STUDY ON MITIGATION FACTORS FOR CONTROLLING COST OVERRUN IN CONSTRUCTION PROJECT

FATEHI MANSOOR SAAD ABDULLAH

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Universiti Tun Hussein Onn Malaysia

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DEDICATION

This thesis is dedicated to my beloved father and mother. I also, dedicated this work to my beloved brother, sisters and my entire family members for tremendous love, care and courage during the cause of my studies and journey to produce this thesis.

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ABSTRACT

The construction industry plays an influential role in the socio-economy of a country. In Malaysia also, the construction industry is one of essential industry participating significantly in the growth of socio-economic development. The construction industry in Malaysia are still facing a significant issue of cost overrun, where only 46.8% of public sector and 37.2% of private sector projects were completed within the specified budget. The issue of cost overrun has become a serious concern to investors, which needs stern attention and in-depth research to put forward solutions to this issue. The objectives of this research are to investigate current mitigation practices for controlling cost overrun in construction projects, to identify mitigation problems for controlling cost overrun in construction projects and to recommend key mitigation factors for controlling cost overrun in construction projects. The research was take place in Johor Bahru the capital of Johor State. The research based on quantitative research by using questionnaire to carry out the research. The questionnaire was designed based on the objectives each objective has ten statements with one option, in order to get accuracy results. A total of 80 questionnaires were gathered from a total of 220 contractors of G7 distributed at Johor Bahru. Data collected was analysed using the Statistical Package for the Social Science 22.0 software. The method of analysis that had being used in this research is percentage, frequency and means score value. There is dissatisfaction about the current mitigation practices for controlling cost overrun. Moreover, the study proves that there are mitigation problems faced by contractors. Furthermore, majority of the respondents agreed to the recommendation provided by the study to control cost overrun. Respondents have been recommended that may will be effectiveness to keep construction project within budget. In conclusion, the research has been introduced and recommended major mitigation factors for controlling cost overrun may will help construction industry achieve project within budget.

ABSTRAK

Industri pembinaan memainkan peranan yang berpengaruh dalam sosioekonomi sesebuah negara. Di Malaysia, industri pembinaan merupakan salah satu industri penting yang terlibat dengan ketara dalam pertumbuhan pembangunan sosio-ekonomi. Industri pembinaan di Malaysia masih menghadapi isu besar yang membebankan kos, di mana hanya 46.8% daripada sektor awam dan 37.2% daripada projek-projek sektor swasta disiaken dengan peruntaken yang ditetapkan. Isu overrun kos telah menjadi perhatian serius kepada pelabur, yang memerlukan perhatian tegas dan penyelidikan mendalam untuk mengemukakan penyelesaian kepada isu ini. Objektif penyelidikan ini adalah untuk menyiasat amalan pencegahan semasa untuk mengawal kos terkumpul dalam projek pembinaan, untuk mengenal pasti masalah pengawalan untuk mengawal kos yang terkandung dalam projek pembinaan dan untuk mencadangkan faktor mitigasi utama untuk mengawal kos yang terkandung dalam projek pembinaan. Kajian ini dijalankan di Johor Bahru, ibu negeri Johor. Penyelidik berdasarkan penyelidikan kuantitatif dengan menggunakan soal selidik untuk menjalankan penyelidikan. Soal selidik itu direka berdasarkan objektif; setiap objektif mempunyai sepuluh kenyataan dengan satu pilihan, untuk mendapatkan hasil ketepatan. Sejumlah 80 borang soal selidik telah dikumpulkan dari sejumlah 220 kontraktor G7 yang diedarkan di Johor Bahru. Analisis data dianalisis dengan menggunakan perisian SPSS. Pembolehubah kajian ini didasarkan pada purata min; terdapat ketidakpuasan mengenai amalan mitigasi semasa untuk mengawal kos yang ditanggung. Selain itu, kajian ini membuktikan terdapat masalah mitigasi yang dihadapi oleh kontraktor. Tambahan pula, majoriti responden bersetuju dengan cadangan yang disediakan oleh kajian ini untuk mengawal kosnya. Responden telah disyorkan beberapa cadangan tambahan yang mungkin akan menjadi keberkesanan untuk memastikan projek pembinaan dalam anggaran. Kesimpulannya, penyelidikan telah diperkenalkan dan disyorkan mitigasi faktor utama untuk mengawal overrun kos mungkin akan membantu industri pembinaan Johor Bahru mencapai projek dalam anggaran.

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LIST OF ABBREVIATION

MARA	-	Majlis Amanah Rakyat
GDP	-	Gross Domestic Product
JKR	-	Department Known as Jaban Kerja Raya
CIDB	-	Construction Industry Development Board of Malaysia
SPSS	-	Statistical Package for the Social Sciences
EVA	-	Earned Value Analysis
RCF	-	Reference Class Forecasting
STEC	-	Shanghai Tunnel Engineering Co. Ltd
PCIM	-	Project Control and Inhibiting-Factors Management Model
G7	-	Tendering capacity of more than 7 million Ringgit Malaysia

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CHAPTER 1

INTRODUCTION

1.1 Research Background

The construction industry plays an influential role in the socio-economy of a country. In Malaysia also, the construction industry is one of essential industry participating significantly in the growth of socio-economic development (Memon *et al.,* 2010). The construction industry has been continually participating to the intensive economic growth of 5.8% in 2009 and subsequently 8.7% in 2010 for the overall Gross Domestic Product (GDP) growth (Memon *et al.,* 2012). Construction is a substantial part of development and modernization. While it is closely remedial to economic growth, it does not follow that providing motivation and increasing spending on projects necessarily lead to economic growth. The construction sector deals mainly with the provision of capital infrastructure, which has an impact on economic growth. The delivery of such infrastructure creates considerable employment through the multiplier effect (Ameh *et al.,* 2010).

The construction industry is the total through which materialistic development is achieved, and that is truly the incentive of the national economy. The more resources, labor, engineering, materials, equipment, capital, and market exchange are provided from within the national economy, the higher the factor of the extent of self-reliance (Borse & Khare, 2016). Construction industry contributes in big amelioration in the overall GDP of a country. Project achievement completion on time and within budget at specified quality levels is major gauge of success of project (Memon *et al.,* 2010). It also improves the quality of life by providing the essential infrastructure such

as roads, hospitals, schools and other basic and enhanced facilities (Rahman *et al.,* 2013). According to Olawale (2010) there had been many researches on the identification of impacting factors of project time and cost overruns worldwide. The most significant variables causing construction time and cost overruns are poor contract management, financing and payment of completed works, changes in site conditions, shortage of materials, imported materials and plant items, design changes, subcontractors and nominated suppliers.

Projects are reportedly unsuccessful across all the key performance measures including cost, time and quality performances. Understanding the essential factors affecting all these key performance measures is still an area of fulfillment in Malaysia. Hence, it is essential that the projects must completed successfully, that is, they must be completed on all measurement of time and within financial budgets dedicated, by managing any risks that could gamble success. Basically, the goal of practitioner engaged in any industry is to achieve the project completion within time and specified budget (Memon *et al.,* 2011). According to Ma *et al.* (2015) revealed that regardless of management efficiency and the financial strength of the contractor, accurate cost of project estimation at an early stage is the key of assured to avoid cost overrun in projects industries. Besides taking into consideration the criteria for successfully completed projects, the needs of the construction practitioners involved in the project who will be impacted by the changes brought about by the construction project should also be considered. Rahman *et al.* (2013) highlighted that it is fundamentally decisive to make construction projects completed successfully within time, budget and expected quality. However, being a complex, fragmented and schedule driven industry, it always facing frequent problems such as low quality and output, cost overrun, time overrun, construction waste and others. Of these, cost overrun is a severe problem because it affects the overall development of any country.

Nowadays, construction industry of Malaysia is being developed rapidly and constitutes an important element of Malaysian economy (Ali & Kamaruzzaman, 2010). However, it is facing frequent problems, such as time and cost overruns, poor workers performance, poor outcome, over dependent on workers from foreign countries and lack of resource (Ismail *et al.*, 2012). Although in Malaysia a lot of money has been spent in construction, but the construction industry is still facing a lot of challenges such as the disbursement overrunning the budget, delay to complete the project on time, the building deficiency and over dependent of foreign workers (Memon *et al.*,

2010). The construction industry is always facing serious problems like low productivity, low quality, delay, cost overrun and etc., due to nature of construction industry which one of the most complex, fragmented, schedule and resource driven industry (Memon *et al.*, 2011).

The construction industry plays an influence and essential part in a socio-economy in any country on the world. A construction project can be considered as a successful when it fulfills its predetermined goals and objectives. While, many projects of industry around the world fail to fulfillment the three element of successful for projects industry, which time, cost and quality. The most important matter causing construction time and cost overruns are poor contract management, financing and payment of completed works, changes in site conditions, shortage of materials, imported materials and plant items, design changes, subcontractors and nominated suppliers. The most effect way to secure and make sure not to extend of project, cost accurate cost of project estimation at an early stage is the key of assured to avoid cost overrun in construction industry.

1.2 Problem Statement

Malaysia is facing a significant issue of cost overrun in construction industry where only 46.8% of public sector and 37.2% of private sector projects were completed within the specified budget. The issue of cost overrun has become a serious concern to investors, which needs stern attention and in-depth research to put forward solutions to this issue (Rahman *et al.*, 2013). According to Memon *et al.* (2010) the large construction project in MARA face a major issue which is the delay resulting with considerable time overrun and cost overrun. Memon *et al.* (2013) highlighted that, only 46.8% and 37.2% of public sector and private sector projects completed within the specified budget, while 84.3% of the private sector projects completed within the 10% cost extension compared with 76.0% of the public sector projects which was investigated for 301 new construction projects and 58 refurbishment projects in Malaysia. Ismail *et al.* (2012) highlighted that, only 20.5% of the public projects and 33.35% of the private sector projects were completed within the specified time in Malaysia while only 46.8% of public sector and 37.2% of private sector projects were found completed within the specified budget.

Memon *et al.* (2012) have reported that, despite providing these huge funds, the construction industry is still facing a lot of defiance such as cost overrun the budget, delay in completing projects in time, defects, and over dependent on foreign workers, which those challenges specifically as a critical issue. While Endut *et al.* (2005) reported that, Malaysia still has a lack of previous study on the time and cost overruns of construction project industry and still need more focusing to investigate the essential factors for those causes. Memon *et al.* (2014) have reported that, on 2nd Jun 2009, 80% of Public Works Department known as Jaban Kerja Raya (JKR) projects, which conducted by Utusan Malaysia in year 2008 were delayed, and the government had been forced to bear the increased cost as well as waste of time and energy. Malaysia construction industry is facing a critical problem of time overrun, which often causes mess in workflow and minimize of productivity.

Malaysia still facing cost overrun in many projects construction industry, which one of the main cause is ineffective resource management (Memon *et al.,* 2013). Abdullah *et al.* (2013) highlighted that; large construction project (MARA) has been faced major issue delay in completing on specified time. More than 90% of large MARA construction projects had an experienced delay since 1984. According to Ismail *et al.* (2012) the time and cost performance in Malaysia construction industry is not satisfactory, this poor time and cost performance in construction projects is a result of several factors and it is very important to uncover these factors. These factors can be majorly classified in denomination including contractor's site management related factors, design and documentation related factors, financial management related factors, information and communication related factors, human resource (workforce) related factors, non-human resource related factors, project management and contract administration related factors and external factors. Therefore, the construction industry in Malaysia still needs more research to avoid and eliminate this kind of issue for better progress and more development.

1.3 Research Questions

(i) What are the current mitigation practices for controlling cost overrun in construction projects?

(ii) What are the mitigation problems for controlling cost overrun in construction projects?

(iii) What are the recommend key mitigation factors for controlling cost overrun in construction projects?

1.4 Research Aim and Objectives

The aim of this study is to measure key mitigation factors for controlling cost overrun throughout the project life cycle. In achieving this target, the objectives are:

(i) To investigate current mitigation practices for controlling cost overrun in construction projects.
(ii) To identify mitigation problems for controlling cost overrun in construction projects.
(iii) To recommend key mitigation factors for controlling cost overrun in construction projects.

1.5 Research Scope

This study of research is limited to the construction industry in Johor. In term of conducting the questionnaire survey was adopted. The respondents involved in data collection are limited to the construction practitioners under G7 aware of content, who have an experience in the construction industry. Besides that, the participants involved in this study are project manager, site manager, quantity surveyor (QS) and Project engineer as well. Furthermore, this study will identifies the expert opinion for factors affecting cost overrun along the project life cycle in Malaysian construction projects. Since the aim of this study is to investigate a suitable mitigation measures for controlling cost overrun factors in the Malaysian construction industry. The location chosen is Johor Bahru to investigate as a one of big Malaysian cities. Johor Bahru is earning most of construction project among Johor state compare to other cities in Johor.

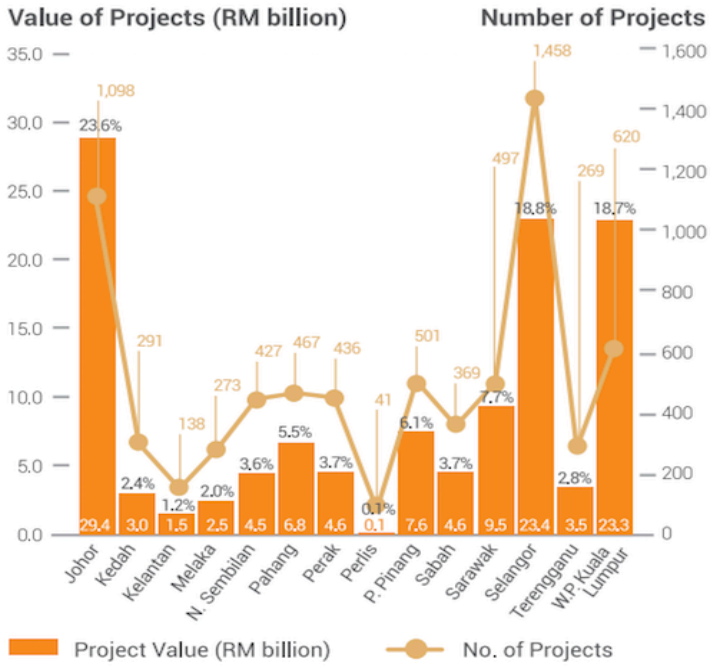

Figure 1.1: Number of Project by State (CIDB, 2018)

1.6 Research Methodology

The aim of the study is to establish the mitigation controlling for cost overrun and labor productivity on construction sites in Johor Bahru. To achieve this, use literature review that focuses on similar past research studies and helps in the identification of factors and categories, research methodology and analysis of data. The method of collecting data will be adopted quantitative research method involving data collection through structured questionnaire survey. Survey will care out amongst potential respondents, project manager, site management, quantity surveyor (QS) and project engineer.

Data was be collected from large construction firms that are based in Johor Bahru, which choice randomly from the registered list of the Construction Industry Development Board of Malaysia (CIDB) under Class G7 (tendering capacity of more than 7 million Ringgit Malaysia). A structured questionnaire as the instrument was been used to collect primary data for the study. Analysis of the data was been carried out using SPSS 22.0 data analysis software in assessing the strength of each factor affecting cost overrun. The demographic details of the respondents were produced and the mean ranks of the identified mitigating measures were used for the ranking in the

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