

# Study on Impact of Resource Constraint Factors on Project Budget in Construction Projects

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**Abstract :** This paper presents a detailed study on construction sector hence, construction sector is considered to be important key driver of economic growth of the country and occupies a pivotal position in the national development plans. It is seen that economic growth is not being achieved at desired level due to cost overrun despite the importance of construction industry in the economic development of the country. It has been observed that not much attention is being paid to handle the problem of cost overrun by the stakeholders of the construction industry in India. Therefore, it is an urgent need to identify actual causes of cost overruns so that the cost of any construction project can be minimized.

**Index term:** 1. Cost overrun, 2. Economic growth, 3. Low cost, 4. resource constraint.

## I. INTRODUCTION

The infrastructural development and socio-economic progress of a nation utterly depend upon the conceptual visualization of major projects and Construction industries plays an important role in economic growth and development of any country especially for developing countries like, India. Construction industry is highly risk prone, with complex and dynamic project environments creating an atmosphere of high uncertainty and risk. The industry is vulnerable to various technical, socio-political and business risks and therefore risk management has grown in significance in the companies of the building industry among which Cost is one of the major considerations throughout the project management life cycle and it can be regarded as one of the most important parameters of a project and the driving force for the success of the project. Despite its proven importance, it is common to see a construction project failing to achieve its objectives within the specific cost. The Indian construction industry is an integral part of country's economy and its growth and a conduit for a substantial part of India's development investment. The construction industry is primarily driven by government investments on core and urban infrastructure; industrial capital investment by corporate sector and development activities of real estate/housing sector. The basic goal in any industry is to achieve the completion of project within time and stipulated cost budget. Study of previous literature revealed that cost overrun is a very common phenomenon and it affects projects greatly. Many studies point out that the situation is more severe in developing countries. The government owned projects are the least cost efficient. According to data laid out at the Indian Parliament, total cost overrun of 179 on-going government projects was Rs 1.23 lakh crore. Therefore, identification of causes leading to cost overrun and assessing its countries where these overruns sometimes exceed 100% of the anticipated cost of the project. impact and frequency are

necessary to avoid or reduce cost overrun and its effects. Managing resources in the framework of civil engineering construction sector is usually an extremely complex task. Factors contribute to this complexity include the variety and great number of existing resources of both human and material, the diversity of tasks that each working unit is able to execute, the performance of each working unit, the involved costs, and the spatial distribution of all resources over the different places, leading to the need for displacement from one site to another.

## II. COST OVERRUN

Cost overrun is defined as the excess of actual project costs over budgeted costs. The cost overburden is obtained by the estimated cost, final cost and the contract between a contractor and an owner. The difference between estimated and final cost is termed as the magnitude of the cost overrun of a project (Akinci and Fischer, 1998). There are various resource related factors which lead to failure of resource management resulting in construction cost overrun. Hence, this study is aimed at investigating construction resources-related factors that cause construction cost overrun in construction industry. Cost overrun is a very frequent phenomenon and is almost associated with nearly all projects in the construction industry. This trend is more severe in developing

## III. NEED FOR THE PRESENT STUDY

Construction sector is considered to be important key driver of economic growth of the country and occupies a pivotal position in the national development plans. It is seen that economic growth is not being achieved at desired level due to cost overrun despite the importance of construction industry in the economic development of the country. It has been observed that not much attention is being paid to handle the problem of cost overrun by the stakeholders of the construction industry in India. Therefore, it is an urgent need to identify actual causes of cost overruns so that the cost of any construction project can be minimized.

## IV. OBJECTIVES OF THE STUDY

- 1) To identify the factors related to resource constraint factors which are responsible for cost overrun in construction projects
- 2) To assess the impact of these causes will be on the total cost of the project
- 3) To develop a fuzzy model to access the level of risk due to resources in a construction project

- 4) To suggest some remedial measures to avoid cost overrun in construction projects

## V. SCOPE OF THE STUDY

- 1) The scope of this research project is limited to building projects in India only.
- 2) The data for this study has been collected through expert's opinion and questionnaire survey
- 3) The data are analysed by means of Statistical tools.

## VI. METHODOLOGY

- 1) This study involves collection of the factors affecting project budget in construction projects from literature survey and through expert's opinion.
- 2) 30 factors are identified influencing project budget based on that a questionnaire has been designed
- 3) The field executives are asked to rate the factors on five-point scale based on the probability of occurrence and level of impact. The scale ratings are as follows, 1=very low, 2=low, 3=moderate, 4=high, 5=very high
- 4) The number of data collected are 170 and preliminary analysis using mean impact method was carried out in SPSS and Excel
- 5) The factors are categorised into low, medium and high-level risk for which a **RISK MATRIX** was developed and risk index was calculated by the following formula

**Risk Index = Probability of Occurrence x Impact of**

### **Risk**

- 6) The mean impact is calculated and various factors were ranked.
- 7) A model is created using fuzzy logic in MATLAB based on the factors to minimise the cost variation group
- 8) Finally, results are obtained and suitable recommendations will be given.

## VII. DATA COLLECTION

This study involves the identification of various factors affecting project budget in construction projects which are categorized based on resources. The lists of factors taken from literature are described in detail below.

### A. SELECTION OF VARIOUS FACTORS FOR STUDY

The identified factors affecting project budget in construction projects are categorized based on resources as follows.

#### a). MANPOWER

Labour availability in the market plays the important role in the labour recruitment. If labour availability is more, an organization can recruit the competent labours. The factors considered under this are

- 1) Shortage of labours
- 2) Problems due to labour disputes and strikes
- 3) Sufficient availability of skilled and competent labours
- 4) Productivity of local employees and ration of local employment

- 5) Frontline supervisory force available to monitor the project
  - 6) Safety requirements of workers
  - 7) Protest or support from local bodies
  - 8) The professional competency and experience to complete the project was efficient
- b). EQUIPMENT

The main reasons for this type of problems concerned the availability of sufficient trucks in the field, especially for moving materials or tools. The factors considered under this are

- 1) Interruption due to shortage of equipment
- 2) Disruption of power / water supply and low productivity of equipment
- 3) Availability & Productivity of P&M (owned / hire). Working & maintenance conditions, Mobilization

#### c). MATERIAL

The primary cause for the delay is lack of material resources and on time delivery. The factors considered under this are

- 1) Shortage of materials
- 2) Escalation of materials like steel cement and metals
- 3) Problem in quality and storage facilities in project site
- 4) Material wastage exceeding the tolerance limit

#### d). FINANCING

- 1) Fluctuation in currency rate
- 2) Changes in working capital requirement
- 3) Any cash flow and financial difficulties faced by the contractors

#### e). ENVIRONMENT

There are so many uncertainties related to environment. We can't predict that factors causing delay but it having more impact. The factors considered are

- 1) Differing site (soil) conditions in this project
- 2) Climate and weather condition
- 3) Location of site
- 4)

#### f). DESIGN

- 1) Frequent design change
- 2) Improper design and delay in producing design document
- 3) complex design in the project

#### g). SCHEDULING AND CONTROL

- 1) Project quality plan satisfies the requirement of quality control and quality assurance
- 2) Commissioning requirement and handling over procedures
- 3) External interference due to rules and regulations of the government
- 4) Cost of rework and bad workmanship
- 5) Conflict with the government in this project

## VIII. QUESTIONNAIRE DESIGN

The questionnaire is divided into two main parts.

**Part I** is related to general information for the company. The respondents were requested to answer questions pertaining to their experience in building construction and their opinions about the percentage average cost overrun in building construction projects they have experienced.

**Part II** includes the list of the identified factors affecting in building construction.

For each factor two questions were asked what is the probability of how often this particular risk affect. And what is the level of impact of this particular risk. In order to select the appropriate method of analysis, the level of measurement must be understood. For each type of measurement, there is/are an appropriate method that can be applied and not others. In this research, ordinal scales were used. Ordinal scale is a ranking or a rating data that normally uses integers in ascending or descending order. The numbers assigned to the agreement or degree of influence (1, 2, 3, 4, 5) do not indicate that the interval between scales are equal, nor do they indicate absolute quantities. They are merely numerical labels.

## IX. CONCLUSION

It is recommended that the cost overrun in construction projects can be minimized by strengthening the Project Implementation Unit (PIU) and Project Management Unit (PMU).

1. The most predictable and significant factor identified by the obtained results is **Frequent design change** therefore it is recommended to Plan and sufficiently study the project and its benefits before the beginning of design works; Allocate sufficient time and money on the design phase; Spend more money on the design phase issued less cost variation; Reviewing drawings and designs, and comparing to avoid the occurrence of any additional works after implementation.

2. The distribution of payments should be carefully designed based on milestone achievement related to detailed cost estimate to avoid fund shortage leading to stoppage of the construction process and to ensure that contractor does not receive large profit at early stages of the project.

The results show that most of the problems in construction projects are originated from poor resource management (human, technical and material). These causes should be controlled right away from the planning to the implementation and management stages. Good practice in planning, coordinating, controlling and monitoring procedures is therefore has to be recognised

In conclusion, it is believed that by focusing on the relative levels of impact of the identified sub-factors, the project team / owners could be

guided well in their efforts to addressing the factors in a cost-effective manner.

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