

Approaches in management of Construction delays and cost overrun of Multiple D&B Projects in Sabah

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Abstract

The construction industry in Malaysia is of paramount importance for creating employment in the country, both directly and indirectly unlike other industries. It is the highest contributor to the country's economic growth as evident from the CIDB reports. Malaysian construction industry has shown continuous growth since independence. Over the years, many forms of private sector participation have been evolved for infrastructure projects of which the Design and Build (D&B) method is one of the most popular approaches for specialised works. Public infrastructure projects under D&B arrangement have a complex risk profile. To a considerable extent, the success of any D&B projects is influenced by the degree of which various project risks are managed. This study has identified the gaps in previous research studies which lack in providing a practical approach to identify these risks and the appropriate responses. The paper discusses the recent related studies from literature; type of contract procurement practiced in Malaysia and a case study of multiple D&B projects in Sabah. The methods planned for the entire research are described in this article. The study of the entire research work is divided into two approaches. Firstly to conduct the questionnaire survey in the industry to acquire ranking of factors causing delays and cost overrun. Secondly to record the potential delay causing factors from the real time project. This paper has collected and analyzed the time and cost related data from the multiple bridge projects. This includes the completed and ongoing multiple projects of the D&B contractor. The final research findings are obtained by comparing the results of the studies from the analysis of the questionnaire survey responses and the case study. Outcome of this analysis has the benefit of providing reliable risk avoidance methods with applicable solutions for the construction practice.

Keyword

Multiple project, Design & Build, Construction delays and Cost overrun.

1. Introduction

Present advancement in Science and Engineering progresses major projects with more opportunities to compete among contractors. These contracts compete for multiple projects for many reasons which are to increase long-term profitability, to balance company's growth, and to manage recurring impacts of construction demands in the market's scenario. On the other hand the engineering and construction sector has had very poor reputation for risk responses. Many major projects have recorded failures to meet deadlines and cost targets. This because of the truth vested to the construction industry, being exposed to risk and uncertainty than other sectors due to various constraints in projects.

A recent practice in the industry has witnessed the continuous of alternative procurement methods such as Design-Build, construction management so on. These new procurement schemes are to be approached more carefully in the aspect of risks, because new schemes increase complexity of projects.

The execution of multiple projects requires high quality project plans and controls. This also holds true for multiple D&B projects where the design also had to be done by the company. Not only is on-time delivery important, it translates directly into whether the contractor will meet the client requirement, quality and provide a return on investment. Delivering a project on time does not occur by hoping that the required completion date will be met. Majority of D&B projects encounter events and/or changes that affect the original plan of executing a project. Further, resources such as labour, material, and equipment may be scarce, in high demand and as a result may hamper project execution. Attempting to solve these unforeseen issues during a project without a plan in place to determine the immediate impact is a major risk which can often lead to delayed projects and disputes between the parties (Galloway, 2006). The situation is more complicated for projects having differing starting and completion date. Multi-project management is not simply the management of a list of individual projects, rather a complex operation with a given capacity and workload (Hans et al., 2007).

Sharing common human resources and construction machinery effectively with no idle time need proper planning. The prerequisites of planning and control for one project are impaired by another project. Also the situation as a whole is less predictable and possibly less viable and thus the need for planning and control is obvious (Viktorsson et al., 2006). When the resources needed for the project execution are widely spread the project is considered complex. Further, D&B project under multi project settings will be of complex nature because of various responsibilities in its project life cycle.

2. Research Objective

- To formulate the questionnaire survey to analyse and identify the important risk causing factors in projects.
- To analyse the real time case study in the aspect of time and cost overrun and to identify the highest risk factors causing failure to meet the deadlines (time overrun) and cost targets (Cost overrun).

3. Research Methodology

The research has dual method approach to identify the potential factors that cause projects to fail in meeting deadlines and cost targets namely

1. Designing Questionnaire to cover all the participants practicing in the industry to categories in groups. The factors influencing time delays are classified in respective groups. Cost overrun run has given a separate section. The respondent's company profile and personal details are the first section of the questionnaire survey.

2. The time delays of real time case study projects are analysed based on the progress of the individual project. This analysis will identify the factors highly influencing the time overrun in projects.

4. Questionnaire designed for the study

The study aims to focus on all the sectors related in construction projects. The questionnaire has 5 sections which are further subdivided into groups as shown in Table 1. The first two sections are respondent's company profile and personal details respectively. The third section has the nine groups to analyse the time delays. The fourth section has factors that may contribute to cost overrun. Finally the fifth section has open end questions for the respondents to suggest or identify other uncovered important factors that are potentially leading a project to exceed the deadline or the targeted budget. Table 1 illustrates the framework of the questionnaire designed for the study.

Table 1: Framework of Questionnaire design

Sl. No.	Section	Topics	No. of groups	No. of Factors
1	A	Company Profile	8	N.A.
2	B	Respondents Profile	6	N.A.
3	C	Risk factors influencing Time delays	9	79
4	D	Risk factors influencing Cost overrun	1	18
5	E	Open ended question	3	N.A.

Section A classifies the respondents organization to investigate based on their role in project performance. Table 2 details the items included in the company profile under this section.

Table 2: Section A: Company Profile categories of Questions

Item No.	Question	No. of Categories
1	Name of Organisation	-
2	Telephone No.	-
3	Nature of Company	5
4	Age of Company	4
5	Type of Company	4
6	Classification of Company	5
7	Major type of work involved	6
8	Average turnover of projects executed per year	4

Section B classifies the respondents personal profile to evaluate the quality of the answers based on their role in a project. Table 3 details the items included in the Respondents profile under this section.

Table 3: Section B: Respondents Profile categories of Questions

Item No.	Question	No. of Categories
1	Gender	2
2	Qualification	-
3	Age group	4
4	Position in the Company	8
5	Working experience in years	4
6	Duration of major projects handled	5

Section C is the main part of the questionnaire with factors influencing time delays. The factors are listed under 9 groups and the respondents have to select the severity of the factors using the Likert scale (Table 4). Table 5 details the Groups and number of factors in each group.

Table 4: Likert scale weightage for the study

C.O (100%)	F.O (75%)	M.O (50%)	S.O (25%)	N.O (0)
5	4	3	2	1

C.O = Continual Occur (100%); F.O = Frequent Occur (75%); M.O = Moderately Occur (50%); S.O=Seldom Occur (25%); N.O = Never Occur (0)

Table 5: Section C: Factors influencing time delays

Item No.	Group	No. of Factors
1	Project Group	6
2	Project Owner Group / Client Group	10
3	Contractor Group	15
4	Consultant Group	7
5	Design Group	11
6	Material Group	7
7	Equipment Group	6
8	Labour Group	5
9	External Group	12
Total No. of Factors in the questionnaire		79

Section D is another important part of the questionnaire with factors influencing cost overrun. As shown in Table 6 this section has 18 factors that contribute to project cost overrun. The respondents have to select the severity of the factors in Likert scale.

Table 6: Section D: Factors influencing Cost overrun

Item No.	Description	No. of Questions
1	Cost overrun	18
Total No. of questions		18

Section E has open ended questions for the respondents to write their opinion, suggestions or even to write about any other factors that are not included in the survey question but important in their personal view point.

The questionnaire was distributed to all the organizations related to construction works. The Questionnaire survey is involving peninsular Malaysia, Sabah and Sarawak with a common blend of results representing for the whole nation. All the earlier studies investigated issues revolving around Peninsular Malaysia in which the findings cannot be representative for construction industry in Malaysia which is fast progressing across borders and boundaries. This knowledge gap has been identified and picked as a major lack of information in perceiving Malaysian construction Industry as one.

This study attempts to design the questionnaire, distribute the questionnaire and receive the responses in an uniform blend of participants from peninsular Malaysia, Sabah and Sarawak. The questionnaires are distributed broadly to Client, Consultant and Contractors. The respondents are practitioners from various

segments of the projects. Table 7 describes those participants based on their role in projects which are broadly classified either as Client / Owners or Consultants or Contractor.

Table 7: Grouping of Client, Consultant and Contractor

Item No.	Category	Departments	Remarks
1	Clients	JKR Sabah (State PWD)	Govt. sector
		DID Sabah (State Drainage and Irrigation)	Govt. sector
		JKR Sarawak (State PWD)	Govt. sector
		JKR Federal (Central PWD)	Govt. sector
		Chemical Company Malaysia	Pvt. sector
2	Consultants	Consultant and Designers	
		Architects	
		Geotechnical and SI specialist and Lab	
		Quantity Surveyors	
3	Contractors	Main Contractors	
		Sub Contractors	
		Specialist Contractors	
		Specialist manufacturers and installers	
		Ready mix concrete supplier	
		Specialist Precast product manufacturers	

Pilot study was conducted on above designed questionnaire by distributing to 10 experts in the industry. After receiving there suggestions, correction and opinions the final questionnaire was formulated for the survey study. Presently the questionnaires are being distributed and receiving respondents reply is in progress. Further analysis on the factor rating and ranking will be reported after receiving substantial replies.

5. Real time Case Study

5.1 Completed Multiple Bridge Projects

As D&B is the fastest way to begin and implement various development projects across the country (Malaysia), the case study Multiple D&B Bridge projects were proposed and implemented successfully in Sabah. Sabah is a state of Malaysia and a part of Borneo Island situated East of Peninsular Malaysia generally called as East Malaysia. Malaysia has two states Sabah and Sarawak in Borneo Island situated as far as 2000 over KM from the rest of the 12 states of the country. Sabah has its own special drawbacks in terms of logistics, geographically hilly terrain, low quality of building raw materials, skilled work force, etc. The aim of the study is to improve the performance of the construction industry by providing better management solutions to overcome these problems faced in the local industry. The research on this case study has highlighted the complexity in the implementation and presented Project Management studies used to solve problems from beginning of the life cycle of these projects. Overview of the multiple projects in this case study is shown in Table 8.

Table 8: Overview of Multiple Projects completed in Sabah

Project Number	No. of Bridges	No. of district Locations	Project Duration	
			Months	Period
1	12	3	18	Jul 03 – Jan 05
2	5	3	18	Jan 05 – Jul 06
3	8	3	18	Jul 05 – Jan 07
4	13	3	20	Oct 05 – Jun 07
5	7	3	20	Oct 05 – Jun 07
Total	45	12	48	Jul 03 – Jun 07

5.2 Presently ongoing Multiple Bridge Projects

The details of Multiple Bridge projects currently in progress are shown in Table 9.

Table 9: Overview of Multiple Projects currently ongoing in Sabah (Project VI & VIII)

Project Number	No. of Bridges	No. of district Locations	Project Duration	
			Months	Period
1	8	4	20	March 09 – Nov 10
2	4	2	20	July 09 – Feb 11
Total	12	5	23	March 09 – Feb 11

- The case study has used practical examples to identify Known unknowns and Unknown unknowns.
- Plan for risk responses and methods of planning and handling risks are being studied on Negative Risks as Threats and Positive Risks as Opportunities.

6. Concluding Remarks

The factors influencing time delays and cost overrun due to various groups related to construction are identified and designed a questionnaire to analyse the rating and ranking of the factor. The analysis of the questionnaire survey will reveal findings that are suitable for the industry practitioners throughout Malaysia. That is for the industrial players in peninsular Malaysia, Sabah and Sarawak. These results will be compared with the multiple project results from the case study of real time project. From this unbiased and practical conclusions produced will provide awareness about the management of risk causing factors. To take risk if within the tolerable limit or to prepare proper Risk response plan.

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