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# Overrun Factors During the Construction Phase of Project

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**Abstract:** The construction sector contributes to a country's development by providing real solutions to human needs, improving the gross domestic product (GDP) and providing job opportunities. Besides numerous benefits, the construction industry is a resource-driven sector and faces many challenges. One of the challenges is to complete the construction project on time within the budget that is momentous for the client, consultant, and contractor. However, time and cost overrun are the most common anomalies due to improper management of the constructions. Hence, this article aimed to recognize the most affecting causative factors to delays and cost overrun construction projects. The detailed literature and comprehensively reviewed from 49 research articles of the past three decades found that 'delay in the payment' is the most repeated factor mentioned by 35 researchers in their studies. However, 'poor site management,' labor, material related factors, and 'delay in design development with errors' are the most repeated factors reported by the research for the delay and cost overrun. This paper also suggests the appropriate strategies and techniques minimize the causative factors of time and cost overruns uncovered from the previous literature.

**Keywords:** Overrun factors, construction, management, cost, schedule

## 1. Introduction

The construction industry is essential to a country's development because there is always a high demand for necessary facilities for the public, such as the provision of public infrastructure including health, education, residential, business, or commercial facilities. It transmits substantial and massive effects on the nation's economy. Since the construction industry nature is resource-driven, highly complex, and diverse, the construction development industry consistently experiences various technical complications and disagreements related to construction management, which negatively affects the completion of the construction project's time and budget (Invernizzi et al.,2017; Mahamid, 2017; Gunduz and Yahya, 2018; Choudhry, 2014).

Sorting and categorizing the factors that can impact a project is beneficial to the stakeholders of construction projects. It helps forthcoming scholars and experts recognize the scope and extent of the uncertainties identified and how various risks are related to one another (Khodeir and Mohamed, 2015; Alsharif and Karatas, 2016) The factors related to financial problems which can be either due to 'client's delay in payment' or 'contractor financial problems' also affect cost and time overrun (Al-Gahtani and Mohan 2007; Enshassi et al.,2009; Chan et al., 2003). Management must enlighten their inter-organizational relationship by considering the financial and overall performance and reducing the problems that will create dilemmas during the fulfilment of the operational labor requirements and execution of projects (Sumra et al.,2020).

The researchers' project performance evaluation recognizes that the owner-caused factor due to the 'client's approval process' is one of the most repeated factors. Most researchers specified that 'Contract modifications' (addition or deletion of scope to the project and specification changes) also contributes to delay and cost overrun (Mahamid ,2017 ; Al-Najjar 2008; Shaikh et al.,2018; Shrestha et al.,2013; Olaniran et al.,2016 and Alghbari 2013).

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Previous studies identified that the contractor was responsible for causative factors such as labour issues (skills, shortage, motivation, overtime, productivity), poor site management rework/mistakes, inappropriate construction methods and low productivity of labor as significant contributors to poor project performance (Bubshait and Abdulaziz 2004; Olaniran et al.,2016 and Van, 2016). Therefore, those causative factors should be removed from the organization by employing technical, motivational tools that will improve the performance of labourers and increase productivity, which ultimately boosts the project (Shaikh et al.,2018).

## 2. Research Aim

This research aims to identify the cost and time overrun factors that affect the construction of a project. The study shows that factors that are causing the project's poor performance arose during the project's execution. This research work will assist with avoiding or minimizing the effect of time and cost overrun factors in global construction projects.

## 3. Research Methodology

Fig. 1 below depicts the research framework that was established for the systematic literature review:

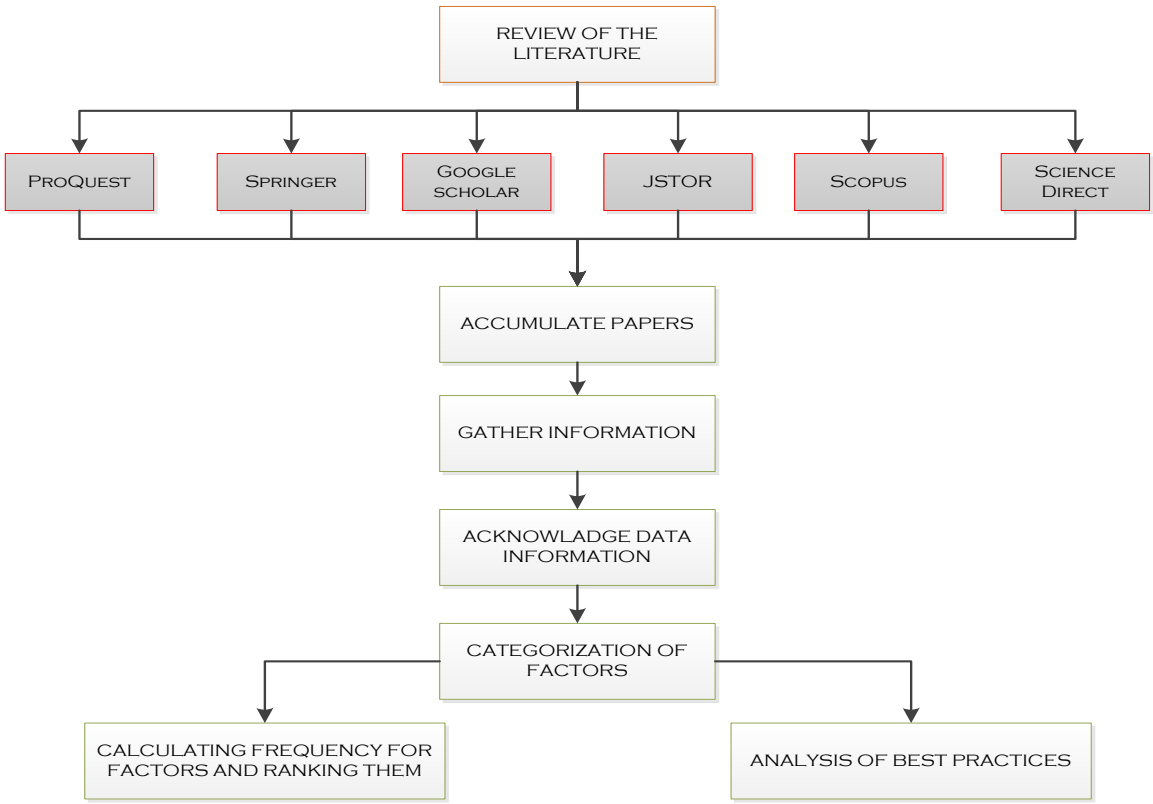


**Fig. 1 - Framework of research**

Based on fig. 1, the research framework develops to review the literature to achieve the research aim systematically. For this study, forty-nine (49) papers of different scholars from various countries during the period 1996 to 2019 have been gathered for careful review to highlight factors that are contributing to cost and time overrun in construction projects. This survey's motivation is to perceive the most recurring factors of delay and cost overrun in construction projects.

## 4. Data Collection and Analysis

The study of previous research papers has been completed in order to identify the most widely recognized factors of cost and time overrun. The study is based on the past papers of the scholars collected from many available resources, as described in fig. 1, such as ProQuest, Science Direct, Google scholars, Scopus, Springer and JSTOR. The forty-nine (49) past exploration papers were downloaded from the above-said sources. An Excel sheet has been prepared to tabulate information from the past papers to obtain the research year, country of research, industry, research method and factors causing the poor performance of the project.

## 5. Results and Discussions

The results demonstration in fig. 2 major causes/factors of cost and time overrun designated in historical research work in many countries during the construction of projects.

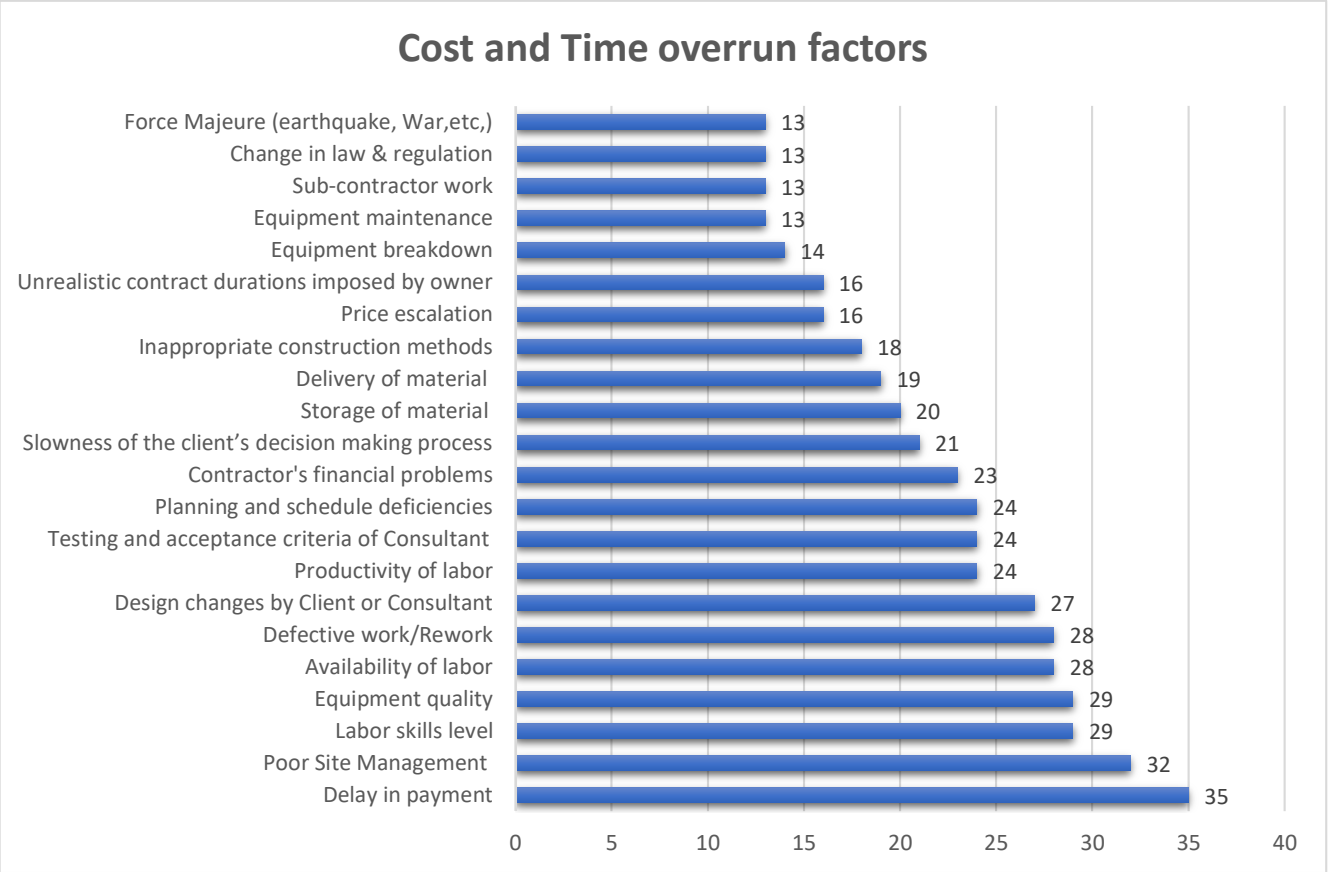


**Fig. 2 - Frequency of causative factors**

Fig. 2 provides an analysis of the cost and time overrun factors which were most frequently identified during construction. In this research total, 73 factors were identified from the different researchers' forty-nine papers and categorized in different clusters such as financial, execution, procurement, design and planning. However, only the top twenty (20) factors have been considered for this analysis. These are the ones most commonly described by the researchers and are shown in fig. 2. The highest frequency of causative factors was found in 35 research papers whilst the lowest was 17 research papers out of the total of 49 selected researchers.

## 5.1 Financial

The leading repeated factor for the poor performance of projects was a delay in payment from the client to the contractor as shown in table 1. The second most common factor in the researchers' financial cluster was the contractor's financial problems due to the first factor.

**Table 1 - Cost and time overrun factors-financial**

| Cost and Time overrun factors | Frequency | Rank |
|---|---|---|
| **Delay in payment** | 35 | 1 |
| **Contractor's financial problems** | 23 | 13 |

Table 1 shows that 35 researchers highlighted the delay in payment during construction as the primary factor. The delay in payment factor is observed in every construction project. Delay in payment from the client-side effects the cash

flow of the contractor during construction. Furthermore, delays in payment also cause to slow the progress of construction. Due to the contractor's own financial problems, this makes the contractor delay the amount paid to the supplier and the sub-contractors. The researchers concluded in their research that the client should always pay the contractor as per the specified time mentioned in the contract to enable smooth completion of the project [3,16,20].

## 5.2 Execution

The detailed literature review and analysis of different research papers identified the top five factors that frequently affect the projects' cost and time. The central five factors were shown in table 2. As per the analysis, the top five factors in the top twenty extracted through research that caused the construction project's poor performance are under the execution cluster as shown in table 2.

**Table 2 - Cost and time overrun factors-execution**

| Cost and Time overrun Factors | Frequency | Rank |
|---|---|---|
| Poor Site Management | 32 | 2 |
| Construction site conditions | 31 | 3 |
| Defective work/Rework | 28 | 7 |
| Testing and acceptance criteria of Consultant | 24 | 10 |
| Inappropriate construction methods | 18 | 19 |

Table 2 shows the most repeated factors affecting project cost and time during execution. As per the analysis, poor site management is the second most repeated factor observed during this analysis. Poor site management such as handling of sub-contractors, resource availability at the site and updated design implementation are factors which slow progress and increase the cost of construction.

The maximum numbers of researchers identified that actual site conditions that are different from the contract drawings delay the projects and have direct impacts on the construction costs and durations. The location of the project or environmental effects is another one of the primary reasons for poor performance. Congested urban areas, weather conditions and harvest times are some examples of location-related factors resulting in poor performance. Before mobilization, the stakeholders should properly observe the site conditions in order to reduce the chance of delays to the works (Gunduz and Yahya 2018; Memon et al., 2010 and Bubshait and Abdulaziz ,2004).

The reworks and construction methods also come under the execution cluster in many researchers' articles that impact and increase project costs and time. The client's rework affects the contractor's cash flow and in return, the contractor may request an additional amount to complete the job. The management team should visit the site on a regular basis to check the quality of the works, identify any defective works and inform the contractor in a timely manner. This may assist in the reduction of the chances of delay to project completion and the estimated time and budgets ( Shrestha et al.,2013; Olaniran et al., 2013 and Alghbari ,2013).

One of the major negative factors observed during the analysis were the consultant’s acceptance criteria. An inexperienced consultant team causes delays in progress which invariably leads to an increase to the cost and time of the project. In the construction industry, it is essential that the client engages a team of consultants that possesses vast experience in project management which includes managing and handling and the successful implementation of methods hired to deal with the a project successfully (Frimpong et al., 2003; Apolot et al.,2011).

Many researchers also discussed the use of inappropriate construction methods as another contributing factor. The researchers highlighted that a number of contractors were even constructing projects without any methods and procedures. The increase in cost and time, delay in progress, lack of contract knowledge, inadequate experts and skilled personnel were significant issues in selecting and implementing construction methods. The stakeholders need to organize and shape appropriate construction methods to smoothly run the project.

## 5.3 Resources (Manpower, Material, Equipment)

In this research, six factors come under the resource cluster: the reason for the delay and cost overrun in the construction project, as shown in table 3.

**Table 3 - Cost and time overrun factors-resource**

| Cost and Time overrun Factors | Frequency | Rank |
|---|---|---|
| Labor skills level | 29 | 4 |
| Equipment quality | 29 | 5 |
| Availability of labor | 28 | 6 |
| Productivity of labor | 24 | 9 |
| Storage of material | 20 | 17 |
| Delivery of material | 19 | 18 |

According to table 3, the availability of skilled labor and their productivity rate is reported by scholars repeatedly as factors for cost and time overrun. The labor-related problems come from sub-contractors as they hire low-wage employees and sub-subcontractors who also may be taking on many projects simultaneously resulting in the shortage of human resources.

The quality of equipment and delivery of material factors was observed during construction, impacting the project cost and time. Management should implement procurement strategies and adopt efficient procurement processes to improve project performance. Therefore, all stakeholders should adopt procurement management procedures to procure the material, labor and resource in an efficient way to complete a project smoothly.

## 5.4 Changes, Design and Planning

In this research, the six factors come under the Changes, Design and Planning cluster that were the reasons for the delays and cost overruns in the construction projects as shown in table 4.

**Table 4 - Cost and time overrun factors-changes, design and planning**

| Cost and Time overrun Factors | Frequency | Rank |
|---|---|---|
| Design changes by Client or Consultant | 27 | 8 |
| Planning and schedule deficiencies | 24 | 11 |
| Insufficient communication between the owner(s) and the consultant(s) | 23 | 12 |
| The slowness of the client's decision-making process | 21 | 14 |
| Design team experience/Lake of experience of consultants | 20 | 15 |
| Design Errors and delays (including ambiguities and discrepancies of details/ specifications) | 20 | 16 |

The analysis shows that scholars reported three factors in a cluster of design, such as design errors, the design team's experience and changes to the design are the factors that contribute to poor project performance. However, planning deficiencies and communications issues are planning factors and the slowness of the client's decision-making process also contribute to the project performance. The client should hire a skilled person who can review the design correctly and make timely decisions.

## 6. Conclusion and Recommendation

This investigation features the most widely recognized factors of cost and time over-run in construction projects. To avoid those factors, the contractor and client should adopt an effective strategy to complete the project on time and budget.

Delays in payment, poor site management, labor skills, equipment quality and labor availability are the most identified factors reported by the researchers over the past 30 years.

Unique consideration should be given to these factors to avoid project cost and time overrun in future development projects. Likewise, the following are the recommendations from the literature to avoid the cost and time over-run factors.

The client should:

- Have a clause in the contract document that describes the client's time duration of payment to the contractor following approval by the engineer;
- Hire an experienced designer and allow enough time for the designer to create an error-free design for construction;
- Avoid changes or variations in the scope in the later stages of the construction of a project; and
- Adopt an efficient change management plan for prompt decisions and communications.

The contractor should:

- Be vigilant in accessing risk associated with project procurement such as material and sub-contractor, to maintenance profit;
- Appoint an experienced manager for the project to align the project requirements with the contractor's business development plan;
- Prepare communications and procurement plans for the smooth construction of a project; and
- Hire experienced sub-contractors with sufficient human resources to complete the works with quality and within the desired time frame.

In conclusion, this research paper will help the project stakeholders pay attention to the repeated factors contributing to project delays and cost over-runs and adopt a strategy to minimize those factors with an approved plan.

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