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Time Overrun in Construction Project

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Abstract. Timely completion is the key criteria to achieve success in any project despite the industry. Unfortunately construction industry in Malaysia has been labelled as industry facing poor performance leading to failure in achieving effective time management. As the consequence most of the project face huge amount of time overrun. This study assesses the causes of construction projects time overrun in Malaysia using structured questionnaire survey. Each respondent is asked to assign a one-to-five rating for each of the 18 time factors identified from literature review. Out of the 50 questionnaires sent out, 33 were received back representing 68% of the response rate. Data received from the questionnaires were analysed and processed using the descriptive statistics procedures. Findings from the study revealed that design and documentation issues, project management and contract administration, ineffective project planning and scheduling, contractor's site management, financial resource management were the major factors that cause the time overrun. This study is hoped to help the practitioners to implement the mitigation measure at planning stage in order to achieve successful construction projects.

Keywords: construction, time overrun, project, management, mitigation

1. Introduction

Construction industry is one of the highly dynamic sector and plays very important role in the development of any country. For that, time or schedule is the fundamental criteria for the success of any projects in the world regardless the industry [1]. Malaysia is a fast developing country in the Asian region and has gone through such rapid economic growth since the seventies [2]. The industry itself has been consistently contributed approximately 3% to 5% of the national Gross Domestic Product (GDP). Basically there are two main sector for construction projects in Malaysia namely public and private sector [3]. Most of the public sector projects are managed by Public Works Department (PWD). In Malaysia, the Construction Industry Development Board (CIDB) is a body that function as developing, improving and expanding the Malaysian construction industry and is involved with the public and private sectors project development [4].

1.1. Background of Study

The objective of a project itself is to produce a quality project, completed within time frame provided, within sufficient budget and in a safe working environment. Normally, in the construction industry, the aim of project control is to ensure all the projects could be completed on time [5]. A successful project

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is the only project which has been accomplished its technical performance, maintained the schedule, and remained within budgetary costs. The project management tools and also the techniques play an important role in the effective management of any projects [6]. The construction time is so much fundamental consideration in the project management and regarded as most important factors for indicate the successes of any projects. Poor performance in terms of time will lead to the significant overrun which is global phenomenon nowadays [3].

1.2 Problem Statement

In any construction project, one of the main goal of practitioners is to achieve timely completion of projects within its allocated budget and required quality as each day of time overrun in the making process of any project has direct impact on the cost of the project. In Malaysia, traditional lump sum payment system, design and built system and Construction Project Management/Contract Management are commonly adopted in the procurement strategies [4]. However, based on any literature review, despite adopting various management practices, construction projects in many countries are still facing problem such as time overrun which really needs serious attention. Construction industry such as in Malaysia is facing chronic problems including poor performance of time and cost, construction waste, poor productivity and over dependent so much on foreign workers. All of these problems, poor in time and cost performance are considered as a critical issue [6]. Aibinu [2] reported that 7 out of 10 projects surveyed in Nigeria suffered the issue of delays. 70% of the large construction projects studied in the Saudi Arabia experienced average time overruns between among 10% to 30%. 50% of construction projects in United Arab Emirates (UAE) encountered delays. During the last few decades, numerous project control methods have been developed such as Gantt Bar Chart, Program Evaluation and Review Technic (PERT) and Critical Path Method. Variation of software have also been introduced to assist project control methods such as Microsoft Project, Asta Power Project, Primavera. Despite the use of these methods and software in practice, and yet still many construction projects suffer time overruns [7].

1.3 Objectives and Scope of Study

This research is mainly focused on three objectives; identify the critical factors which lead to time overrun in construction project, to recognized and identify how these factors could occur and to propose mitigation measures on how to reduce number of time issues. This research and review focuses on the factors of time overrun at construction project in Malaysia. Correspondently, this research will also determine the most factors causes' time cost overrun and rank them, based on the most chosen by the respondents.

2. Literature Review

In general, Malaysian construction industry itself is categorized into 2 areas as first category is the general construction, consist of residential construction, non-residential construction and civil engineering construction. Second category named as special trade works which comprises activities of metal works, plumbing, sewerage and sanitary works, refrigeration and air conditioning works, painting works, carpentry, flooring works, tiling and glass works. A construction project is a project that relate to any of these areas in the construction industry [4]. According to Endut [3], only 30% of construction projects were completed within specific scheduled dates and the average time overrun was between 10% and 30%. Looking into detail of Malaysian construction projects, it is found that there is a significant growth in the construction industry throughout the years. According to Market Watch Report 2012, the construction sector strengthened further by 6.3% during the first half of 2010 which is from January 2009 till June 2009 with 2.9%. The expansion was largely due to increase of civil engineering and non-residential activities. The rapid implementation of construction projects under the Ninth Malaysian Plan (9MP) and stimulus package provided by the government contributed largely in this expansion. The construction sector expanded further up till 3.5% in the year 2011. Time overrun could be defined as late of completion of works as per compared with planned schedule or contract schedule. It occurs when the progress of job done behind its fixed schedule [1]. Other than that, construction project time overrun

can also be defined as an extension of time beyond the contractual agreement during tender process. It may have adverse effects on both the owner and contractor (either in the form of lost revenues or extra expenses) and it is often raises the contentious issue of delay responsibility, which later may result in the conflicts that frequently reach the courts. Since the problem of project delay some sort of contextual, studies have been conducted to investigate this problem in the construction industry in several countries. A lot of researches have outlined the issue of poor time performance of the construction projects globally [6]. There have been studies of 8000 projects where the researchers found that only 16% of the projects could satisfy the three famous performance criteria namely completing projects within time frame, within budgeted cost and also quality standard. Malaysian construction industry also facing these problems significantly. In a survey of delay practices in most Malaysian construction industry, the result stated that 87% of the respondents reported that they have encountered delays in projects with overrun in time of 10-40% of contract. Furthermore, study of MARA large projects that concluded the construction projects encountered an overrun with average of 23.47% of contract duration [3].

3. Methodology

This research is carried out in two stages whereby firstly, literature survey and the interview with the project superintendent working for the Public Works Department in Perak Tengah are conducted to determine the factors influencing the time and cost overrun in construction and oil and gas projects. Eighteen factors are identified and categorized into two different groups in this research. These groups or sections shall cover partial of the criteria that need to be considered in the time factors concern. Secondly, a questionnaire survey methodology is employed to determine and rank these factors based on their levels of importance on the time overrun. The survey questionnaires are sent via gizmo survey – online survey form – to seniors and known associates. The questionnaires also are sent via hand delivery to 50 respondents either engineer, superintendent officer, quantity surveyor and interns. The response rate for the questionnaire survey is about 68% which is very much higher than the normal rate of 20% and 30% for most postal questionnaire surveys of the construction industry. The analysis of survey is done by Relative Importance Index (RII) method. The scores are then transformed to importance indices based on the following formula:

$$\text{Relative importance} = \frac{\sum w}{AN}$$

Where w is the weighting given to each factor by the respondents, ranging from 1 to 5, A is the highest weight (i.e. 5 in the study) and N is the total number of samples. At the same time, the analysis also was based on the qualitative measurement or ranking system. Rating for the questionnaire is 1 – Totally Disagree, 2 – Disagree, 3 – Moderately, 4 – Agree, 5 – Totally Agree. The Average Index Formula as follow [8]:

Average Index (AI) = $\sum(\beta \times n)/N$

Where, ß is weighing given to each factor by respondents, n is the frequency of the respondents, N is the total number of respondents.

4. Result and Discussion

The questionnaires had been distributed to the professional in construction projects and government agency. A total of 50 questionnaires for the total of industry are distributed through self-delivery of hardcopy questionnaires to the companies involved. The questionnaire consists of three main sections, General Information, Likelihood of Factors of Time Overrun to Occur and Current Practice of Time Cost Management in the Construction Project. From the survey, eighteen (18) respondents working in projects have Bachelor's Degree. Three (3) respondents have Master's Degree and four (4) respondent has diploma as their lowest education. Indeed, from all 33 respondents, none of the have PhD for their highest education. Meanwhile the rest have other lower qualifications such as Sijil Pelajaran Malaysia (SPM), Technical Certificate or Diploma as their highest education. Based on the data collected above, the author has extracted the most crucial which is top 10 factors that would be the

factors toward the time overrun and author has ranked the questions based on its relative importance index as shown in Table 1. There is one factor that possess RII of 0.915 (closest to 1.00) while the lowest among top 10 out of 18 has the RII value of 0.800 which was considered as the least important information for this research. The author has arranged the Likelihood of Factors of Time Overruns to Occur based on the ranking order as shown above. This indicates that complexities and non-performance of subcontractors is not included in the factors of time overrun.

Table 1. Summary of Top 10 Time Overrun Factors

No.	Factor of Time Overrun	RII	Rank
1	Design and Documentation Issues	0.915	1
2	Project Management and Contract Administration	0.892	2
3	Contractors Site Management	0.862	3
4	Ineffective Project Planning and Scheduling	0.854	4
5	Financial Resource Management	0.831	5
6	Material and Machineries Resource	0.815	6
7	Issues regarding permissions/approvals	0.815	7
8	Design Changes	0.808	8
9	Inaccurate Evaluation of Project / Time Duration	0.800	9
10	Complexities and Non-Performance of Subcontractors	0.800	10

All the result from Table 2 shows a high range number which is between 3.40 and 5.00. This can be indicated that the respondents were neutral/agreed/strongly agreed with the statement given by the author for the most 2 section, B and C from the questionnaire. Therefore, based on the Average Index (AI) data, the questions from the survey can be considered as the valid of set of questions for time and cost overrun factors.

Table 2: Average Index for Factors of Time Overrun

No.	Factor of Time Overrun	AI	Rank
1	Design and Documentation Issues	0.915	1
2	Project Management and Contract Administration	0.892	2
3	Ineffective Project Planning and Scheduling	0.862	3
4	Contractors Site Management	0.854	4
5	Financial Resource Management	0.831	5
6	Design Changes	0.815	6
7	Inaccurate Evaluation of Project / Time Duration	0.815	7
8	Issues regarding permissions/approvals	0.808	8
9	Complexities and Non-Performance of Subcontractors	0.800	9
10	Material and Machineries Resource	0.800	10

Cronbach's Alpha value is about 0.899 and 0.884 as shown in Table 3 which author can consider as good internal consistency. High value indicate that the information gathered are reliable and consistent so that it could not be questions by others. Some of the questions if were deleted, will provide higher consistency of Cronbach's Alpha.

Table 3: Reliability Statistics for Time Overrun Factors

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.899	0.894	18

4.1 Analysis of Top 5 Time Overrun Factors

Based on the survey conducted and through the analysis process, the most likely factor of time overruns to occur is Design and Documentation Issues with relative importance index (RII) of 0.915. Highest RII indicate that as per mentioned above nearest to 1 show that this factor affecting the time overrun for

most of the projects. From the structured interview done with Engineer of JKR Perak Tengah, Mr Faizal, he mentioned that from the point of view as the owner, in construction project implementation process, there are few stages such as feasibility study, planning, technical design stage, and so on whereby those stages done by different team and different department which really make this factor the most likely to occur.

The second factor most likely to occur is Project Management and Contract Administration with RII of 0.892. This factor affects the overall progress of the project in terms of optimization of time. Based on the interview, this factor reflects on how the project manager handle the case. For example, if the person experts with the project, it should be non-issue since he knows how to deal with. It is also depending on how the project manager keep on discussion with team members for any new projects.

Contractors Site Management ranks at 3 among the all other top Time Overrun Factors. The number of RII after analysed it is about 0.862 and this also indicate that it is really related with the time overruns for construction and might be Oil and Gas Industry. In any construction project, 3M such as manpower, money and materials involves directly towards the betterment of the income. Synchronized availability of those 3M's can only lead to the progress at site. Site management also affected based on 3M as the contractors already agreed with the number of workers, amount of money, material ordered, but at the end of the day, all of the would have effect of it.

3M as mentioned before also related with this factor. The planning and scheduling done based on the number of manpower, money and material that contractor have. So it is very crucial to optimize each task with each manpower so that it great outcome can be achieved. Cash flow in the construction project should be done carefully at any time by the project manager and arrange it necessary at requisite time helps the project to move as per schedule. Nowadays, a lot of software have been created to ease the task, but at the end of the day, it is still depending of the project manager competency to cope with the issues.

This factor related with time overrun where the contractor should have particular within a period, such as concreting process, but it not delivered due to the payment or bad cash flow. Hence, the time of concreting shall be delayed until the contractor done the payment to the batching plant. On behalf of the person who shall delivered the payment, a few stages need to go through and endorsed by a few persons, and in that sense of manner, we would see the delay of payment occur. Policy of government mentioned that progress payment shall be done within 14 weeks starting from the certifying the amount of progress of the projects.

5. Conclusion

The main objectives of this research are to identify the issues and factors that faced by the contractors, consultant and clients due to the time overrun, investigate the causes of such issues and to propose some suggestion for future performance in term of time effectively. Results from this research are based on the respond from the respondent which already being distributed during this research. Besides, at the end of this research the author would like to emphasis on proper time management control in construction project as it would assure the effectiveness of a project. Based on research done, improvements in many aspects need to be considered and monitored frequently in order to ensure the relevancy of time performance in construction project. Mitigation measures that can be applied are external factors such as under staff should not be an issue unless the company already applied to have more but not yet success, they need to have a good plan to utilize and optimize all the staff. Project manager should be more tolerance and competency. Competency here is about more to communication and thinking skill. Indeed, we deal with person which have various background hence it is important for him or her to be flexible and can cope with the tasks given.

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