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Literature Review and Identification of Prominent Cost Overrun Causing Factors in Highway Projects

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Abstract: ***The main motive of Construction companies is to achieve profits at the completion of project. This benefit in terms of money is achieved when the project is completed within the estimated budget, scheduled duration and delivering specific standard quality work. Cost overruns have been a constant source of anxiety for project developers and several studies have been conducted in order to identify major causes responsible for cost overruns. In this paper, literature survey was conducted in order to identify the most critical factors that lead to cost overruns in construction of highway projects. 10 critical factors that lead to cost overrun were identified.***

Keywords: ***Cost overrun, Design Changes, Highway Projects, Utility Shifting.***

I. INTRODUCTION

One of the most important problems that affect construction projects progress is cost overrun. It reduces the profit which leads to enormous losses, and leaving the project in complex situations. Construction cost is one of the peak criteria of success for a project throughout its lifecycle and is of high concern to those who are involved in the construction industry. Cost overrun is common all over world whether it may be a project related to infrastructure, building, or it may be a technological project. Cost overrun should be distinguished from cost escalation, which is used to express an anticipated growth in a budgeted cost due to factors such as inflation. Construction industries play a vital role in the development of the economic growth of a country. In recent times, it has been witnessed that the construction industry has become one of the leading industries in the globe. The increasing complexity of the construction projects shows a greater demand on construction managers to deliver projects within planned budget , within stipulated time and with required standardized quality.

II. COST OVERRUN IN CONSTRUCTION INDUSTRY

When a project is completed at a cost higher than budgeted cost, that situation is called cost overrun. It occurs when a project slipping over its planned schedule and is considered as a common problem that is faced by both macro and micro construction industries. Handling projects within the contract stipulated time is one of the important turning points to a successful project [6]. Therefore, a cost overrun is treated as the margin between the initial project cost expected and the real final costs. Cost overruns do not vary by project type, procurement method and contract value [8]. The project performance is mainly influenced by managerial effectiveness and sophistication of the client and their representatives in terms of creating and maintaining positive project team relationships between contractor and design teams [8]. Shortage of skilled project managers emerges as the root cause for time and cost overruns in a project lifecycle [5]. cost overrun are fuelled by frequent changes in design and weak procurement planning, which can be mitigated by adequate training and coaching of project managers[5]. As a result cost uncertainty analysis is an important feature of cost estimation that helps decision makers to understand not only the potential funding exposure but also the nature of risks for a particular project or program [10].

III. LITERATURES ON COST OVERRUN IN CONSTRUCTION INDUSTRY

Ahmed Senouci et al.(2016) explained cost overruns and delays with the use of ANOVA method. In this study data collected from 122 projects belonging to public roads, building and drainage projects was used for analysis. Regression analysis was used to establish the relationships between contract prices and cost overruns and to predict models for calculating overruns. Based on the analysis, it was seen that the cost overruns and delays were related with o project type and size of the project.

Mulenga Mukuka et al.(2015) discussed the effect of construction schedule overrun in proects of South Africa. The data was derived from both primary and secondary sources. The primary source was questionnaire and the secondary source included detailed

literature survey. MIS method was used for data analysis. The study concluded that extension of time, loss of profit, dispute, poor quality of work, disputes related to claims, were the major factors responsible for project cost overrun.

Jose Ramon San Cristoba (2014) studied the cost allocation between activities that caused delays in a project using Game theory. The construction sector represents one of the most dynamic and complex industrial environments where conflicts among builders and owners are very common particularly in a bidding or claiming situation where owners, builders and contractors pursue their own interests at the expense of the others, leading to conflict or cooperation. The time required to complete the project was usually greater than the time specified in the contract. Because of the overruling importance of time for both the owner and the contractor, delays are the source of frequent disputes and claims among owners, clients and consultants, leading to lawsuits. There was a general consent between theorists that Game theory provides, the appropriate tools for the analysis and eventual solution of conflicts of any kind.

The course of a conflict as well as its resolution depends on the decisions made by the various factors involved. Each party, when considering is decisions, should take into account the decisions made by all the other parties. Game theory is a natural tool that can be used in such interactive situations where the results of the interaction depend on all the players' decisions. Despite the extensive literature devoted to the delay is acknowledged as one of the most common, costly, and risky problems, and the source of frequent disputes and claims among owners, clients and consultants leading to lawsuits. Such situations usually involve questioning the facts, causal factors, contract interpretations and quantum of the claims.

Since the ability to make a claim is very much based on what the contract says about delays, contractual documentation needs to reflect the particular nature of each project in order to prevent disputes and claims. Analysis was based on game theory and it was applied to road building project to identify the activities that are responsible for delay in the project and divide the costs among them. Using the model presented in this paper, a wide variety of project situations can be modeled and placed as contractual obligations. The number of variables, equations, and Inequalities needed to model these real-life situations will depend on the complexity of the problem.

Trefor P.Williams et al.(2014) had explained the prediction of cost overrun using data mining classification algorithms. This model used only numerical data for predictions with lower precision and recall. Modeling results found that a stacking model that combined the results from several classifiers produced the best results.

Zayyana Shehu et al.(2014) prepared an analysis of cost overrun on Malaysia based construction companies. A questionnaire survey was conducted among Malaysian quantity-surveying consultants. It was done to obtain project characteristics and cost performance data, in relation to 359 recently completed construction projects. Data was analyzed based on, project sector, contract values, type of project, procurement strategies, and nature of projects. The data was analyzed through regression and descriptive analysis.

Ismail Abdul Rahman et al.(2013) had focused on the effect of various factors on budget overrun in construction projects in Malaysia. In this a quantitative method is used for data collection using structured questionnaire survey amongst clients, consultant and contractors. The data was analyzed using advanced multivariate method of structural equation modeling with PLS approach using Smart PLS software.

Peter E. D. Love et.al (2013) explained the probability of project cost overrun in 276 Australian construction projects. The Kolmogorov-Smirnov, Anderson-Darling, and chi-squared nonparametric tests were used to determine the goodness of fit of the selected probability distributions.

ANOVA test was used to determine differences between the cost overruns experienced in the construction and engineering projects. The study revealed a mean cost overrun of 12.22%.

Abhishek Bhargava et.al (2010) proposed analysis based on Time and Cost Overruns in Indiana highway projects using three-stage least-squares technique to investigate the factors affecting time delay and cost overrun against the background of their simultaneous relationship.It was observed that, a number of factors that significantly affect cost overrun and time overrun are project type and results of the bidding process. Three-stage least-squares regression models was used to explain cost overrun and time delay as a function of variables that are available at planning phase. This study provided empirical evidence that a simultaneous relationship does exist between cost overruns and time delays.

IV. RESULT AND DISCUSSION

Cost overrun comprises of both expected and unexpected costs incurred in excess than the budgeted amounts. This might be due to any issues occurring pre-construction, during construction or post construction. From the literature survey 20 prominent factors leading to cost overrun were identified and listed in Table-1.

Table-1. Cost overrun causing factors

S. No	Cost overrun causing factors
1	Escalation in price of building materials
2	Delays in contractor's payment by owner
3	Design and scope change
4	Increase in quantities due to additional work
5	Utility shifting
6	Delay in obtaining approvals related to design
7	Lack of effective communication
8	Negligence of site visits before/during the bidding process
9	Weak and insufficient technical studies.
10	Poor site management and supervision

V. CONCLUSION

Change in cost of building materials and services, delay in delivering payments, changes in scope and design, additional work leading to change in quantities, delay in approval of design, delays in utility shifting, and lack of effective communication between stakeholders, and change in government policies are the top eight critical factors responsible for cost overrun in highway construction projects, based upon the literature survey and their probability of occurrence. From the literature survey and detailed project reports it is clear that, cost overrun and time overrun occurs not only in high budget projects but it may also occur in small scale projects. Inaccurate estimates and design changes at the time of construction may directly affect the cost found initially. Proper use of project management techniques, implementing project planning and scheduling strategies, monitoring activities at every stage and taking counteractive action results in minimizing the cost overrun in highway construction projects.

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