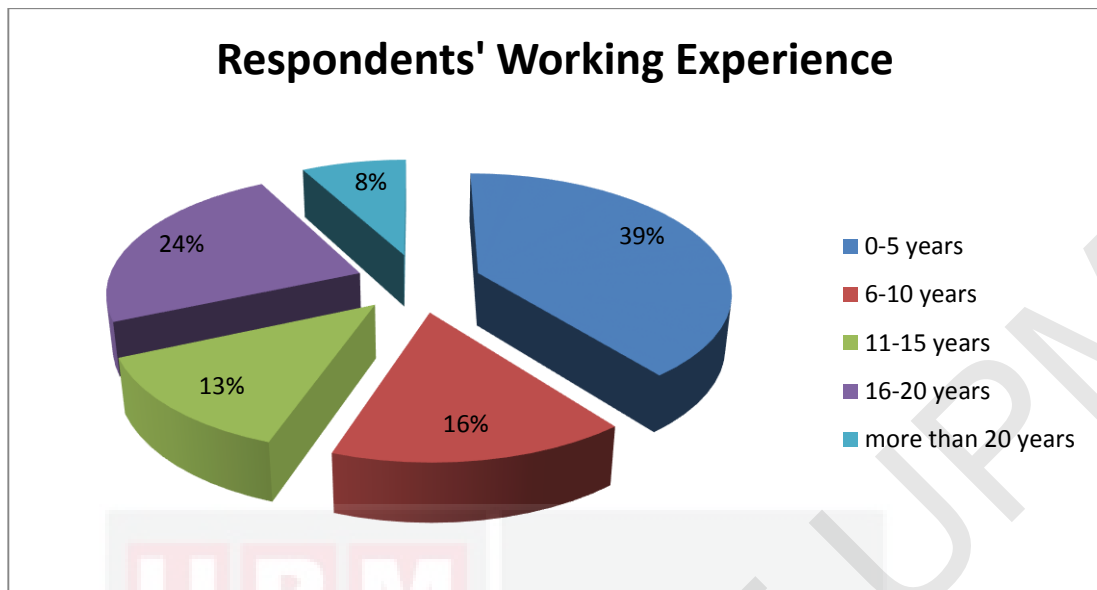


Figure 4.1 Respondents' Working Experience

The respondents in the questionnaire survey had been involved in construction industry for many years. The respondents working experience was asked in this section, whereas the respondent was grouped and ranked based on the working durations, The data collected was analysed using the index method. It is clear that slightly below half of the respondents have less than 5 years of working experience which is 39%. 16% had six to ten years experience, 13% had 11-15 years experience, 24% had 16 to 20 years experience and 8% had more than 20 years experience as presented in Table 4.1.

4.2.2 Validity of the questionnaire

The reliability test depicts the degree of consistency of the data collected. The data of financial related factor that caused cost overrun and delay are first analysed separately using Cronbach's Alpha. Next, using the mode from each variables, result from financial related factor that cause cost overrun and delay are analysed using Pearson Correlation to measure how well the two set of data are related.

4.2.2.1 Cronbach's Alpha

Results were shown in Table 4.2, 4.3, 4.4, 4.5, The analysis is explained accordingly.

Table 4.2: Reliability Statistics on Cronbach's Alpha for Part II: Question 1

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.990	.991	20

Table 4.3: Cronbach's Alpha for each individual variable

Financial related factor causing delay	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
DLP1	55.6579	177.312	.932	.989
DLP2	55.4737	174.905	.937	.989
DLP3	55.6842	177.141	.928	.989
DLP4	55.8421	177.974	.910	.989
DLP5	56.0000	180.595	.887	.989
DLP6	55.8947	180.313	.912	.989
DLP7	55.7632	177.591	.913	.989
DLP8	55.8158	179.398	.933	.989
DLP9	55.7895	179.468	.939	.989
DCM1	55.6842	180.708	.926	.989
DCM2	55.5789	181.926	.883	.989
DCM 3	55.8158	184.317	.883	.989
DCM 4	55.4474	177.389	.912	.989
DCM 5	55.8158	182.749	.912	.989
DCM 6	55.8158	181.398	.930	.989
DMI1	55.2105	176.927	.899	.989
DMI2	54.7368	182.037	.874	.989
DMI3	54.7895	182.225	.839	.990
DIF1	55.4211	175.007	.936	.989
DIF2	55.2632	174.037	.945	.989

Table 4.4: Reliability Statistics on Cronbach Alpha for Part II: Question 2

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.988	.990	20

Table 4.5: Cronbach's Alpha for each individual variable

Financial related factor causing cost overrun	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
CLP1	57.3947	154.678	.925	.987
CLP2	57.3684	154.671	.938	.987
CLP3	57.3421	153.528	.921	.987
CLP4	57.2632	159.983	.866	.988
CLP5	57.4737	157.229	.904	.987
CLP6	57.2105	158.279	.895	.988
CLP7	57.3684	159.536	.878	.988
CLP8	57.2632	157.713	.879	.988
CLP9	57.2895	156.644	.927	.987
CCM1	57.5000	157.230	.895	.988
CCM2	57.3421	158.339	.907	.988
CCM3	57.0263	153.540	.893	.988
CCM4	56.7368	149.226	.911	.988
CCM5	57.3684	154.996	.919	.987
CCM6	57.4737	158.472	.889	.988
CMI1	56.5789	154.142	.907	.987
CMI2	56.4211	151.980	.931	.987
CMI3	56.5526	157.119	.889	.988
CIF1	56.7105	149.184	.940	.987
CIF2	56.8158	147.289	.954	.987

Table 4.6: Cronbach's Alpha range and indication

Cronbach's Alpha	
>0.9	Excellent
>0.8	Good
>0.7	Acceptable
>0.6	Questionable
≥ 0.5	Poor
<0.5	Unacceptable

Report definition

Scale Mean if item deleted: Reflects the change in Cronbach's Alpha that would be seen if a particular item were deleted.

Corrected Item-Total Correlation: The correlations between each item and the total score from the questionnaire.

Summary of report

Results of Cronbach's Alpha for all the questions were acceptable as it ranged from 0.987 to 0.990. Range of Cronbach's Alpha values from the analysis were within the "excellent" category. The alpha coefficient for the both the items is 0.991 and 0.991, suggesting that the items have relatively high internal consistency.

For these data, all data have item-total correlation of more than 0.3, which is encouraging. All the items correlate very well with the scale. Overall, the questionnaire is reliable and no significant effect on the overall reliability. None of the items here would substantially affect the reliability if they were deleted. All the values are around the overall value.

Besides that, Cronbach's Alpha if item deleted' for each financial related factor that caused delay and cost overrun are highly significant to the questionnaire, which is higher than 0.9. It shows that all the financial related factors that are identified from the literature review, is acceptable for further investigation.

4.2.2.2 Pearson Correlation

Correlation between sets of data is a measure of how well they are related. the most common measure in correlation in statistics is Pearson Correlation. It shows the linear relationship between two sets of data. Using the mode of each variables from financial related factor that cause cost overrun and delay, data are analysed using Pearson Correlation to measure how well the two set of data are related.

Table 4.7: Pearson correlation of financial related factor that caused delay and cost overrun

Factors	LP1	LP2	LP3	LP4	LP5	LP6	LP7	LP8	LP9	CM1	CM2
Delay	2	2	2	2	2	2	2	2	2	3	3
Cost Overrun	3	3	3	3	3	3	3	3	3	3	3

Factors	CM3	CM4	CM5	CM6	MI1	MI2	MI3	IF1	IF2
Delay	3	3	3	3	4	4	4	4	4
Cost Overrun	3	3	3	3	3	4	4	3	4

Pearson Correlation Factor = 0.62051

Table 4.8: Pearson coefficient range and indication

Coefficient Value	Strength of Association
$0.1 < r < .3$	small correlation
$0.3 < r < .5$	medium/moderate correlation
$ r > .5$	large/strong correlation

From Pearson Correlation analysis, a result of 0.62051 is obtained showing a large positive strength of correlation between financial related factor that cause delay and financial related factor that caused cost overrun. Hence, the factors can be analysed together in frequency analysis to determine the factor that contribute to delay and cost overrun in construction project.

4.2.3 Respondents' frequency on Financial Related Factor that caused delay and cost overrun

In this study, the research hypothesis were written as the research propositions specifying the result to be expected and the significant level at 0.05. From the result, the value of t distribution for a particular variable is larger than $p > 0.05$

4.2.4 Ranking of Financial Related Factor that caused delay and cost overrun

Based on Respondents

Table 4.9: Average of mean from factor that caused cost overrun and delay

Factor	Delay	Cost Overrun	Average
LP1	2.84	2.74	2.79
LP2	3.03	2.76	2.89
LP3	2.82	2.79	2.80
LP4	2.66	2.87	2.76
LP5	2.50	2.66	2.58
LP6	2.61	2.92	2.76
LP7	2.74	2.76	2.75
LP8	2.68	2.87	2.78
LP9	2.71	2.84	2.78
CM1	2.82	2.63	2.72
CM2	2.92	2.79	2.86
CM3	2.68	3.11	2.89
CM4	3.05	3.39	3.22
CM5	2.68	2.76	2.72
CM6	2.68	2.66	2.67
MI1	3.29	3.55	3.42
MI2	3.76	3.71	3.74
MI3	3.71	3.58	3.64
IF1	3.08	3.42	3.25
IF2	3.24	3.32	3.28

Table 4.10: Ranking of factor that caused cost overrun and delay

Ranking	Factor	Average
1	MI2	3.74
2	MI3	3.64
3	MI1	3.42
4	IF2	3.28
5	IF1	3.25
6	CM4	3.22
7	LP2	2.89
8	CM3	2.89
9	CM2	2.86
10	LP3	2.80
11	LP1	2.79
12	LP8	2.78
13	LP9	2.78
14	LP4	2.76
15	LP6	2.76
16	LP7	2.75
17	CM1	2.72
18	CM5	2.72
19	CM6	2.67
20	LP5	2.58

From the ranking of factors that caused cost overrun and delay, it is seen that most of the respondents had agreed that the factors under the market instability category has the most significant impact on delay and cost overrun, with inflation of material prices, labour wages and transportation costs transportation costs (MI2) being the highest ranked factor. Followed by increment of foreign exchange rate for imported materials(MI3) and plants and inflation of material prices, labour wages and transportation costs transportation costs (MI1). Market instability is factor that will impact overall of a project more as compared to factors from late payment, poor cash flow management and insufficient financial resources as it is unpredictable and not in control by construction player

4.2.5 Respondents' Frequency on Financial Management Tool

Table 4.11 shows the most frequently used financial management tool used by contractors in Malaysia's construction industry according to our respondents.

Table 4.11 Respondents opinion on financial management tool

Most frequently used financial management tools	Frequency	Percentage	Cumulative percentage
Critical Path Method	15.0	39.5	39.5
Precedence Diagram Method	0.0	0.0	39.5
S-Curve	5.0	13.2	52.6
Ghantt Chart	14.0	36.8	89.5
Cash flow diagram	4.0	10.5	100.0
Total	38.0	100.0	

From table 4.11 the most frequently used tool by the respondents' project is the "critical path method", as indicated by 39.5 percent of the respondents. The critical path method is as easy way of project progress tracking. There are many advantages in using the Critical Path Method. The advantages of the usage of the Critical Path Method were discussed in the previous segment. CPM encourages managers and project members to graphically draw and identify various activities that need to be accomplished for final project completion. Periodic control of work after the start of construction is defined as continuous tracking of the progress of the work in a specific interval of time. It is an easy method to visualize the project schedule, and makes it very easy for the engineer to communicate the project schedule to various stakeholders as well as the project team.

4.2.6 Respondents' Opinion on Current Financial Management Software.

Table 4.12: summary of result for respondents' opinion on current financial management software

Question	Responses	Frequency (n)	Percentage (%)	Cumulative frequency (%)
3. Which software is used the most for financial management purposes in your company	Primavera	3	7.9	7.9
	JD Edward Enterprise One	0	0.0	7.9
	Microsoft Project	22	57.9	65.8
	Excel Spreadsheets	10	26.3	92.1
	Other	3	7.9	100.0
	Total	0	100	
4. Degree of success for the tools used for financial management	Very successful	7	18.4	18.4
	Moderately successful	26	68.4	86.8
	Unsuccessful	3	7.9	94.7
	Undecided	2	5.3	100.0
	Total	38	100	
5. Most significant disadvantage of the chosen software	Requires excessive work to implement	5	13.2	13.2
	Requires too much dependency of specialist	10	26.3	39.5
	Complicated software required a lot of details	6	15.8	55.3
	Features of grouping and sorting data is very limited	0	0.0	55.3
	Not all parties understand the application of the software	7	18.4	73.7
	Do not really have a reporting features	5	13.2	86.8
	Relatively expensive	5	13.2	100.0
	Total	38	100	

4.2.6.1 Preferences on Financial Management Software

From figure 4.2, in managing the financial of a project, there are various software out there in the market. The most popular software used is Microsoft project used by majority of the respondents (57.9%).

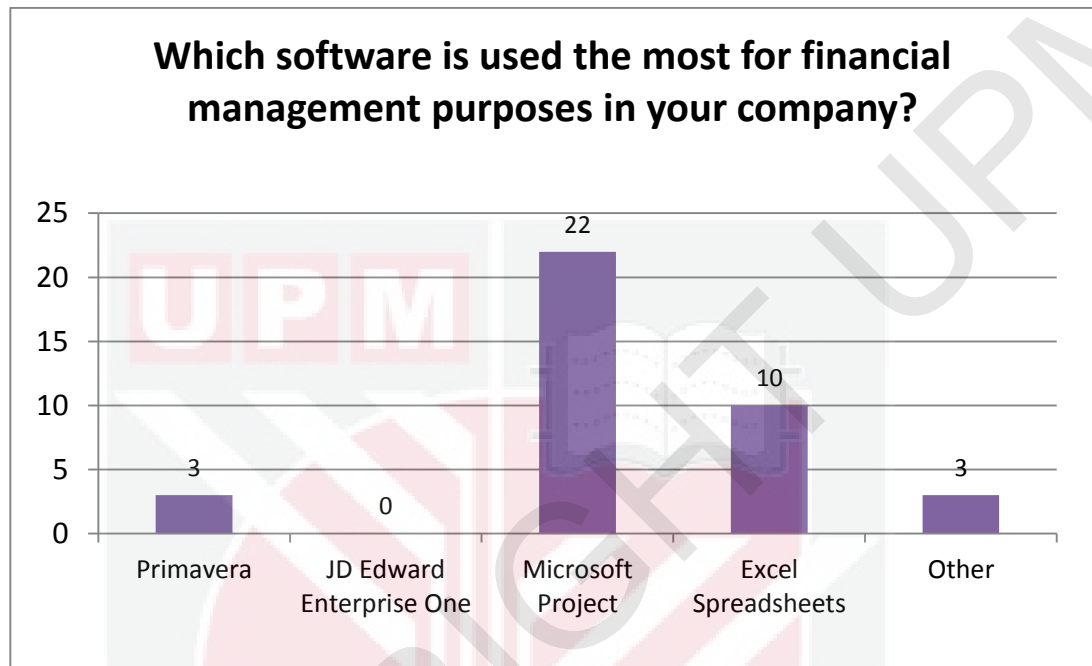


Figure 4.2: The response of financial related software preferences

It is one of the most easily accessible in the market software with lower costs. Therefore, it is the preferred software despite having some limitations compared to other software. The second most used software is Excel Spreadsheet (26.3%) and followed by Primavera (7.9%). Meanwhile, JD Edward Enterprise One is used least by company as there are many other software packages used for financial management purposes besides the software mentioned above.

4.2.6.2 The response on the Degree of Success of the Software

As shown in figure 4.3, there is almost 68% of the respondents summarised that the current software used by their company as moderately successful. Only 19% of the respondents answered very successful and a smaller amount of the respondents are undecided. Hence, it is deduced that despite the popularity of software usage it still has its own fair share of disadvantages. This could be the reasons why many respondents did not agree that the particular software was very successful in financial management of their project.

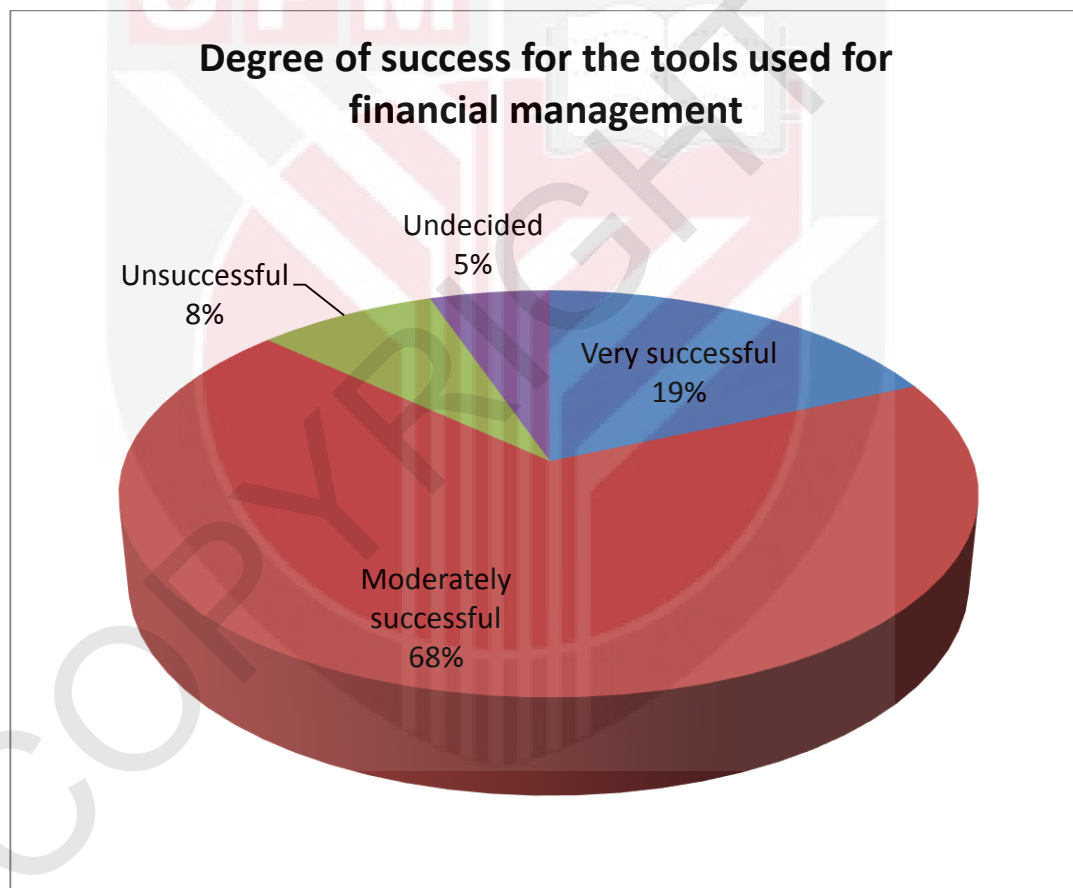


Figure 4.3: The degree of success of the software

4.2.6.3 The weakness of the available software

The figure 4.4 represent the responses of the software's weakness obtained from questionnaire survey.

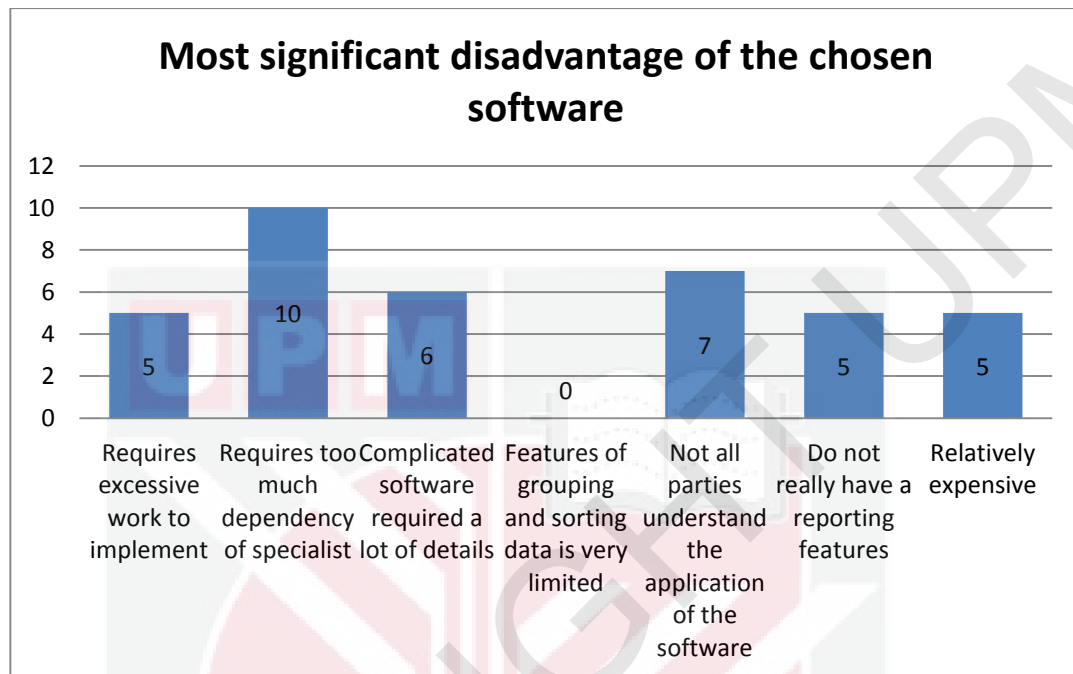


Figure 4.4: The responses on the software's weakness

From the results obtained in the frequency analysis on the weakness of the software used by their company, it could be used to determine the major problem faced by respondents. The most critical weakness of the software as agreed by the respondents is that they required too much dependency on a specialist who are well versed in the software, which makes up 26.3% of the total respondent. The second and third highest weakness are not all parties understand the application of the software used by their company (18.4%) and that the software is complicated and required a lot of details(15.8%). Data redundancy results in inefficient processes and poor data quality. The construction schedule must be readable and easily understood by the field personnel who are involved in work supervision. Hence, the proposed software should be simplified and user friendly to the use.

4.3 Development of financial management system

The development of financial management tool is based on the findings presented earlier. In previous section of chapter 4, the problem and current practice in construction industry are determine through questionnaire survey. The results obtained enabled the formulation of a framework for cost and schedule control.

4.3.1 General Overview of Improvement to be Incorporated

From the review of previous research, the financial management tool to be developed should have a basis as followed:

- Tool should be simple, user-friendly, and less expensive method that can be implemented by any party involve in construction project.
- Tool should be able to indicate cost and time at any percent of work performed in order to estimate at completion performance variations.
- Tool should be able to provide early warning on both schedule and cost so that corrective action can be taken to prevent further decline
- Tool should consider the impact of corrective actions on future performance.

4.3.2 Procedure of setting up the Financial Management system

As shown in figure 4.5, it summarized the procedure of setting up the financial management system

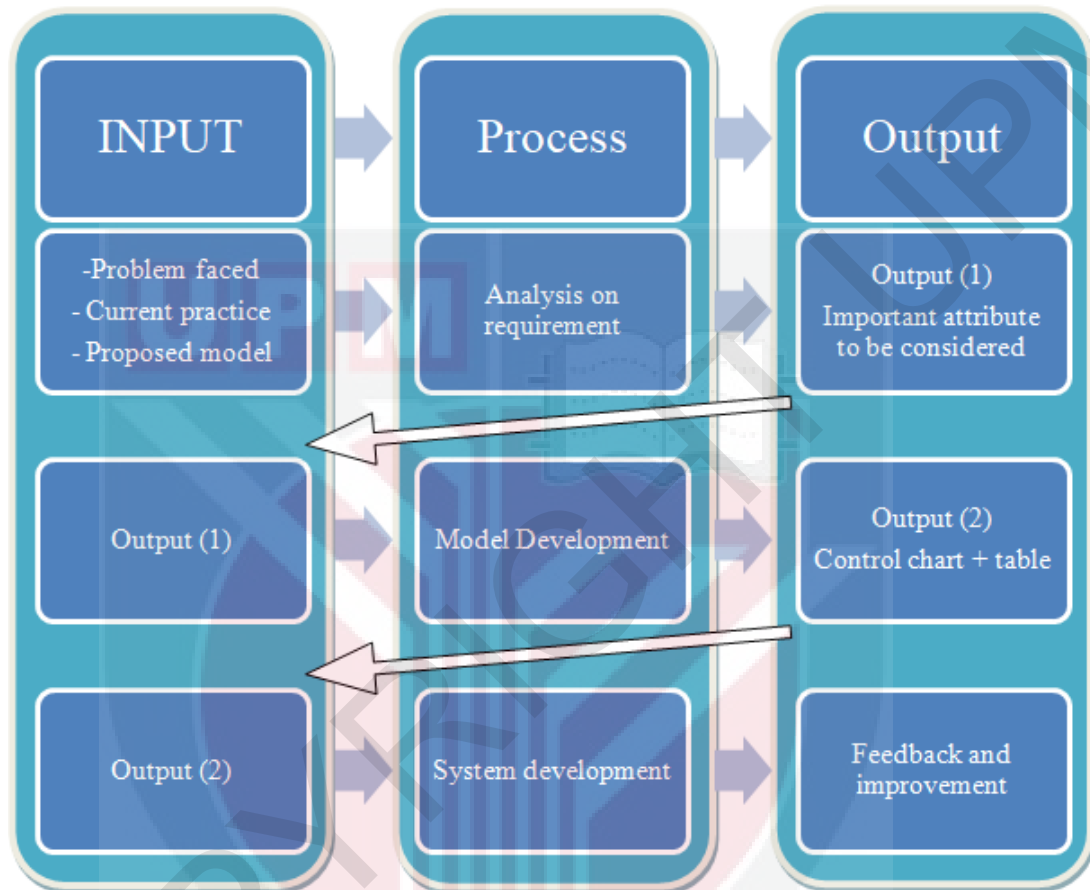


Figure 4.5: Procedure of setting up the financial management system

4.3.3 Data Flow Diagram for Cost Control (Cost overrun)

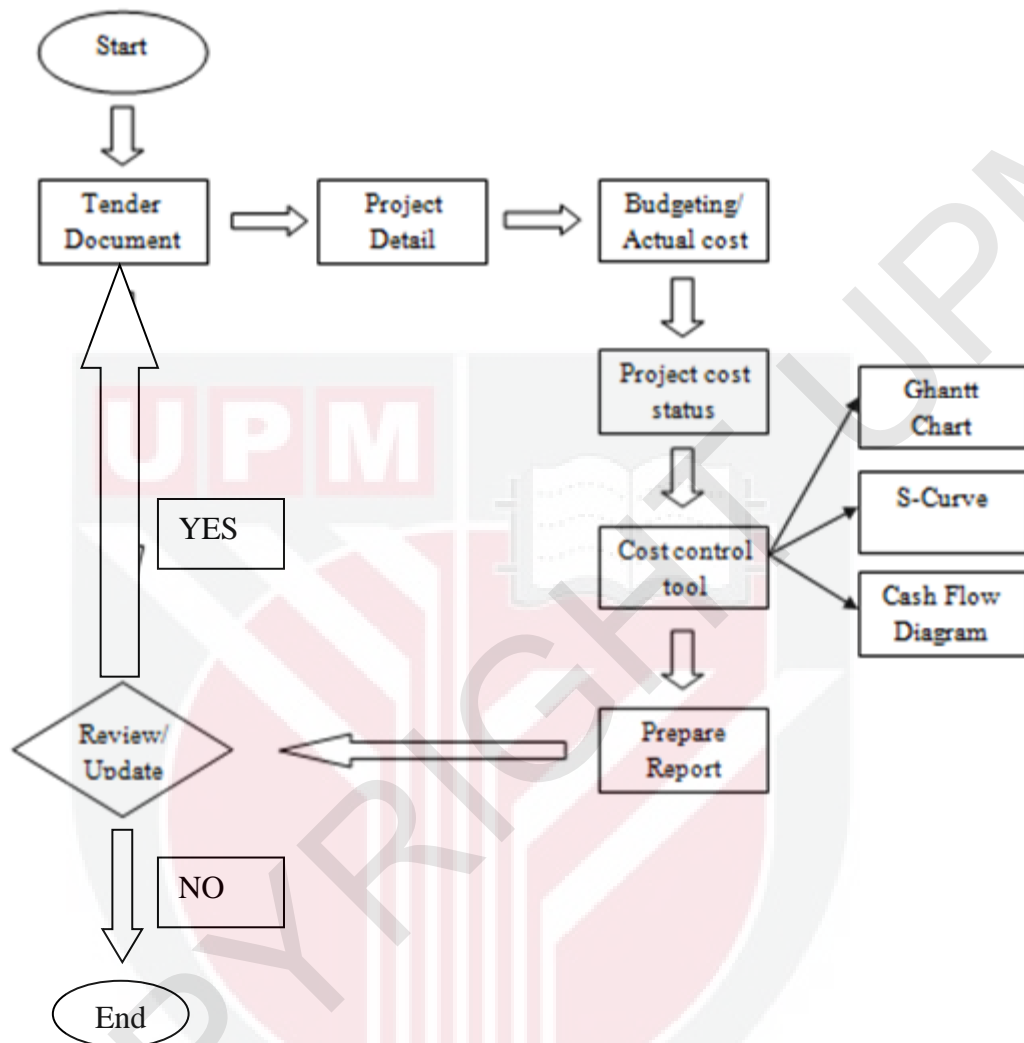


Figure 4.6 Tools Flow Chart (Cost)

4.3.4 Data Flow Diagram for Schedule Control (Delay)

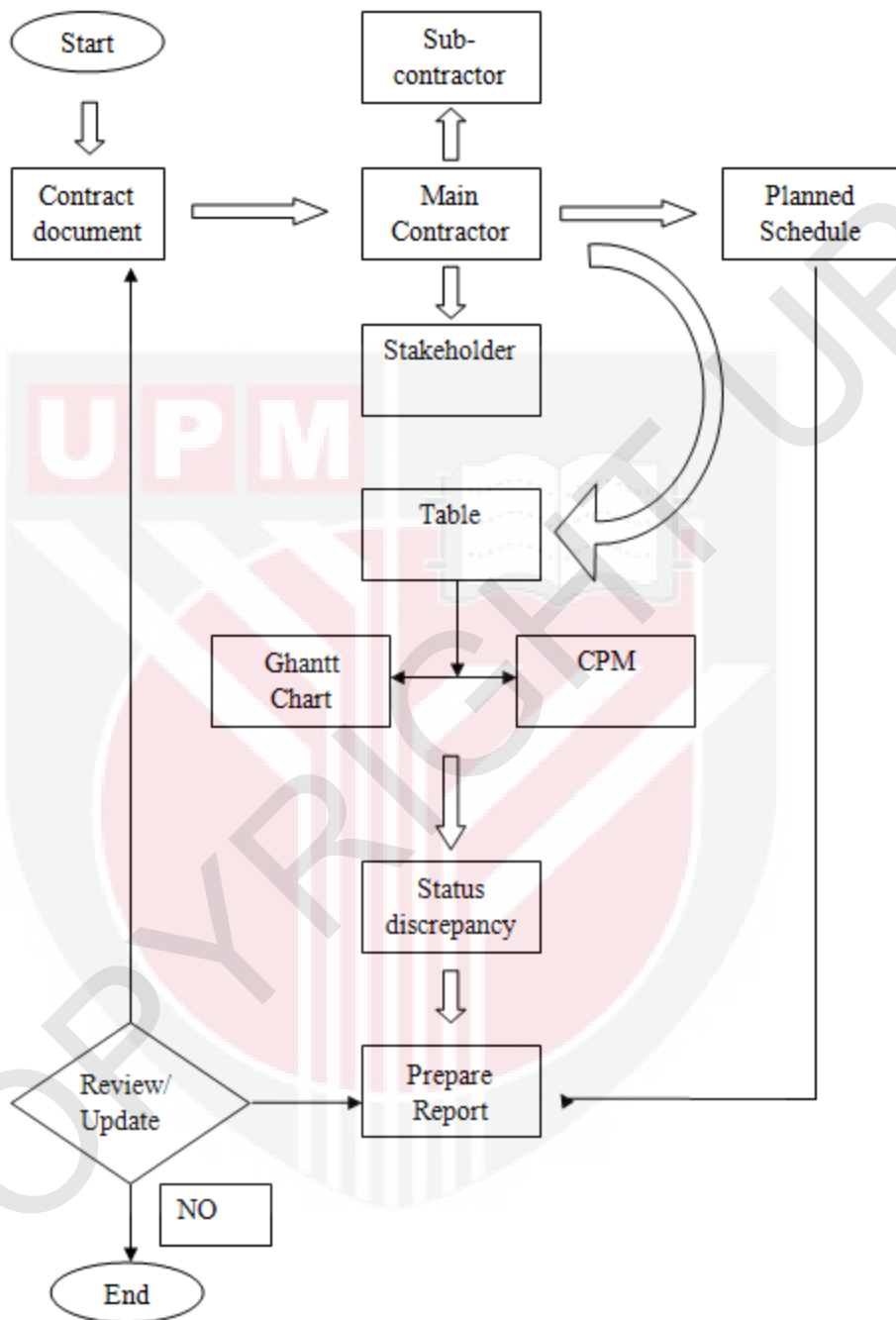


Figure 4.7 Tools Flow Chart (Schedule)

4.3.5 Procedure of Using Developed Financial Management System

1. Figure 4.8 shows the login page into the account

Financial Management System Home Create Project Project Listing Audit Upload File File Listing

Log in.

Use a local account to log in.

Email oscar@gmail.com

LoginPassword

Log in

Register as a new user

© 2017 - Financial Management System

Figure 4.8: Login page

2. Figure 4.9 shows the create account function

Financial Management System Home Create Project Project Listing Audit Upload File File Listing Register

System User - Add

Name NAME Phone PHONE

Email Email

LoginPassword LoginPassword

Save Cancel

© 2017 - Financial Management System

Figure 4.9: Add user page

3. Figure 4.10 shows the Home page displayed after user successfully login. It indicates the current status of the project and compare it with total progress and also total cost. Users are able to change chart filter in order to only display details of interest.

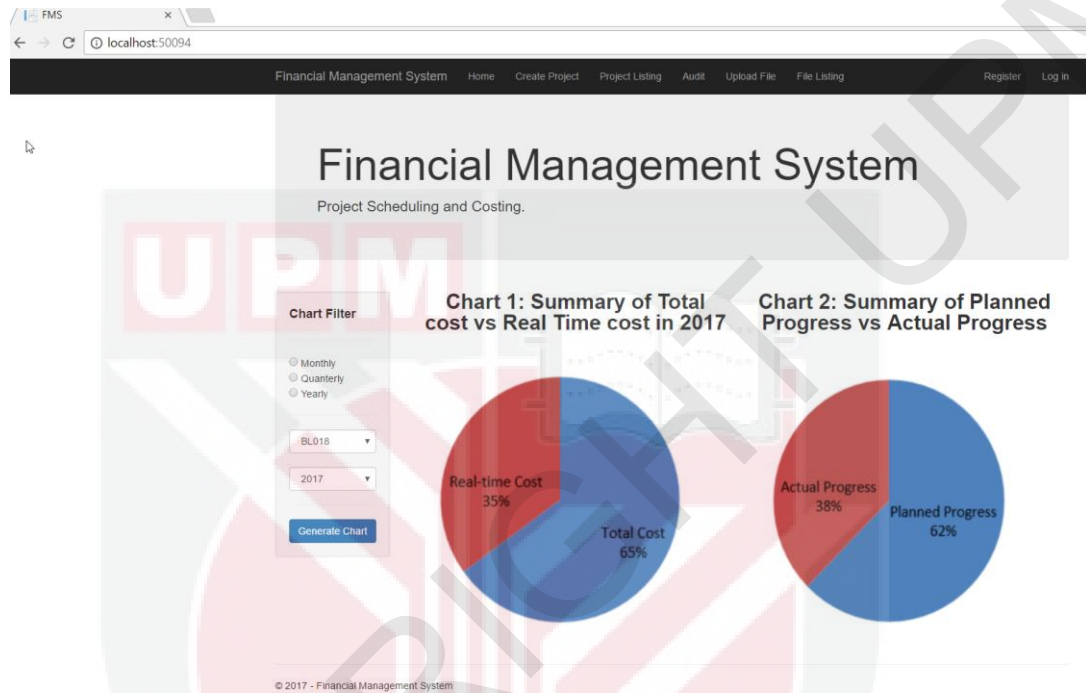


Figure 4.10: Home page

4. Figure 4.11, users are able to add project through create project functionality.

Activity	Assignment	Planned					Action
		Start Date	End Date	Period	Total Cost(RM)	Weightage(%)	
Commense of work	Lee	31/2017	05/03/2	3	10000	10	Add More

Figure 4.11: Create project page

5. Figure 4.12, all project held by the company is display in project listing where users can click on edit to update the project.

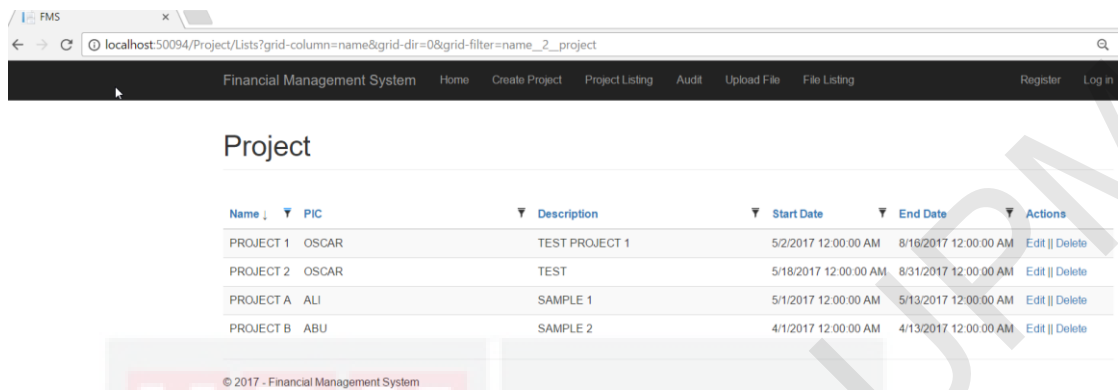


Figure 4.12 Project listing page

6. Figure 4.13 users choose the date in "update date" and key in the data for actual cost and actual progress for that particular date. Planned cost, planned progress and weightage are automatically calculate by the system. User click on submit to save the data for the date.

Project - Edit

* Project Name: PROJECT A

* Project Description: SAMPLE 1

* Person In Charge: ALI

Project Duration: 13

* Start Date: 05/01/2017

* End Date: 05/13/2017

* Update Date: 05/03/2017

Total Cost(RM)	Weightage(%)	Real Time					Action
		Planned Cost(RM)	Actual Cost(RM)	Planned Progress(%)	Actual Progress(%)	Weightage(%)	
10000.00	10.00	10000.00	10000	100.00	100	10.00	Add More
20000.00	20.00	10000.00	9000	50.00	40	8.00	Remove
30000.00	30.00	0.00	0.00	0.00	0.00	0.00	Remove
40000.00	40.00	0.00	0.00	0.00	0.00	0.00	Remove

Submit Generate Chart

Figure 4.13 Update project page

7. When generate chart function is chosen. 2 windows will pop up showing Gantt chart and S curve for cost and schedule.

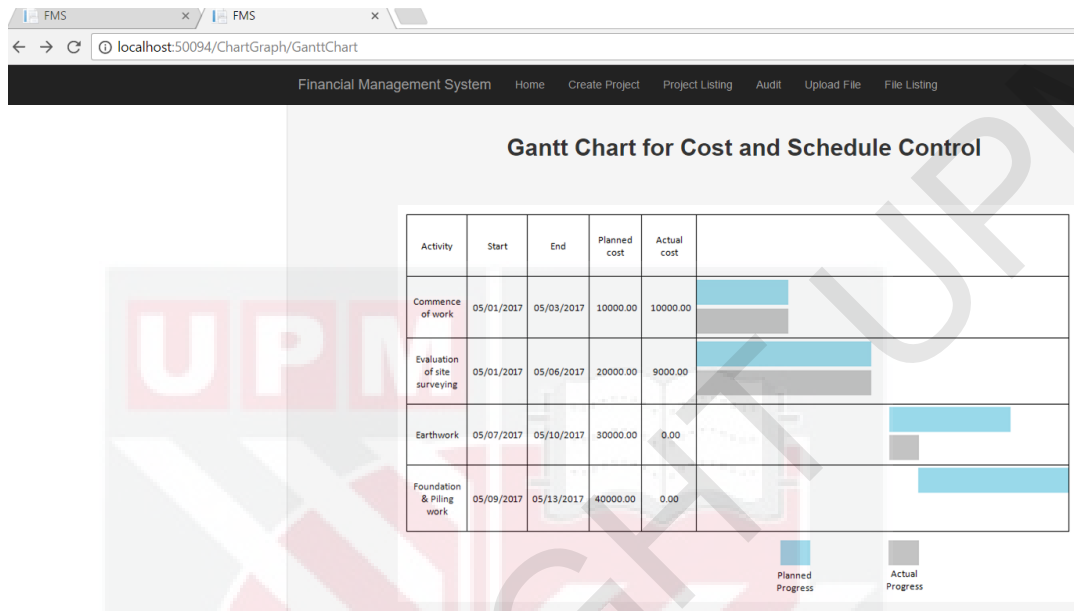


Figure 4.14 Gantt chart for cost and schedule

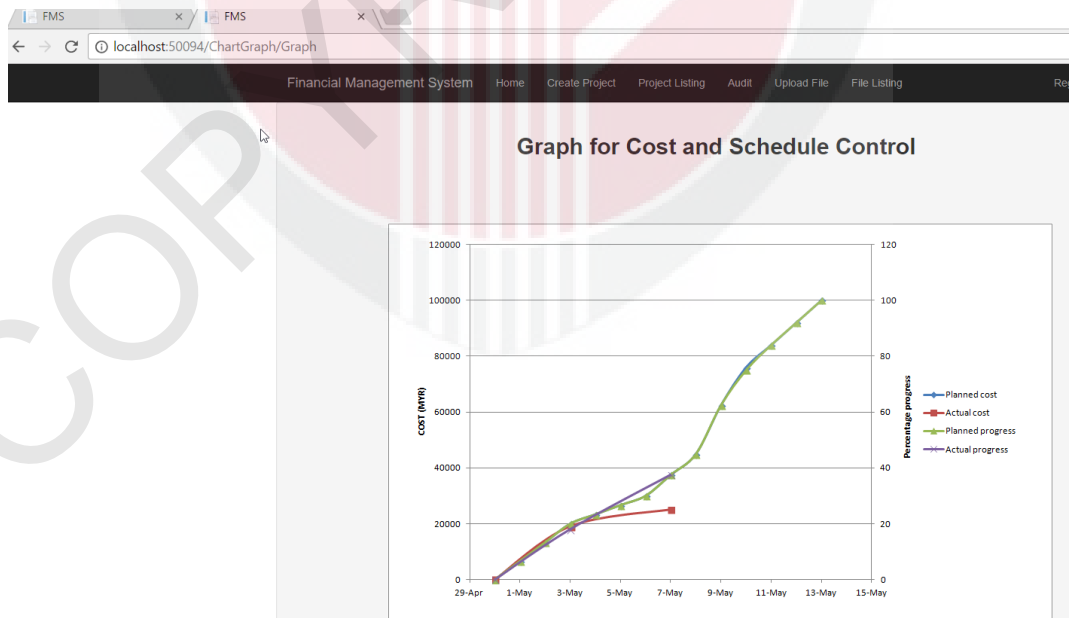


Figure 4.15 S-curve for cost and schedule

4.3.6 Verification and Implementation

- The tools function as expected.
- Useful as it indicates project status (under budget, over budget, behind schedule, ahead of schedule)
- Helpful for small and medium contractors as they have less activity.
- Should be have added function for user to include variation order and extension of time, data and S-curve will adjust itself. (See figure 4.13)
- For integrated cost and progress chart, user should be given an option to separate the chart (See figure 4.15)
- Can only cater for a small amount of activities.

4.3.7 Summary

Chapter 4 discussed the data collection from the respondents through distributed questionnaires. Respondents' background were analyze to provide a picture of their an insight on their understanding of technical aspects and pass experience which influenced the individual personal view and also the result of the study. The analysis of the data collected show findings of study and discussion were made accordingly.

Also, through the data collected from questionnaire, requirement of what need to be included in the model development is identified. The model developed should be able to fulfilled the need of contractor. Web-based system is suggested to be for the financial management system.

CHAPTER 5

CONCLUSION

5.1 Introduction

In this final chapter of the research project, the overall conclusion and summary of the study will be made. The result and findings gathered throughout the study will be summarised in this chapter by referring to the main objective of this study is to accomplish the objectives of the study.

5.2 Conclusion

Objective 1 - The purpose of this study is to identify the current financial management plan/system and the status in Construction, identify the common financial related factor for both project delay and cost overrun issues and finally to come out with a simple financial management solution that is able to minimize the risk for SME contractor from experiencing the targeted factor that lead to financial problems.

Current financial management software and tools that's more commonly used are determine through literature reading. The software and tools most commonly used by contractors of this category are find out through questionnaires question with most of them prefer Microsoft Project for management software and Critical path method used as the tool. The respondents were also asked to ranked the effectiveness also the biggest disadvantages of the current construction management used. Only a small portion of the respondents agreed that the software is very successful in financial management and most agreed that software requiring specialist are the biggest disadvantages of current software.

Objective 2 - Based on literature review, it's understood that the common financial related factor that caused both cost overrun and delay can be divided into four groups which are, poor cash flow management, delayed payment, market instability and insufficient financial resources. There are as many as 20 common factors under the four group. Questionnaires are send out and respondents are asked on to ranked the severity of each factor contributing to both delay and cost overrun with likert scale. It is found out that market instability make up the three top contributing factor to the problems according to industry players.

Objective 3 - In proposing the simple financial management solution for small and medium contractors, it is important to look into both cost control and schedule control as delay is related to schedule and cost overrun is related to cost. However, if one of the problems exist, it will negatively impact the financial performance of a contractor. Hence, to provide a simple financial management solution that can counter cost overrun and delay, both cost and schedule control must be looked into. The questionnaire data are also important as the requirements of the system to be developed are derived from it. The disadvantages of the current software is being

looked into and the counterpart of will be the advantages of the software that is going to be proposed. Besides, most used tools and software were find out to know which software can be used as reference during software development as to create a software that gives the user a feeling of familiarity. A web based application financial management system has being developed and through verification had deem to be good for simple project.

5.3 Recommendation

Since this research only looked into small and medium contractor company opinion, in the future, research can be done based on opinions and respondent from large contractor company. Large contractor company might have different opinion of the financial related factor that caused cost overrun and delay as their project are usually more complex and involve huge capital. They might think some other factors are more critical in causing cost overrun and delay hence required a different system to solve it.

This research has only studied on common financial related factor that caused cost overrun and delay. Future studies can focus on finding the common factor for other aspect which are client-related factors, contractor-related factors, consultant-related factors, material-related factors, labour- and equipment-related factors, financial-related factors and contract-related factor to come out with a framework or system to counter the problems caused these factors.

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APPENDICES



UNIVERSITI PUTRA MALAYSIA
FACULTY OF ENGINEERING
DEPARTMENT OF CIVIL ENGINEERING

QUESTIONNAIRE SURVEY

**FINANCIAL MANAGEMENT SYSTEM IN SMALL AND MEDIUM
CONSTRUCTION COMPANY**

OBJECTIVE OF RESEARCH

- i. To identify the financial related factors that cause delay and cost overrun for small and medium contractor.
- ii. To identify the current financial management plan/system in construction.
- iii. To proposed a simple financial management tool for small and medium contractor that will minimize the risk of contractor from experiencing targeted factor that lead to financial problem.

* This questionnaire is governed by the limiting condition which is only for academic purpose. All the information given is therefore private and confidential.

** This questionnaire is to be filled by **targeted respondent which involve in financial management** of a company.

APPENDIX A - QUESTIONNAIRE SURVEY FORM

Instruction: Please tick 'X' for the appropriate answer accordingly

PART I : Respondent Background

1. Position :

2. Number of years under construction industry?

() 0-5 years

() 6-10 years

() 11-15 years

() 16-20 years

() More than 20 years

3. Company's Name :

4. Company Phone's Number :

5. Company E-Mail Address :

PART II : Issues on Financial Management

1. Rate the likelihood for following financial related factors causing **delay** in a construction project:

FINANCIAL RELATED FACTORS	Almost Certain	Likely	Possible	Unlikely	Rare
i) LATE PAYMENT	1	2	3	4	5
Client's poor financial management	1	2	3	4	5
Withholding of payment by client	1	2	3	4	5
Contractor's invalid claim	1	2	3	4	5
Consultant delay the valuation and certification of interim payment	1	2	3	4	5
Inaccuracy of valuation for work done	1	2	3	4	5
Insufficient documentation for valuation	1	2	3	4	5
Involvement of too many parties in the process of honouring certificates	1	2	3	4	5
Heavy workloads of consultant to carry out evaluation for work done	1	2	3	4	5
Contractor's misinterpretation of client's requirement of variation order	1	2	3	4	5

FINANCIAL RELATED FACTORS	Almost Certain	Likely	Possible	Unlikely	Rare
i) POOR CASH FLOW MANAGEMENT	1	2	3	4	5
Contractor handles too many projects at one time	1	2	3	4	5
Contractor's instable financial background	1	2	3	4	5
Unqualified contractor underbidding the project	1	2	3	4	5
Lack of regular cash flow forecasting	1	2	3	4	5
Poor credit arrangement with creditors and debtors	1	2	3	4	5
Capital lock-up	1	2	3	4	5

FINANCIAL RELATED FACTORS	Almost Certain	Likely	Possible	Unlikely	Rare
iii) FINANCIAL MARKET INSTABILITY	1	2	3	4	5
Increment of interest rate in repayment of loan	1	2	3	4	5
Inflation of material prices, labour wages and transportation costs	1	2	3	4	5
Increment of foreign exchange rate for imported materials and plants	1	2	3	4	5

FINANCIAL RELATED FACTORS	Almost Certain	Likely	Possible	Unlikely	Rare
iv) INSUFFICIENT FINANCIAL RESOURCE	1	2	3	4	5
Difficulties in obtaining loan from financiers	1	2	3	4	5
Allocation of government budget not in place	1	2	3	4	5

2. Rate the likelihood for following financial related factors causing **cost overrun** in a construction project:

FINANCIAL RELATED FACTORS	Almost Certain	Likely	Possible	Unlikely	Rare
i) LATE PAYMENT	1	2	3	4	5
Client's poor financial management	1	2	3	4	5
Withholding of payment by client	1	2	3	4	5
Contractor's invalid claim	1	2	3	4	5
Consultant delay the valuation and certification of interim payment	1	2	3	4	5
Inaccuracy of valuation for work done	1	2	3	4	5
Insufficient documentation for valuation	1	2	3	4	5
Involvement of too many parties in the process of honouring certificates	1	2	3	4	5

Heavy workloads of consultant to carry out evaluation for work done	1	2	3	4	5
Contractor's misinterpretation of client's requirement of variation order	1	2	3	4	5

FINANCIAL RELATED FACTORS	Almost Certain	Likely	Possible	Unlikely	Rare
i) POOR CASH FLOW MANAGEMENT	1	2	3	4	5
Contractor handles too many projects at one time	1	2	3	4	5
Contractor's instable financial background	1	2	3	4	5
Unqualified contractor underbidding the project	1	2	3	4	5
Lack of regular cash flow forecasting	1	2	3	4	5
Poor credit arrangement with creditors and debtors	1	2	3	4	5
Capital lock-up	1	2	3	4	5

FINANCIAL RELATED FACTORS	Almost Certain	Likely	Possible	Unlikely	Rare
iii) FINANCIAL MARKET INSTABILITY	1	2	3	4	5
Increment of interest rate in repayment of loan	1	2	3	4	5
Inflation of material prices, labour wages and transportation costs	1	2	3	4	5
Increment of foreign exchange rate for imported materials and plants	1	2	3	4	5

FINANCIAL RELATED FACTORS	Almost Certain	Likely	Possible	Unlikely	Rare
iv) INSUFFICIENT FINANCIAL RESOURCE	1	2	3	4	5
Difficulties in obtaining loan from financiers	1	2	3	4	5
Allocation of government budget not in place	1	2	3	4	5

3. What kind of software is used **most** for financial management purposes in your company? **(CHOOSE ONE)**

- Primavera
 - JD Edward EnterpriseOne
 - Microsoft Project
 - Excel Spreadsheets
 - Other, please specify:
-

4. In reference to the question above, what is the degree of success of the above used software for financial management?

- Very successful
- Moderately successful
- Unsuccessful
- Undecided

5. What are the **most significant** disadvantages of the software used by your company? **(CHOOSE ONE)**

- Requires excessive work to implement
- Requires too much dependency of specialist
- Complicated software and requires a lot of details
- Features of grouping and sorting data is very limited
- Not all parties understand the application of the software
- Do not really have a reporting features
- Relatively expensive

6. Which of the following tools is **most frequently used** by your company? **(CHOOSE ONE)**

- Critical path method
- Precedence Diagram Method
- S-Curve
- Ghantt Chart
- Cash flow diagram

7. Please answer the questions base on only one (1) completed project.

Project	
Year	
Contract sum	RM.....
Contract periodmonths
Actual contract sum	RM.....
Actual contract periodmonths

8. Would you like to share your experience of the project more detail in a walk in interview after this questionnaire. Please fill in your name, contact number or email if yes.

Name :

Contact no. :

Email :

~Thank You Very Much For Your Time!~

