# IMPORTANCE LEVEL OF MANAGEMENT FACTORS IN AFFECTING TIME AND COST PERFORMANCE IN CONSTRUCTION PROJECTS

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**ABSTRACT**

**Objective:** This study was carried out to assess the importance of management-related factors contributing to the time and cost overruns in the construction projects of Malaysia. It also reviews previous research carried out in this regard.

**Research Method:** Data were collected through a structured pre-tested questionnaire from consultant, contractor, and client and was based on 16 factors found from literature. These factors were further categorized into construction resource management and site management. The responses from all respondents are analyzed using SPSS and Microsoft Excel, and the sample size is taken as 131.

**Findings:** Evaluated results of collected data indicated that the topmost related factors to construction resource management and site management factors of time overrun are the financial difficulties of the owner and delay in material procurement. Similarly, Cost overrun factors is financial difficulties of the owner and inaccurate time and cost estimates.

**Originality:** This study will help improve the construction time and cost performance with the help of improved management strategies.

**Keywords:** time performance, cost performance, management, construction projects, Malaysia

## 1. INTRODUCTION

Construction is deemed a productive and imperative industry among the key industries that add value to Malaysia's economic growth. Currently, the Malaysian construction industry is in the developing phase and is playing a major role in the country's economic growth. The construction sector registered a strong increase to 5.8% in 2009, which was reached 8.7% in 2010, whereas overall growth in Gross Domestic Product (GDP) was recorded as 10.1% (Mansor, 2010). Hence, a lot of money has been spent on construction development. This indicated the importance of the construction industry in Malaysian development. Although construction works in Malaysia have got much attention, the Malaysian construction industry faces many serious challenges. Where frequent project time and cost overrun are the major issues that have significantly affected the development works. These issues are referred to as a global phenomenon and affect the amount of physical development undertaken. Time and cost are always considered basic parameters for measuring the performance or success of any project (Memon et al., 2021)

A study by Hartley concluded that construction projects experience an increase in the cost of about 33% on average (Hartley & Okamoto 1998). Besides that, comprehensive research made on cost overruns in the global construction industry (Flyvbjerg et al. 2003) was the major finding of this research that 9 out of 10 projects faced a cost overrun problem. As Azhar et al. (2008) concluded in their research, cost overrun is a major issue in developing and developed countries. Although the tendency is more towards the cases of developing countries than developed ones, there had been instances where the cost overrun exceeded 100% of the initial expected cost of the project. Memon and Rahman (2014) highlighted that cost overrun is still a significant

issue in construction projects resulting in an additional burden to all related stakeholders.

Similarly, An investigation carried out by (Al-Momani 2000) involving 130 public projects in Jordan revealed that 106 (82%) of projects were facing time overrun problems. In Ghana, it was reported that 70% of 47 projects considered in a research study had met overran (Frimpong et al., 2003). In Saudi Arabia, an average of 70% of projects are delayed with 10% to 30% of the initially scheduled period (Assaf & Al-Hejji 2006). This problem of time overrun is a common issue in construction works worldwide, which needs serious attention to reduce and achieve construction projects completed as targeted. Hence, this research study focuses on investigating the occurrence and severity of significant factors causing the Malaysian construction industry's time and cost overrun construction projects. The study also highlights the importance level of the factors causing project time and cost overrun.

## 2. LITERATURE REVIEW

Time and cost are among the primary considerations throughout the project life cycle and are weighted as key factors for any construction work. Rarely the construction projects are completed within estimated time and budget, so time and cost overrun are critical problems and essential to be worked out for the upcoming projects (Akram et al., 2017). Several management-related factors affect construction time and cost performance. Among these, management-related factors are considered fundamental factors. Several researchers have undergone research work to uncover these factors. For example, long et al. (2004), conducting a survey, concluded that poor site management and supervision, poor project management assistance, owner financial difficulties of contractor, design changes, unforeseen site conditions, and slow payment of completed works are significant factors of insufficient time and cost performance. Memon (2014) revealed that poor time performance is a severe issue in the Malaysian construction industry. Similarly, cost overrun is also a major problem in Malaysia's construction industry (Memon 2013).

Meeampol & Ogunlana (2006) also conducted a questionnaire survey to investigate highway works' factors. A total of two hundred thirty-nine questionnaire sets were sent to the selected project managers at the Department of Highway (DOH) Thailand. However, ninety-nine sets of questionnaires were returned, yielding a response rate of 41%. Independent sample-test and discriminate analysis were selected to analyze the data. The most critical factors of cost performance were construction resource management, budget management, construction method, schedule management, communication and report, and human resource management. While, significant factors for time performance were construction method, construction resource management, schedule management, human resource management, supervision and control, and budget management. Frimpong et al. (2003) studied groundwater projects. They found that the main factors of cost performance are monthly payment, difficulties from agencies, poor contractor management, material procurement, poor technical arrangements, and escalation of material prices. Bureaucracy in bidding method, not enough information gathered. Surveys done before design, inflation, economic condition of the government, material cost changes, monthly payment difficulties, law changes by the government, mode of financing and payment for completed work, financial problems, and changes made by the owner are regarded as common issues of cost overrun in water sector construction projects of Iran. Another research work conducted by Kaliba et al. (2009) declared that change in the scope, frequent stormy weather due to heavy rains and the resulting floods, environmental safety, pressure from local government, strikes, minor mechanical challenges, schedule delays, and rise in material prices are significant causes of cost overrun in Zambia construction projects. In a study of the construction of sector of Pakistan, Memon et al (2020) reported that time and cost performance is very poor,

resulting from several factors. For improving construction performance, these factors need to be identified and controlled.

An extensive literature review was conducted to identify the most common factors affecting time and cost performance. This literature review identified a total of 51 factors related to resource and site management.

## 3. RESEARCH METHODOLOGY

Research methodology is a systematic method to resolve a problem or achieve the aim. The aim of this research study is to identify the probablity of occurrence and level of severity of time overrun and cost overrun factors contributing to the Malaysian construction industry projects. To achieve this aim, preliminary previous research papers were reviewed thoroughly to determine the responsible management related factors of time overrun and cost overrun performance at the the global level. After, a questionnaire was designed for data collection and validated by the most experienced practitioners of the Malaysian Construction industry.

A five-point Likert scale was used to record responses on the designed questionnaire. Survey respondents were from clients/owners, consultants, and contractors in Malaysia. Total gathered questionnaire samples were analyzed statistically to rank on significance level for each factor with the help of Statistical Package for the Social Sciences (SPSS) and Microsoft Excel. The analysis of effectiveness has been assessed in accordance with the Important Index. According to Le-Hoai et al. (2008), the importance index is based on the frequency, which is the frequent occurrences of factor and severity of the factor and can be calculated using the following formula:

I.I = F.I x S.I.

Where I.I = Important index, F.I= Probability of Occurrence, and S.I= Severity Index. F.I and S.I were calculated based formula adapted from Le-Hoai et al. (2008) as:

$$F.I. = \frac{\sum_{0}^{4} a_i n_i}{4N}$$

$$S.I. = \frac{\sum_{0}^{4} a_i n_i}{4N}$$

## 4. RESULTS AND DISCUSSIONS

A total of 131 completed questionnaires were received from construction practitioners; questionnaire forms were randomly distributed among the client; consultant and contractor involved currently going construction projects in different regions throughout Malaysia. Figure 1 shows a large number of respondents, with 78.10% are engaged in a private organizations, 13.90% of respondents are involved in government sector' organizations and only 8.0% of respondents are working under joint venture organization.

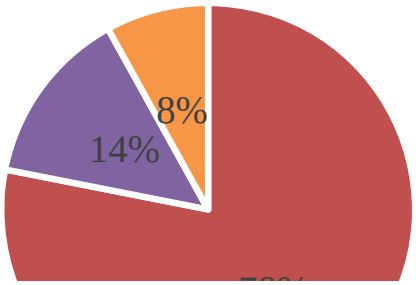


**Figure 1**: Respondents Organizations

All respondents involved during the questionnaire survey have experience dealing with different construction works, such as building, infrastructure, and both (building

and infrastructure). Figure 2 Indicates that 32.8% of participants have been practiced in the construction industry for 1-5 years, 21.2% of respondents are practicing for 16-20 years, 19.0% of respondents are practicing for 6-10 years, 10.9% of respondents have experience for 11-15 years, 6.6% have experience for 21-25 years, 5.8% have experience for 26-30 years, 2.9% have experience 36-40 years, and only 0.7% of respondents have experience for 31-35 years in handling projects.

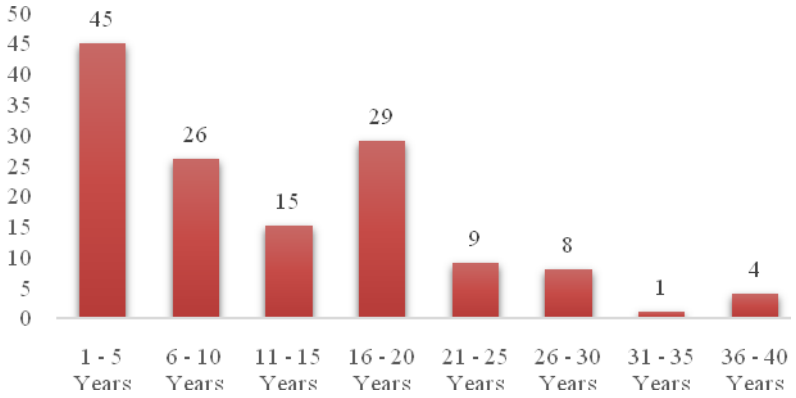


**Figure 2**: Respondents Experience

This section presents the result of the importance index of management-related factors after analyzing collected data. There are two domains in management-related factors: construction resource management factors and site management factors. There are 8 factors involved in construction management factors, and in site management factors, there are also eight factors involved. As discussed in the succeeding sections, these factors' importance index level was evaluated independently from time and cost overrun. Therefore, the ranking of importance index concerning time performance is presented in table 1.

**Table 1:** Ranking of Importance Index value of Time performance

| No. | Factors | F.I | S.I | I.I | Rank |
|---|---|---|---|---|---|
| **Construction Resource Management Factors** | | | | | |
| 1 | Financial Difficulties of Owner | 0.587 | 0.600 | 0.352 | 3 |
| 2 | Shortage of Materials | 0.604 | 0.600 | 0.362 | 1 |
| 3 | Cash flow and financial difficulties faced by contractors | 0.591 | 0.560 | 0.331 | 5 |
| 4 | Insufficient number of equipment | 0.609 | 0.591 | 0.361 | 2 |
| 5 | Shortage of technical personnel (Skilled Labour) | 0.542 | 0.622 | 0.337 | 4 |
| 6 | Delay in Progress payment by owner | 0.578 | 0.569 | 0.329 | 6 |
| 7 | High cost of labour | 0.596 | 0.591 | 0.352 | 3 |
| 8 | Fluctuations in prices of materials | 0.511 | 0.556 | 0.284 | 7 |
| **Site Management Factors** | | | | | |
| 1 | Delay in material procurement | 0.631 | 0.609 | 0.384 | 1 |
| 2 | Poor site management and supervision | 0.613 | 0.613 | 0.376 | 3 |
| 3 | Lack of experience | 0.618 | 0.604 | 0.373 | 4 |
| 4 | Incompetent subcontractors | 0.604 | 0.618 | 0.373 | 4 |
| 5 | Inadequate planning and scheduling | 0.600 | 0.631 | 0.379 | 2 |
| 6 | Inaccurate time and cost estimates | 0.596 | 0.618 | 0.379 | 5 |
| 7 | Inadequate monitoring and control | 0.587 | 0.609 | 0.357 | 6 |
| 8 | Waste on site | 0.587 | 0.502 | 0.295 | 7 |

From table 1, it can be perceived that the importance index for resource management factors lies in between 0.362 to 0.284, where the shortage of materials is

reported as the most important factor in time performance. On the other hand, the importance index value for site management-related factors lies between 0.384 and 0.295, with delay in material procurement as the most important factor. Similarly, the ranking of importance index concerning cost performance is presented in table 2.

**Table 2:** Ranking of the Importance Index value of cost performance

| No. | Factors | F.I | S.I | I.I | Rank |
|---|---|---|---|---|---|
| **Construction Resource Management Factors** | | | | | |
| 1 | Financial Difficulties of Owner | 0.587 | 0.582 | 0.342 | 3 |
| 2 | High cost of labour | 0.596 | 0.640 | 0.381 | 1 |
| 3 | Shortage of Materials | 0.604 | 0.618 | 0.373 | 2 |
| 4 | Cashflow and financial difficulties faced by contractors | 0.591 | 0.551 | 0.326 | 5 |
| 5 | Insufficient number of equipment | 0.609 | 0.533 | 0.325 | 6 |
| 6 | Fluctuations in prices of materials | 0.511 | 0.662 | 0.338 | 4 |
| 7 | Delay in Progress payment by owner | 0.578 | 0.533 | 0.308 | 7 |
| 8 | Shortage of technical personnel (Skilled Labour) | 0.542 | 0.569 | 0.308 | 7 |
| **Site Management Factors** | | | | | |
| 1 | Inaccurate time and cost estimates | 0.596 | 0.604 | 0.369 | 1 |
| 2 | Delay in material procurement | 0.631 | 0.578 | 0.365 | 2 |
| 3 | Poor site management and supervision | 0.613 | 0.587 | 0.361 | 3 |
| 4 | Inadequate planning and scheduling | 0.600 | 0.596 | 0.357 | 4 |
| 5 | Lack of experience | 0.618 | 0.569 | 0.352 | 5 |
| 6 | Incompetent subcontractors | 0.604 | 0.591 | 0.357 | 4 |
| 7 | Inadequate monitoring and control | 0.587 | 0.587 | 0.345 | 6 |
| 8 | Waste on site | 0.587 | 0.569 | 0.334 | 7 |

From table 2, it is evident that the importance index for resource management factors lies between 0.381 to 0.308, where “High-cost labor” is reported as the most important factor in affecting cost performance. On the other hand, the importance index value for site management-related factors is between 0.596 and 0.334 with “inaccurate time and cost estimates” as the most important factors.

## 5. CONCLUSIONS

Using a statistical method for factor analysis, the main theme of this research study identified the probability of occurrence, severity index, and importance index of affecting attributes of time performance and cost performance in construction projects of the Malaysian construction industry. Our research study shows that shortage of Materials and delay in material procurement are related to the Construction Resource Management Factor and Site Management Factor, respectively. After analyzing the data through statistical methods, these affecting factors of cost performance are at the top-ranked. Similarly, financial difficulties of the owner and inaccurate time and cost estimates are the topmost ranked factors affecting of time performance. The findings of this research study will be helpful for academicians and construction industry experts to find some proactive precautionary measures for achieving the expected results of time performance and cost performance of construction projects of the Malaysian construction industry.

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