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COST PERFORMANCE FOR BUILDING CONSTRUCTION PROJECTS IN KLANG VALLEY

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Abstract

Since seventies, the economic of Malaysia has undergone rapid growth. Construction industry constitutes an important element of Malaysian economy. It shows how important to control and manage the projects in good quality and efficiently. There are four fundamental constraints needed to be considered when managing the construction projects, which are scope, cost, time, and quality. In order to manage the projects successfully, it is necessary to consider whether the project is within those four constraints. However, it found that there were many problems on cost performance in many countries. One of the major problems was cost overrun in construction projects. In Malaysia, the problem of cost overrun considered significance in construction industry. There were many factors that contribute to cost overrun in Malaysian construction projects. The factors might become risks and lead to negative effect to the projects. Hence, this research is to identify factors that contribute to cost overrun and potential measures to overcome the problem with the focus given to construction projects within Klang Valley. The method used in this research is quantitative based. A questionnaire survey conducted to collect data from the respondents that consisted of project manager, quantity surveyor, M & E Engineer, C & S Engineer, and other related respondents. Questionnaires were distributed to 30 respondents from construction firms in Klang Valley. Data collected form a database for analysis using Statistic Package for Social Sciences (SPSS) version 17.0. Descriptive statistics and ranking analysis were used in data analysis. The result shown that the most serious factor contributes to cost overrun was inaccurate or poor estimation of original cost and the factor do not affect most was mistake in design. The most important method to control construction cost is proper project costing and financing. On the other hand, the least important approach was establishing a system in design. In conclusion, the problem of cost overrun is not a small issue but could cause serious problems to the construction industry in Malaysia.

Keywords: Construction projects, Cost overruns, Cost performance, Malaysia

Introduction

Malaysia is in the process of rapidly developing. Intan Rohani et al. (2009) reported that since seventies, the economic in Malaysia has undergone rapid growth. It found that construction industry constitutes an important element of Malaysian economy. According to Chan (2001: 10), "*the construction sector achieved a more moderate growth of 11.8% in 1996 after recording a high growth of 15.2% in 1995*". Its constribution to GDP (Gross Domestic Product) is estimated to be stabilised at 4.5%.

In construction industry, it is important to have control on cost performance of projects to ensure the construction cost is within the budget. So, project cost management is needed to keep the project within its defined budget. Project Management Institute (2004: 14) defines project management as "*application of knowledge, skills, tools and techniques to project activities to meet project requirements*". A project gets more scientific and systematic when the project gets larger and more complex. This is because the project becomes necessary to integrate and coordinate human inputs and some of physical components within the four fundamental constraints which are scope, cost, time and quality.

According to Ramli (2003), cost management in construction industry is less effective compared to time management. Categories of project cost management include project resource planning, cost budgeting, cost control and cost estimating. Two important components of cost control are cash flow management and project accounting. It should determine the projected final cost and consider the projections of future cost where it involving scope, time and quality.

Cost overrun is a major problem in project development and is a regular feature in construction industry. The situation of a construction project in which budgetary estimate exceeds estimation, budget exceeds budgetary estimate, and settlement exceeds budget is a universal phenomenon. Construction cost which is out of control adds to investment pressure, increases construction cost, affects investment decision-making and wastes the national finance might result in corruption or offence. Hence, it is important to identify the factors that contribute to cost overrun to avoid and reduce the problems.

Cost Performance

"Cost is among the major consideration throughout the project management life cycle and can be regarded as one of the most important parameters of a project and the driving force of project success" (Azhar et al., 2008: : 7). Gido and Clements (2003) mentioned that cost performance is an effective technique in project management effort expended and it is widely accepted in the literature and industry. Earned Value Analysis (EVA) is used to evaluate cost performance of different types of projects. Cost control, cost estimating, and cost budgeting are three cost related processes that interact among each other and with other scopes of construction projects.

Besides that, Gido and Clements (2003) stated that there are four cost-related measures in cost performance analysis which are used to analyze cost performance of a project. The measure is used to evaluate the project whether the project is being performed within the budgeted cost or whether it is in line with the actual cost. The four cost-related measures are TBC (total budgeted cost), CBC (cumulative budgeted cost), CAC (cumulative actual cost), and CEV (cumulative earned value).

Normally, cost estimation will be made before start a project so that it can be controlled within cost budget. A project may require more than one person and may occur more than once during the life of a project which depending on the complexity of the project. It may be very simple or extremely complex when managing the cost of project. In project management, it should also consider the needs of project stakeholders in the project cost (Gido antd Clements, 2003).

It found that it is important to studies more detail on costs of building and it is agreed by Ashworth (1994: 6) found that "*cost studies of buildings consist of the application of the techniques and expertise of economics to construction projects*". Also, it is to ensure available resources are used efficiently and to increase the rate of growth of construction work in the most efficient manner.

Cost Overrun

Cost overrun is a very common phenomenon and majority projects in construction industry facing this problem. Cost overrun occurs when the final cost or expenditure of the project exceeds the original estimation cost, Avots (1983). Angelo and Reina (2002) pointed out that cost overrun is one of the main problems in construction industry. The problem may found in both developing and developed countries. This problem is quite serious and futher study on this issue is needed to reduce the problems. There are some factors contribute to cost overrun in construction industry which are found from the researchers' study. The factors are as follow:

Inaccurate or Poor Estimation of Original Cost

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

Inflation of Project Costs

Harrison (1981) stated that inflation of project costs cause increasing of costs. Inflation of materials, equipments, and labours costs may vary geographically within a country, from country to country, and contracts of subcontractors with suppliers may involve different inflation protection terms that agreed with a client. As inflation goes up, interest rates will go up and the costs will increase too.

Improper Planning

According to Frimpong (2003), improper planning and management experience limitation caused failures of using technical. The processes to produce a product become slower and take longer period to complete the project.

Fluctuation in Price of Raw Materials

Price fluctuation causes cost overruns in most cases where it is hard to estimate the cost accurately because it is objective. This happen caused by high inflation of price in developing countries or the speculation of suppliers (Long et al., 2008).

Poor Project Management

Poor of site supervison and management and poor project management assistance contribute to problem of cost overrun in construction projects. Poor of site management reflected the weakness and incompetency of contractors. Skilful and experience human resource is insufficient in site management (Long et al., 2008).

Lack of Experience

Chan and Park (2005) found that most of the contractors are lack of experience especially in financial management. The distributon of the costs do not plan well in the projects. It might cause over of costs budgeted.

Obsolete or Unsuitable Construction Equipments and Methods

Obsolete and unsuitable equipments and methods cause the progress of construction works become slower. Some countries try to import or transfer the modern technology into their countries. However, the method is unsuccessful because lack of skilful human to operate the technology (Long et al., 2004a).

Unforeseen Site Conditions

Nega (2008) found that actual site conditions of a project are not usually determined until excavation is completed. It is sometimes possible that site conditions are overlooked by the initial review or conditions have changed due to change of weather conditions or sub-soil conditions. The unexpected conditions on sub surface sometimes require fundamental redesign of projects with high expense. Changes of site conditions become a problem for machinery and supplies to move in and out of the site. This also increase costs required.

Mistake in Design

According to Long et al. (2008), mistakes in design or poor design are caused by the low-competence designer. The approval design or drawing process becomes low quality and ineffective especially for those with government-funded projects. The unrealistic design which found after the start the construction projects has to change and it could lead to cost overrun.

Insufficient Fund

Long et al. (2008) noted that delay of the projects followed by cost increasing to cover all the expenses during construction. Owners are not preparing sufficient fund for project and pay on time as shown in contract agreement to contractor.

Poor Contract Management

Ogunlana and Olomolaiye (1989) mentioned that many contractors in developing countries have organizes their own commercial undertaking. They are good in managing expense because they are familiar with the business of making money. They pay low wages, submit low bids and low ability to plan and coordinate contracts. They do not follow the agreement that stated in contract.

High Cost of Machineries

Chan and Park (2005) found that high cost of machineries is one of the market related problems. Construction industry is mainly market driven where it is influenced by curent market style. For example, when the oil needed to run machineries increasing, the rental cost of machineries also inceasing.

Construction Cost Underestimation

In order to get project approval for the project, some parties have deliberated underestimating of costs for their project. It is quite serious situation that occurred on some project (Nega, 2008).

Measures to Control Construction Cost

There are some measures which are found from the researchers' study to control the construction costs or to overcome the problems of cost overruns. The researchers have their own opinion on how to solve the problems. The measures are as below:

Proper Project Costing and Financing

Kaliba et al. (2009) stated that delays of schedule may occur caused of delayed in payments due to complex financial processes in client organisations. Delay in payment would cause financial difficulties to contractors and subsequently delay the schedule to complete the activities on site. Interest could be charged on delayed payments hence inducing cost overruns in the project.

Competent Personnel

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

Appropriate Scope Definition

Nega (2008) agreed that only concern on the works required to complete the project successfully. Guard against incomplete identification of scope is important to avoid frequent changes. Also, do not incorporate the works out of scope to avoid unnecessary works.

Proper Cost Control

Ashworth (1994) mentioned that one of the client's requirements in respect of construction project is assessment of its expected cost. Proper cost control is important as it is the general trend towards greater cost-effectiveness and ensures construction costs not solely in the context of initial costs, but in terms of life-cyccle costs or total cost appraisal.

Risk Management during Project Execution

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

Appropriate Contractual Framework

Peeters and Madauss (2008) has supported that once the objective of cost has been estimated, it is followed by choosing an appropriate contract model where there are techniques to make a relationship between the initial estimate and final price.

Increase Supply of Materials

Frimpong et al. (2003) found that there should prepare adequate allowance for any emergency case in order to cover increasing in material cost due to inflation.

Realistic Cost Estimation

The initial cost estimates should be as accurate as possible. Accuracy of cost estimation allows clients to check and determine the required funds for executing the project are made available when required (Kaliba et al., 2009).

Efficient Management

Gould (2002) stated that efficient management is important to produce a productive and cost efficient site. Scope may changes due to inadequate planning and feasibility studies. In order to control the project effectively, the project manager must follow up the schedule to avoid additional costs and ensure the building can be occupied on time as planned.

The techniques to overcome the problems of cost overrun are found by literature study. From the literature study, it found that there are eleven variables that are suggested by the researchers to overcome or reduce the problems of cost overrun in construction projects. An appropriate technique should be considered and used in construction projects in Malaysia to reduce the problems of cost overruns.

Research Methodology

There are four main stages involved in this study. They are:

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, availability of data, relevance, and ethical issues.

Stage 2: Research proposal

A research proposal includes the overall plan, structure, scheme, and designed method to get answers for the existing problems that constitute to the research project. Besides, a research proposal should outline the various tasks that have planned to undertake to fulfil the research objectives or obtain answers of the research questions.

Stage 3: Data Collection and Processing Data

After have determined the research problem, formation a study design, constructed a research instrument and selected a sample, data will be collected from where it will draw inferens and conclusion for the study. The method used to collect data in this study is questionnaire survey. The questionnaire is designed based on the objectives of the study. The questionnaires were distributed to 30 respondents of different projects. Then, it is followed by processing data. The data collected from the respondents will be analysed. Due to limitation of time and cost, the following limitations were used during the data collection process.

- The project was completed projects in Klang Valley.
- The project was completed in between years 2000-2009.
- The project size in contract value is at least RM 5,000,000.

Stage 4: Conclusion and Recommendations

At this stage, all of the relevant data were written up in a report. This included conclusion and recommendation for the research. The conclusion will be tied up with the objectives to ensure the objectives have been achieved.

Data Analysis and Discussion

The data collected by using questionnaire survey method will be analyzed by using Statistics Package for Social Sciences (SPSS) version 17.0. The data were collected from 30 respondents of construction consultancy firm in Klang Valley. The questionnaires were distributed to the relevant respondents which include project manager, quantity surveyor, M & E Engineer, C & S Engineer, and others repondents who have knowledge on cost overrun in their projects. The respondents need to answer the questions based on their projects selected which include types of project and total cost for the projects. It is also to identify the cost performance in their project.

The method used in the data collection is descriptve statistics. Purpose of descriptive analysis is to summarize the data collected from the respondents. In this study, decriptive analysis is applied in discussing the respondents' profile, projects' profile and respondents' opinion on the relevant projects. Two types of question are used in the questionnaire which is multiple choice questions and Likert scale. Table 1,2 and 3 shows the result collected from the 30 respondents:

There are many factors that contribute to cost overrun in construction projects. From literature review, it was found that there were thirteen main factors that contribute to cost overruns. The factors contribute to cost overrun includes inaccurate or poor estimation of original cost, inflation of project costs, improper planning, fluctuation in price of raw materials, poor project management, lack of experience, obsolete or unsuitable construction equipements and methods, unforeseen site conditions, mistake in design, insufficient fund, poor contract management, high cost of machineries, and construction cost underestimation.

Since cost overrun is a quite serious problem, so it is necessary to identify the measure can be implemented by contractors to control their construction cost. There are eleven measures have been identified which include proper project costing and financing, proper cost control, competent personnel, efficient management, risk management during project execution, realistic cost estimation, appropriate scope definition, appropriate contractual framework, establish training programs, increase supply of materials,and establish a system in design. The ranking of variables were identified based on the mean.

Table 3 shows ranking for measures used to control cost overrun in construction projects. From the result, it found that poor estimation in project costs is the main factor contributes to cost overrun in the projects of Klang Valley area. In respondents' opinion, mistake in design is not a serious problem if compare with other factors. Since poor estimation is the main problem, so the respondents consider that the main measure to overcome cost overrun is by controlling project costing and financing properly. Besides that, it found that the mistake in design is not a serious problem, so the respondents consider that establish a system in design is not very important for them to overcome cost overrun.

Conclusion

Cost performance in contruction projects is a critical issue in Malaysia. It was found that most of construction projects in Malaysia are affected by cost overrun. Finding of the research shows that construction industry suffered for the problem of cost overrun in projects. Two main variables that contributed to the cost overrun in Malaysian construction projects are poor estimation of original project cost and underestimate the construction cost by quantity surveyors.

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Appendix

Table 1: Result Obtained from Multiple Choice Questions

Questions	Major answer from respondents	Percentage (n=30)
Position of respondents	Project manager	44
Frequency of Respondents' involvement in cost overruns	5-10 times	47
Types of project selected	Residential	60
Total cost for project selected	More than RM 20,000,000	37
Ratio for actual project cost to target project cost	0 to 8, 0.81 to 0.90, 0.91 to 1.00	23.3

Table 2: Ranking on Factors Contribute to Cost Overrun

Variables	Mean (n=30)	Standard Deviation	Ranking
Inaccurate / poor estimation of original cost	4.30	0.794	1
Construction cost underestimation	4.30	0.837	1
Improper planning	4.27	0.828	3
Poor project management	4.20	0.847	4
Lack of experience	3.90	0.803	5
Poor contract management	3.83	0.950	6
Inflation of project costs	3.80	1.031	7
High cost of machineries	3.67	0.884	8
Fluctuation in price of raw materials	3.47	1.167	9
Unforeseen site conditions	3.47	0.776	9
Insufficient fund	3.33	0.959	11
Obsolete / unsuitable construction equipments and methods	3.27	0.828	12
Mistake in design	3.17	0.986	13

Table 3: Ranking on Measures to Control Construction Cost

Variables	Mean (n=30)	Standard Deviation	Ranking
Proper project costing and financing	4.70	0.466	1
Proper cost control	4.50	0.682	2
Competent personnel	4.47	0.681	3
Efficient management	4.43	0.728	4
Risk management during project execution	4.33	0.711	5
Realistic cost estimation	4.13	0.629	6
Appropriate scope definition	3.97	0.718	7
Appropriate contractual framework	3.80	0.714	8

Establish training programs	3.67	0.758	9
Increase supply of materials	3.53	1.074	10
Establish a system in design	3.50	0.820	11