4 Evaluation of Project Cost Management and Cost Trend Analysis

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Abstract

Construction projects are the most complex, with no certainty of the exact cost or time to completion. According to the records, it is uncommon for construction projects completed without contract variation, due to the nature of construction projects; it involves many stakeholders, making them more complex and distinct from other sectors. Project variations have had an impact on construction projects all over the world. Both contracting parties acknowledge the situation and work hard to keep it to a minimum. The main objective of this study is the evaluation of project cost management and cost trend analysis. The methodologies of this study are qualitative and quantitative methods, survey will be distributed with engineers and interview with industry experts. The expected results for this study are to evaluate and analyse the factors that affect project costs, and how to maintain the budget. Also, to understand the importance of cost trend analysis.

Keywords

Trend analysis, Project Management, Cost and Budget

Received: 11 Apr 2023 | Accepted: 27 Sep 2023 | Online: 01 Oct 2023

Cite this article

Pranita Banerjee and Hussin A.M Yahia (2023). Evaluation of Project Cost Management and Cost Trend Analysis. Engineering Research Transcripts, 4, 1–14.

DOI: https://doi.org/10.55084/grinrey/ERT/978-81-964105-1-3_4

1. Introduction

The construction industry is one of the most important indicators of a country's economic growth. Because construction projects are very complicated, it is very common to find projects completed far beyond the original schedule and cost [1]. A change order is any request to change or modify an approved design, including an increase or decrease in quantity, specifications and standards, and quality [2].

The most common issues in the construction industry are cost and time overruns. These two factors are regarded as the most important parameters in construction project management. Cost and time overruns are the primary causes of construction project failures. Project cost management and cost trend analysis are mathematical techniques that use previously published data and results to forecast possible future outcomes. This is usually accomplished by closely monitoring cost and performance variances. Cost trend analysis and project cost management are critical tools in project management and quality control [3].

The practice of collecting information about an organization and identifying the pattern in which it moves is known as trend analysis. This is mostly used to predict the future, but it can also be used to estimate uncertain past events. Trend analysis employs cost estimation techniques to comprehend and maintain a project's scope. Scopes of work frequently shift and vary during a construction project [4]. Thus, trend analysis is a continuous process that is carried out with reference to previous estimates. Cost is typically represented graphically. The data quality within an organization is calculated using this type of trend chart representation [5].

The construction industry happens to be one of the most important factors of economic growth of a country and construction projects are very complicated in nature. The main issues faced in a construction project are cost and time overruns [6]. These two factors are regarded as the most important parameters in managing a construction project. Project cost overruns and unable to finish the task within the given time are the factors in the failure of a project. Cost trend analysis and project cost management are two very critical tools in project management. This is the practice of collecting information about an organization and identifying the pattern of profit or loss also known as trend analysis. In a construction project scope of work constantly shifts and varies. Therefore, cost trend analysis is a continuous process [7]. In a construction project, the project scope and quality must be integrated with time. This is the fundamental concept of cost management, and this helps ensure the success of a project. Some of the most important factors to be considered are project investments, economic evaluation & cost forecasting. The combination of these forms the foundation for cost trend analysis. It is often noted that a place/ organization follows a particular pattern.

Trend analysis examines these patterns to make future predictions. This helps in making the best decisions financially and examines the monetary arrangement of an organization. Cost trend analysis predicts what may lead to profit and what maybe a loss. It indicates where a market is headed.

1.1. Project Cost Management

Budgeting, estimating, and controlling expenses throughout the life of a project are all aspects of project cost management. This is done to keep the budget within the approved limits. This is critical to the success of any project.

The following must be noted for a project's success:

- It meets or exceeds the standards and scope
- It is executed to a high standard
- It is completed on time and under budget

As a result, one of the most important pillars of project management is project cost management, which applies to every industry, including manufacturing, retail, technology, and construction. It contributes to the establishment of a financial baseline against which project managers can assess the current state of their project costs and, if necessary, realign the project's course [8]. Cost management is self-evidently important.

If you want to build a house, for example, you must first establish a budget. Once you know how much you want to spend on the project, you can break down the high-level budget into expenses for sub-tasks and smaller line items. The budget will determine critical decisions such as: which designer to hire—a high-end one who will build and deliver the project from start to finish, or someone who can assist with a few elements and work on a smaller budget? How many stories should the house have? What kind of material should be used?

It is impossible to answer these questions without a budget, and it is also impossible to determine whether you are on track once the project is underway. Because of the concurrent running of multiple projects, changes in initial assumptions, and the addition of unexpected costs, the scale of this problem is magnified in large organizations. This is where budgeting comes into play. Project managers can use efficient cost management practices to:

- Set clear expectations with stakeholders.
- Control scope creep due to transparency established with the customer.
- Track progress and respond with corrective action at a rapid pace.
- Maintain expected margin, increase ROI, and avoid losing money on the project; and
- Generate data to benchmark for future projects and track long-term cost trends.

Cost management and control are critical for most projects, but project scope and cost overruns are common all over the world. This is largely due to ineffective approaches to identifying, managing, and controlling client needs, project scope, and project cost. Numerous cost overruns on major projects worldwide in the hundreds of millions and billions of dollars have piqued the interest and concern of people at all levels of society [8]. The process of planning, organizing, directing, and controlling a project is known as project management. Control over company resources for a relatively short-term goal formed to achieve specific goals and objectives. One of the key resources in the above definition, according to the project management overview in the diagram below, is cost.

Fig. 1. Overview of Project management

2. Methodology

The orderly and hypothetical technique used for investigation for achieving the goals of the analysis is the most important strategy used. The methodology used includes a hypothetical analysis to provide an understanding of the investigation. In this research, a quantitative approach was adopted to achieve the primary goals. Along with this, a qualitative analysis was also adopted.

The qualitative method examined the experiences of experts and specialists' experiences, using their opinions, words, and information to collect data based on real-world insight. The subjective strategy is more concerned with organizing information in a different way by using an interview [10]. The raw data was extracted and discussed to develop the general framework. The quantitative research strategy relied on the data collected through a questionnaire, which was further investigated. Where people are selected based on relevant knowledge or records that can help with the topic and analysed by SPSS -V25.

3. Results and Discussion

Semi-structured interview questionnaires and interviews are the primary data collection tools. The questionnaire's goal was to identify the primary causes and effects of various policies on a specific project or organization. The questionnaire was divided into three parts, 1st part for general demographic information, 2nd part for the causes and 3rd was for effects. Questionnaire Respondents come from a wide range of industries and organizational structures. It was discovered that 78.4% of respondents were male and only 21.6% were female. Omani participants made up 14.9% of the total, while non-Omanis made up 85.1%. Out of the 74 responses, 59.5% were engineers, most of who worked in the construction industry. Non-engineers made up 20.3% of the total, with the remainder coming from a variety of other occupations. 45.9% have 0 to 5 years of experience. This is followed by respondents with more than 17 years of experience, who account for 41.9% of the total. 6.8% have 11 to 16 years of experience. 45.4% have 6 to 10 years of experience. The majority of the participants were either new professionals or experienced professionals. Participants were from different age groups as mentioned; It was 45.9% for those aged 25 to 30 years, 43.2% for those aged 41+, and 40.7% for those aged 36 to 40 years. 40.5% of the 74 total respondents were from the construction industry.

Table 1. Frequency Statistics

Variables	Category	Results	
		F	%
Gender	Male	58	78.4
	Female	16	21.6
Nationality	Omani	11	14.9
	Non-Omani	63	85.1
Designation	Engineer	44	59.5
	Non- Engineer	15	20.3
	Other	15	20.2
Experience	0-5 Years	34	45.9
	6- 10 years	4	5.4
	11-16 years	5	6.8
	More than 17 years	31	41.9
Age group	25-30 years old	34	45.9
	31-35years old	5	6.8
	36-40years old	3	4.1
	More than 40	32	43.2
Sector of work	Construction	30	40.5
	Non construction	27	36.5
	Other	17	23

Pearson's coefficient was computed and found to be N=74. The cost means score (M = 1.945, SD = 0.719) indicates that cost overruns and cost management are common issues in construction projects. A correlation test was performed, and the results are as mentioned, p = 0.744, the two variables are related and have a strong relationship. r = 0.01 in this study, indicating that the relationship between cost and trend is moderately strong and the study is significant.

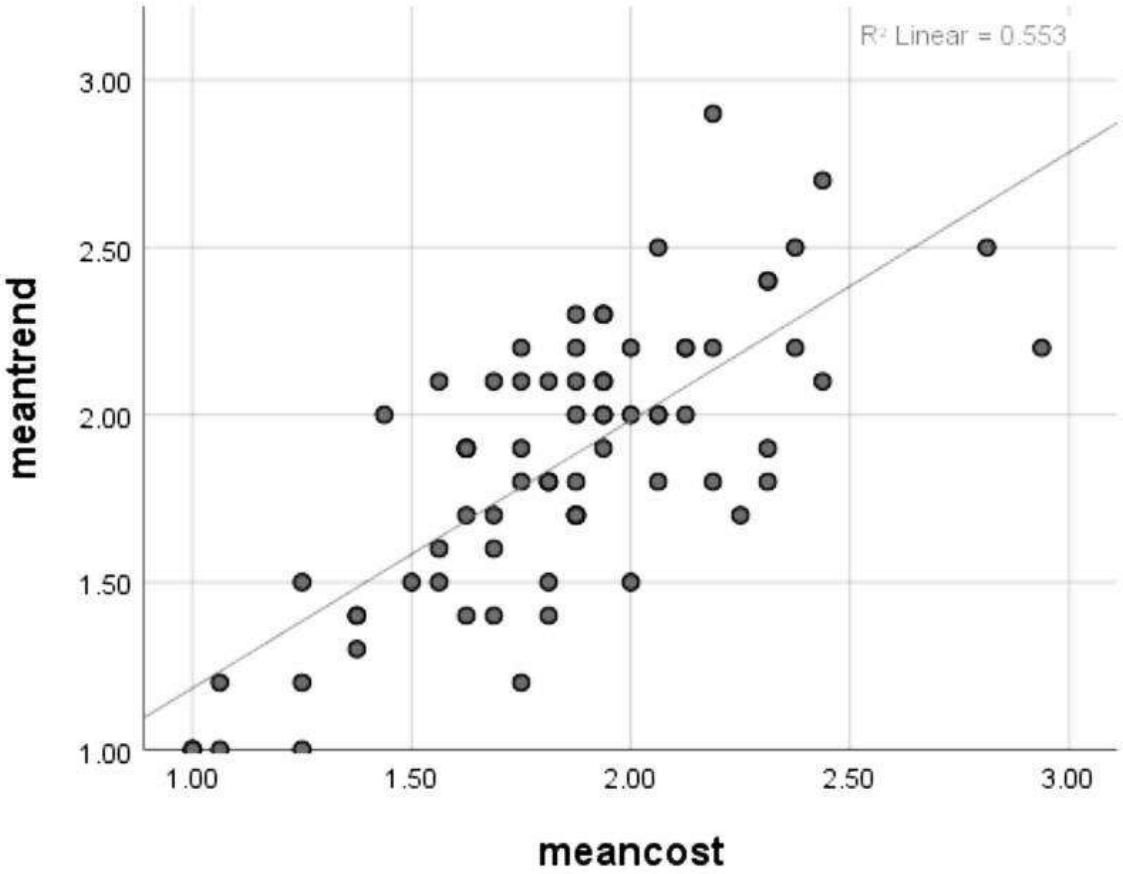

Fig. 2. The positive correlation between mean cost and mean trend

Also, there is a positive relationship between mean cost and mean trend. A null hypothesis test was performed on the sample data collected and the following were the results. The hypothesis test has a 95% confidence interval of difference and t =41.637, df = 73, and mean difference = 1.847. This indicates that the study is important. A crosstab analysis was done to analyse categorical data; crosstab testing is used as a nominal measurement scale. It demonstrates that the relationship between cost management and the trend is very important in construction projects. A rank analysis was also performed to check the significance and the study found no significant differences between the responses collected.

3.1.Qualitative Data Results

The interviews focused on three types of contracting parties: the client, the contractor, and the consultant. Three construction interviewees were chosen from various categories, including senior project manager (contractor), contract manager (consultant), and senior engineering manager (client). The interviewees all agreed that the main driving forces behind project cost management challenges are new requirements and ongoing changes from the client's perspective. The interview also revealed that poor design, unfavourable site conditions, inconsistent contract documents, and a lack of a project database are the main concerns with project costs in the construction industry. The contracting process, particularly in pre-tenders, requires modification. According to the interviewees, there should be a system in place to select the right contractor

based on their level of technical expertise. During the interview, six main open-ended questions were discussed. The interviewees all concur that new requirements and ongoing changes from the client's perspective are the main driving forces behind challenges related to managing project costs. However, an interview also revealed that the main concerns with project costs in the construction industry are poor design, unfavourable site conditions, inconsistent contract documents, and a lack of project database. According to observations, the contracting process, particularly in pre-tenders, needs to be adjusted to each project's specific requirements. As a result, choosing the lowest bidder for the A Despite its technical suitability, a contract typically results in numerous extra and additional costs during the execution stage. The interviewees argued that there needs to be a system in place to choose the right contractor by considering their level of technical expertise.

The interview revealed that work completion delays are the most common problem faced in a project in the construction industry, followed by project cost overruns (out of budget) and, to a lesser extent, rework, or demolition. Finally, the interviewees largely agree on the proposed set of strategies to manage projects and related costs in a more effective way. However, interviewees A and B were slightly opposed to the strategy of daily reporting. As a result, in their opinion, it will complicate the requested verification process while also being time consuming, potentially delaying the approval process even further.

4. Conclusion

The main focus of this study was to find and analyse the factors that affect project costs, estimations, and how to maintain the budget. Also, yet another aim was to understand the importance of cost trend analysis. Based on the questionnaire responses and their analysis, it can be concluded that: The cost planning factors included in the project cost plan are as follows, beginning with the one deemed most important:

- Project requirements
- Work statement (brief)
- Structures of work breakdown
- Timetables for major milestones

Milestone schedules are thought to be the least important cost planning factor. As a result, if not monitored, it can be one of the causes of indirect costs, leading to cost overruns on a project. This hypothesis is supported by the analysis and interpretation of the research findings on cost planning techniques. This is because, while cost planning factors were included in the cost plan, they were ineffective because the statement of work (scope) and project specifications were not complete when the cost plan was determined. The study revealed that the cost analysis of the variations was done mostly when the contract variations were executed / or after they were executed, and the employer was notified afterwards. It is reasonable to conclude that cost analysis was performed when it was too late to make decisions on alternatives.

Future project costs are not adequately analysed and reported, resulting in ineffective cost- cutting measures. This hypothesis is supported to a large extent by the research findings and analysis. This is because future costs were not calculated before they occurred, but only after they occurred. As a result, instead of cost control, what was done on projects was cost monitoring and simple bookkeeping of performance in terms of costs. A project's financial completion entails settling contractual claims and agreeing on final accounts. Based on the research findings and analysis, it is possible to conclude that. Following the completion of the project, final cost reports were prepared. The project cost management system can be tailored to specific projects, resulting in successful financial project management and completion. The project cost management system can be tailored to specific projects, resulting in successful financial project management and completion.

4.1. Recommendations

- The recommendations below would improve the effectiveness of project cost management in construction projects.
- A detailed brief and project specifications should be provided for all projects. These should be clear and concise in order to confirm the project requirements, particularly since most construction projects are standardized. This will reduce the cost variances caused by an inadequate statement of work (scope) and specifications.
- More emphasis should be placed on milestone schedules as a cost planning factor. This is due to the fact that this time parameter has indirect cost implications that should be considered, especially when changes are made.
- Cost variance approval by the client or contractor should be encouraged. However, this should be done before the changes are implemented so that the employer can make decisions and consider alternatives.
- In terms of cost reporting, there is a need for a standard format for presenting project cost reports. It should outline the report's contents, requirements, and presentation style. The report should include graphs so that the employer can easily understand the project status and make decisions.
- According to the current procurement system, the lead consultant should oversee project cost reporting. The report should be compiled by a quantity surveyor (cost expert) with assistance from other consultants.
- Contractual claims and final accounts should be settled and agreed upon as soon as they arise or are specified in the contract. In most contracts, the period of final measurement and final accounting conclusions is no more than six months after the practical completion of a project.
- Final project cost reports should always be compiled and reported in their entirety, including cost variances, analysis, and comments (Earned value format is recommended). Following this report, a post-mortem investigation should be carried out to compare the actual expenditure with the original estimate, which will aid in identifying mistakes to avoid when estimating or executing future projects.

Acknowledgment

The author would like to thank Middle East College, Oman who provides all the facilities for this research.

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