

# **A REVIEW PAPER ON ANALYSIS AND ASSESSMENT OF COST ESCALATION IN CONSTRUCTION PROJECTS**

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## **ABSTRACT**

*The construction scenario in today's world is rapidly moving with a good pace in the developing countries. On the other hand cost differences due to escalation and overrun has been a problem for the success of construction projects. The project life cycle of any construction project is mastered by monitoring of various engineering and management techniques but somehow are not capable of achieving success up to the expected limit .Cost is hence an important aspect of these projects as it is the backbone on which the success of a project depends and hence it needs to be studied in detail and a proper track of control should be established for obtaining optimistic output. This study deals with various factors which are the root of various reasons of cost escalation and overrun. This paper explores the review of methodologies of various statistical and project management techniques which are used for the assessment of cost escalation and overrun in various construction projects.*

**Keywords-** *Analytical Hierarchical process, Construction projects, Cost Escalation & overrun, Contracts, Relative Important Index, Statistical package of social science (SPSS).*

## **I. INTRODUCTION**

The Construction industry throughout the world is growing rapidly. India is one of the developing countries in the world which has agriculture as primary source of income and it is followed by the construction industry sector which provides the second highest number of employment. The Indian government has been continuously targeting for a high scale of economy growth in every five year plan by being reliable on the construction sector. The infrastructure development is the major cause of the growing world economy. Hence every construction project should be monitored correctly as finance is involved in it specially for the developing country like India. For each construction project where cost is involved 'Cost Escalation' is a phenomenon which comes in to existence. Every Construction project is planned and scheduled and hence a budgeted cost is developed, this cost does not remain the same throughout the project lifecycle and hence an 'Actual Cost' comes in to existence which is always higher then the budgeted cost and this difference is called the project cost overrun. This paper hence discusses for the elimination of the various causes and factors that take the construction projects on the verge of extension and hence escalation. The various developed engineering techniques should be adopted with proper management and hence optimal results are obtained.

## II. RESEARCH BACKGROUND

1). Mr. Peter Morris & Mr. William F. Willson carried a study which underwent the measuring and managing of cost escalation. This paper focuses on understanding the basics of escalation and also the factors of escalation were obtained through experience and survey in the construction industry in the U.S. They describe Escalation as Volatile [1] in nature and is very dangerous for the smooth operation of a construction project as it creates competition for resources and skilled labours. It becomes difficult for both the contractors as well as the owner to quantify and manage cost escalation in the given budgeted period of the project. Minimization and reduction of escalation is the base idea of this paper.

The author's clearly states that escalation is a type of risk and is difficult to estimate. Some of the factors responsible are natural disasters, increase in material price, bid market disruptions, high volume of construction work, climate etc. Delay increases the impact of escalation [1] and this impact creates a pressure of work on the entire team to complete work on time. There is a need to study the respective cost indices and abide by them properly so as to give proper quote of contract and receive a healthy bid from the contractors. The main dominant cause is poor risk allocation which is always transferred from higher authority to the lower level staff. Partnering in risk factor of the project should be adopted by the owner and a fluctuation clause should be maintained in the contract for the betterment of the project. Cost plus contracts are a good option for assessing risk up to some extent [1].

2). Knight et.al (2000) had published a paper in which the preliminary study of the factors affecting cost escalation in construction projects was done. This study brings the scenario of the escalation factors responsible for over costing from the contractor's perspective. The authors clearly state that labour productivity is a major source of cost overruns. A combination of subjective, objective and secondary indicators is used to measure the factors responsible and find out their impact on the projects performance. The factors were identified from various literatures and questionnaire surveys from Alberta based construction contractors. Rework is an additional factor which depends on labour productivity. Study based on the use of fuzzy logic was used to model the factors affecting the cost of construction [2].

### *Survey Response*

Survey was carried which involved owners, clients, engineers, contractors, skilled labours and government officials.

3). Mrs. Jeya Priya.R and Ms. Nandini.S discussed in detail the topic of assessment of cost overrun in construction projects. Cost is a major consideration throughout the project management life cycle and is the driving force of the projects success [3]. A list of fourteen factors responsible for creating cost escalation and thirty three factors of overrun were found out through questionnaire survey. The results of this survey were fed in a SPSS tool (statistical package of social science) and the results were obtained in rank describing their effects in the lifecycle of the project. The factors are responsible for creating a friction between the owners (especially govt. owners), project managers, contractors [3].

The technique of descriptive and frequency analysis were adopted in SPSS model to obtain the ranking results. A criteria was set for obtaining the results which was based on the person interviewed, type and size of the company, and the type, size and location of the project. The top five factors of cost escalation were the government policies, taxes, raw material input, environmental protection and labour cost. The top five cost

overrun factors were delay in work approval, slow decision making, fraudulent practices and kickbacks, bidding price higher than the original estimated cost [3].

*The Analytic Hierarchy Process (AHP) Methodology*

The AHP is also one of the appropriate statistical method to relate priorities of final choices alternatives in multi-criteria decision problems. This involves pair wise comparison of elements to get their relative weights or importance score. It gives a well structure for decision making which is suitable for both decision making by an individual or a group of experts.

For eg.

client	3	2	1	2	3	Contractor
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4). Dawood et.al (2002) has done a research on decision support system for cost escalation in heavy engineering industry in the U.K. A well-defined cost escalation methodology for improving management of estimation and control in the heavy engineering industry was prepared. The author discusses that there are three elements of cost escalation first the market variations that are dealt by the cost indices of respective countries, second the risk in the engineering strategy adopted. Lastly the Bias that is dealt with as part of the company by monitoring and comparing it with other previous projects. The study does not give a firm solution to the problem but suggest the possible cases of answers buy feeding proper data in to the model[4].

5). Ali Touran & Ramson Lopez in their research named Modeling of cost escalation as a risk factor in construction projects discussed a computer based model specially to incorporate the effect of cost escalation on large projects which span for several years .This model considers the precedence relationships between projects and models the effect of escalation probabilistically [5] a distribution is calculated for the total program cost. Delay of individual projects for the total over costing of the entire project is done and the uncertainty in the value of escalation factor for cost indices especially for multiyear projects is done. For this Monti carlo simulation which is a statistical method is used for obtaining the probable value of cost escalation and overrun.

6). Iyer et.al (2007) carried a study related to understanding time delay dispute in construction contracts. The author has found several faults and gaps in the regular contract documents which are the real reason for the arising of disputes. The study focuses on developing a system which will be able to fill these gaps and hence eliminating disputes. For this the author suggest to create a better training area of contract management to the professionals by which they can understand the essentials of a healthy contract and this may help proper drafting of the construction contracts. As disputes will get reduced the projects can be completed successfully on time [6].

7). Tejale et.al (2015) in her research work of analysis of construction project cost overrun by statistical method makes a point that project overruns due to time and cost results in delay delay during project execution[7]. Various cost overrun factors were found in the study by discussion with experts, interviews and questionnaire survey. Forty five such factors were obtained in the study and a questionnaire of these factors were prepared and distributed to various owners and contractors. The statistical method of 'Relative importance Index' was used to get the desired result and proper ranking was done, this fetched the top eleven causes of cost overrun. Material management, resource planning & management, and proper financial management may be adopted.

The Relative importance index method is used to determine the relativity according to importance of factors causing delay in the construction projects. It has a five point scale involved in it according to which the factors are ranked. It helps to cross compare the relative importance of factors based on the numerical score given by the respondents through the questionnaire survey. The importance based rank is given by the following formula:

$$RII = \sum W / (A * N) \{0 \leq index \leq 1\}$$

Where,

- W - Weightage given to each factor by the respondents and ranges from 1 to 5.  
 $\sum W$  - Total score assigned to the respective factor by the respondents.  
A - Highest weight allotted  
N - No.of respondents involved in the survey.

8). Kaliba et.al (2008) in their research work of cost escalation and schedule delays in road construction projects in Zambia found various reasons which are not satisfactory for the better performance of the project. Cost escalation and schedule delays were in existence due to elements like bad weather which resulted in heavy rains and floods. The scope of work was changed. Other factors such as schedule delays, strikes, local govt. pressure, technical challenges and inflation were found to be contributing to cost escalation [8].

The study also found that the client organization failed to timely pay the contractor, contract were modified, drawings underwent changes, staffing problems, labour disputes prevailed. Hence resulting in cost escalation. The author suggested points for betterment such as proper project timing and scheduling of work, properly defining the scope of work, proper estimating and costing indirectly proper financing for the success of the project, better communication & linear staff management, good governance is also necessary.

### **III. METHODOLOGY**

This study is aimed at getting better results to assess and analyze the cost escalation phenomena. The study inculcate information from various surveys, publication research, literature review, interviews and other research techniques which will be able to help make responsible decisions during the construction phase of any project. Further the structural methodology is structured as below.

- i. Introduction.
- ii. Literature Survey.
- iii. Study of the Research topic in detail.
- iv. To study the research papers, articles and magazines related to the topic of study.
- v. Data collection from the proposed area of study which includes large, medium & small scale construction projects.
- vi. Collection of information with help of a questionnaire from authorities which include owners, project managers, engineers, contractors.
- vii. Analysis of the root causes of cost escalation & overrun with help of mathematical formulae & SPSS software.
- viii. Assessment of cost escalation & overrun by implementation of the result on ongoing projects.

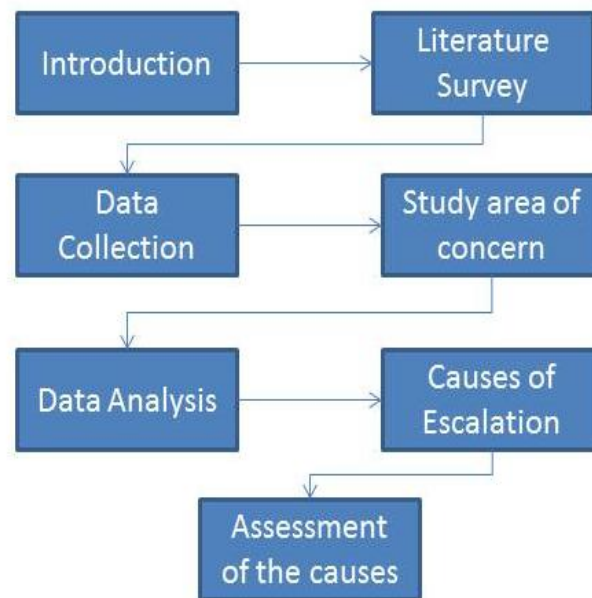


Fig 2. Flowchart of Methodology.

#### IV. CONCLUSION

The review study identified various causes of cost escalation and overrun in today's construction sector and also analyzed the impact of each of them respectively on the construction project lifecycle such as labour productivity. The management team can lessen the duration of existence of the non-excusable delays by effective management techniques. Escalation can be statistically forecasted up to certain extent and hence we can get an idea related to it and we can act accordingly. Proper formation of contracts without any gaps in it can be done by establishment and improving the area of contract management. Computer model developed has ability to incorporate the effects of escalation and proper output is obtained which is useful to predict the factors responsible. We can get probable results by the help of the decision support system established for the use of heavy engineering projects. The use of cost plus contracts should be given importance and the risk should be sportingly divided between the owners and the contractors.

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