DETAILED STUDY ON COST INFLATION IN CONSTRUCTION PROJECT.

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ABSTRACT -*Cost inflation in infrastructure projects around the world is common which represents significant, but avoidable, economic losses. Historical data over the last several decades indicates that cost performance has not improved over time - no significant learning has occurred. Studies have identified a wide spectrum of various causes for cost inflations in infrastructure projects. According to Flyvbjerg et al. (2004), the two main causes of cost inflations are: optimism bias and strategic misrepresentations. Other studies have found that factors such as lack of experience, the size of the project, mistakes in design, overall price fluctuations, inaccurate estimations and scope changes have impacts on cost inflation (Memon et al., 2011; Love et al., 2011). The myriad of causes makes the planning and management of projects difficult. The objective of this research is to propose a theoretical framework sorting the causes and corresponding management approach in the infrastructure project. The empirical literature on infrastructure project cost inflation causes is reviewed and catalogued for causes of cost inflation. Based on the review, a typology of cost inflation causes has been developed to provide a theoretical framework that organises and describes parsimoniously the pattern of relationships between types of causes and inflation, thus simplifying the seemingly complex pattern of relationships. The typology study organizes the main causes in five types: market volatility, pressure for distorting estimation, novelty, complexity, and time pressure; and develops a conceptual framework that identifies and explains patterns of relationship between causes and inflation within each category. Such a typology can be used to aid the assessment of causes of cost inflation for large infrastructure projects and effectively mitigate risks of significant inflations.*

Keywords: Cost inflation, Ranking, Schedule and causes, SPSS, RII.

1. INTRODUCTION

Cost inflation is an unexpected change in the project budget that ends up increasing the total project cost. It can happen due to three primary reasons: Economic factors that occur due to inaccuracies in project budget or scope. Technical reasons including erroneous estimates or incorrect data gathering. Cost inflation is an unexpected change in the project budget that ends up increasing the total project cost. It can happen due to three primary reasons:

1. Economic factors that occur due to inaccuracies in project budget or scope
2. Technical reasons including erroneous estimates or incorrect data gathering
3. Psychological causes including the presence of scope creep or any decrease in project commitment levels

1.1 Definitions

Cost inflation is defined as the difference between the actual and estimated costs as a percentage of the estimated cost, with all costs calculated in constant prices. Actual costs are defined as the accounted costs actually spent, as determined at the time of project completion. Estimated costs are defined as the budgeted or forecasted costs at the time of project approval, which are typically similar to costs presented in the business case for a project.

2. LITERATURE REVIEW

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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. The model developed has an average accuracy of 43.72% for five model runs.

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 contractors, consultant and clients. The data was analyzed with an advanced multivariate method of structural equation modeling with PLS approach using Smart PLS software. The analysis showed that all the constructs in model contributes significantly to budget overrun with R2 value of 0.623.

Gul polet et al.(2014) has focused on micro-scaled construction companies. The data was collected through questionnaire survey within 136 companies .Reliability and ranking method was carried out for data analysis .According to him design factor plays the most critical problem for cost overrun. The findings of his study can help micro-scaled construction companies to know and prevent the root causes of cost overrun.

Zayyana Shehu et al.(2014) prepared an analysis of cost overrun on Malaysia based construction companies. A questionnaire survey of Malaysian quantity-surveying consultants was undertaken to obtain project characteristics and cost performance data, in relation to a sample of 359 recently completed construction projects. Data was analyzed based on, project sector, contract values, type of project, procurement route, nature of projects and tendering method used for analysis. The findings offer stakeholders descriptive statistical cost performance information in relation to these characteristics. The data was analyzed through regression and descriptive analysis.

Mulenga mukuka et al.(2015) discussed the effect of construction schedule overrun in Gauteng construction projects in South Africa.The data was derived from both primary and secondary sources. The primary was well prepared questionnaire and the secondary data includes 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, claims, delays are the major criteria for project schedule overrun. Extension of time ranked 1(SD=0.829) and the last rank goes to loss of skilled employees (SD=1.077)

Ghulam Abbas Niazi et al. (2015) identified the significant factors that lead to construction cost

overruns in Afghanistan. The questionnaire was circulated to 75 construction practitioners, including clients, consultants and contractors. Causes are determined based on different categories such as contractor, client, ,labor, material and equipment's and external things .RII (Relative Importance Index) method was used for analysis. According to them Corruption was ranked as first major contributor of cost overrun with a RII value of 0.89. Corruption constitutes a serious threat to the Afghanistan Construction Industry being able to improve because it has a serious effect on construction cost growth. Delay in progress payment by the client, this factor was ranked the 2nd most significant contributor of cost overrun with a RII value of 0.82.

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. An ANOVA test was used to determine differences between the cost overruns experienced in the construction and engineering projects (p =0.05). The contract award as the reference point, cost overruns from 276 construction and engineering projects were calculated and revealed a mean cost overrun of 12.22%.

Le-Hoai et al. (2008) found the 5 significant factors influencing cost inflations in Vietnam such as financial difficulties of owner, poor site management and supervision, poor project management assistance, financial difficulties of contractors, design changes.

Enshassi et al. (2009) analyzed the major factors causing cost inflations which includes fluctuations in the cost of building materials, increment of materials prices due to continuous border closures, delay in construction, supply of raw materials and equipment by contractors, unsettlement of the local currency in relation to dollar value, project materials monopoly by some suppliers, resources constraint, lack of cost planning/monitoring during pre-and post- contract stages, funds and associated auxiliaries not ready, design changes, improvements to standard drawing during construction stages and inaccurate quality take-off.

A questionnaire survey was carried out by **Ali.A.S. et al (2010)** and the most serious factor contributed to cost inflation was inaccurate or poor estimation of original cost. The most significant method to control construction cost is proper project costing and financing. He concluded that the problem of cost inflation is not a small issue and it could cause serious problems to the construction industry.

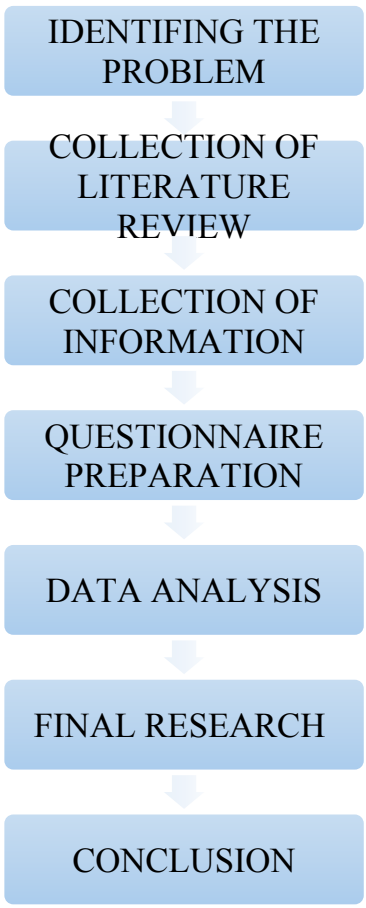
Abhishek Bhargava et.al (2010) proposed analysis based on Time and Cost Overruns in Indiana highway projects using three-stage least-squares technique to investigate the factors affecting time delay and cost overrun against the background of their simultaneous relationship. They identify a number of factors that significantly affect cost overrun and time overrun and the effect of these variables vary by attributes such as 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 provides empirical evidence that a simultaneous relationship does exist between cost overruns and time delays, and therefore the prediction of cost overrun and time delay is best carried out.

A. M. El-Kholy (2015) studied two models for predicting cost overrun in Egypt based construction projects. The first model based on regression analysis and the second model was case based reasoning (CBR) model. CBR method was used to estimate percentage cost overrun in construction works. Based on the first method 20 projects was used for model building, while the data of remaining 10 projects was used for validation purposes.. The second model was based on

case based reasoning. After comparing of the two model he concluded that regression model has prediction capability higher than that of CBR model in predicting cost overrun percentage for construction projects.

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 overriding 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, by its very nature, 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.

3. METHODOLOGY



3.1 QUESTIONNAIRE PREPARATION

A questionnaire was designed based on object of study i.e., finding out causes of construction budget Inflation of residential projects, finding out opinions to minimize the construction delays. The questionnaire was developed to investigate and assess sensitivity of owners, consultants, and contractors to the importance of causes that affect the time, cost, quality and health & safety of the construction projects. Factors making

time and cost Inflations in construction projects were first identified and examined through the questionnaire. The questionnaire was prepared in such a way as to get the opinions and understandings from experienced respondents.

a) Respondent background

In this section we tried to obtain the respondents information. This questionnaire includes

- The respondent organization
- The position of the respondent in the company
- The experience of the respondent in the construction project

b) Causes of construction Inflation

This section of questionnaire evaluates the factors that contribute to the cause of construction delays. The factors are divided into 9 groups namely

Parts of the questionnaire are:

1) Factors related to management of work

2) Economic factors

3) Factors related to owner-client

4) Factors related to consultant of the project

5) Factors related to contractor of the project

6) Factors which are related to material, manpower and equipment

7) External factors.

4. ANALYTICAL TOOL

The relative important index(RII)

$$\mathbf{RII = \sum W / A.N}$$

Where

RII = Relative Important Index

W = weighting specified to each factor by participants in the questionnaire.

(W ranges between 1 and 5),

1 is not significant

5 is extremely significant.

A = the highest weight which is 5 in this questionnaire and

N = the total no of the participants.

4.1 t TEST

When the size of the sample (n) is less than 30 then the sample is called as small sample. t test is best suited for small sample therefore this method is adopted

$S^2 =$

Where ,

, - Sample mean

s- standard deviation.

5. CONCLUSIONS

Studies and discussions were done on detailed study on cost inflation at various fields based on the journals collected. Cost inflation is a challenging task in the construction projects. It is composed of large number of participants who work together in the project in a temporary manner. Different factors affecting Cost inflations in construction fields are to be identified and the conceptual remedial measures for each study are going to be suggested according to its convenience. The details regarding the topic are to be collected by questionnaire survey with the help internal and external personalities involved in the system. Different methods are suggested by the authors for the ranking of the factors in the management system like RII technique, Software uses like SPSS etc.,

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