A Study on Factors affecting Cost and Time Overrun for Residential Construction Projects by RII

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ABSTRACT: In this day and age, construction of buildings in India's construction industry, are encountering numerous difficulties regarding total cost flow and project schedule. The main aim of this study was to identify, asses the risk factors affecting the total cost and time of project and their effects on construction projects. After thorough and in-depth literature review, forty (40) risk factors were identified. Questionnaire survey and personal interviews were carried out across associates, stakeholders, engineers, contractors and sub-contractors to know their perspectives on causes of cost and time overrun of the project. This study categorizes and asses the risk factors that affect the total cost and time of project using relative importance index (RII) for analysis. Due to utilization of RII, factors were computed so as to get their respective ranks. The most crucial factors that played significant role in increasing the predefined budget and project time were identified as: (1) inflation (RII=0.945), (2) time overrun (RII=0.815), (3) shortage of key materials (RII=0.81), (4) access to funds at reasonable interest rates (RII=0.806), (5) labour shortage (RII=0.805). The study deducted that inflation and time overrun were top two factors having highest impact with RII values 0.945 and 0.815 respectively. Also factors that had the least impact were changes in currency exchange rates and poor communication between parties having RII values 0.32 and 0.314 respectively. Due to identification of these factors, we can prevent complexities, uncertainties and increase in total cost and time of a building project.

KEYWORDS: Risk impact, Relative importance index, and Total cost flow

I. INTRODUCTION

There are numerous factors which affect the total cost and time of the construction project. Hence analysis and assessment of these contributing factors must be done in order prevent any kind of catastrophe. Nowadays, most of the projects are getting delayed and overrun on the behalf of owner as well as the contractor. Due to many variables and unpredictable risk factors, it has become very difficult to achieve economy and efficiency in a construction project. This has become a major concern in Indian construction industry. Due to unawareness of hazards, inability to estimate and evaluate risks factors, the total cost flow and time period of a project is seriously hampered. As India is a developing nation, many significant risk factors are ignored in a construction project. This study attempts to identification and assessment risk factors affecting the total cost and time of project. Also the results can be used in other regions of the country working in similar conditions.

II. LITERATURE

- Sai Murali Krishna Reddy.Raya and S.S Bhanu Prakash (2016) [1] "COST AND TIME OVERRUNS IN INDIAN CONSTRUCTION INDUSTRY". A lot of research and studies have been done to identify the root cause of the time overrun and cost overrun in construction projects which lead to the delay in the project completion Time and cost are the lifelines of any and every project. It is of supreme importance to study, analyse and evaluate the common factors leading to these constraints and suggest the best mitigation measures to overcome time and cost overrun constraints. During the construction phase it is the prime responsibility of the project managers to monitor cost and time and avoid the overruns of the both cost and time. Due to these limitations, this paper discusses the effective cost and time control overrun practices in construction industry
- Mamata Rajgor, Chauhan Paresh, Patel Dhruv, Panchal chirag, Bhavsar Dhrmesh (2016) [2] "RII & IMPI: EFFECTIVE TECHNIQUES FOR FINDING DELAY IN CONSTRUCTION PROJECT". Delays are unique one in every of the largest issues construction companies are facing today. The research presents the result of the questionnaires survey conducted to identify and evaluate the relative importance of the significant factors contributing to delay in construction project. Construction projects are heavily affected by causes of delay, if anybody doesn't knows which are the factors that causes delay then they cannot be succeeded. The project investigated in this study included residential building, office building projects and high rise building .In this research the project team members

i.e. owner, contractor, consultant, Engineers etc. are taken for questionnaire survey to obtain the delay factors and research to identify the main causes and effects of delay in construction projects.

- Desai Megha, Dr Bhatt Rajiv (2013) [3] "A Methodology for Ranking of Causes of Delay for Residential Construction Projects in Indian Context". Delays are unique one in every of the largest issues construction companies are facing today. Delays will result in several negative effects like lawsuits between house owners and contractors, exaggerated prices, loss of productivity and revenue, and contract termination. Albeit varied studies are thought of into the causes touching delays, these studies rarely discuss common and general causes of delays in construction comes. Thus, comprehensive study on these delays is important. Present study works on identification of causes of delay in residential construction projects in Indian context. Literature review and structured interviews were carried out on construction projects in central Gujarat region of India. The paper presents the framework of causes of delays in residential construction projects. Total 59 causes were identified under 9 major groups. An approach is suggested to carry out ranking of these causes by two different techniques: Relative importance index and Importance index based on degree of severity and degree of frequency. It is hoped that the findings of the paper will help the stake holders to act on critical causes and further try to reduce delay of their projects.

III. METHODOLOGY

The data collected to define the most significant risk factors affecting total cost flow and time period of a project was done through questionnaire survey and structured interviews involving engineers, contractors, sub-contractors of the construction site. Respondents were asked to score the extent of occurrence and the impact of each risk factor occurring. The analysis was carried out using relative importance index (RII).

IV. SCOPE OF STUDY

The research identifies the significant risk factors affecting total cost flow and time of a project. Based on the identified risk factors, their analysis was done using relative importance index method. This research is mainly on data obtained from opinions and reviews from all technical staffs including engineers, contractors, etc. These factors and their analyzed impact could further be used in other construction projects keeping in mind the attributes like site conditions, specifications, etc.

V. OBJECTIVE

The main objective is to study, identify and evaluate the most crucial risk factors affecting total cost and time of project.

VI. DATA COLLECTION AND ANALYSIS

Onsite data was collected from construction sites located at Mumbai and Thane region in order to identify the risk factors and its analysis. The architects, engineers, contractors and sub-contractors of the construction sites were mainly targeted for survey. Sites selected were strictly residential buildings of medium to large firms. These attributes were considered to adopt sample size of study. Distribution of 75 questionnaires was carried out and out of which 42 responded. Hence, response rate was 57% which was under acceptable limits and further analysis was carried out using relative importance index method. This method calculates and represents relative importance of numerous factors which affects total cost and time of project. The criticality of risk factors was computed by using formula:

$$\text{RII} = \frac{\varepsilon W}{A \times N} \; (0 \leq RII \leq 1)$$

where, W – is the weight given to each factor by the respondents and varies from 1 to 5, (where "1" is "strongly disagree" and "5" is "strongly agree");
A – Is the highest weight (i.e. 5 in this case) and;
N – Is the total number of respondents.
Higher the value of computed RII, more crucial was the cause of overrun/delay.

Table 1: Significant risk factor affecting total cost and time of project by RII method

Types of risk	R.I.I	Rank
Inflation	0.945	1
Time overruns	0.815	2
Shortage of key materials	0.81	3
Access to funds at reasonable interest rates	0.806	4
Labour shortage	0.805	5
Unavailability of utilities	0.8	6
Incomplete scope	0.795	7
Improper execution	0.79	8
Subcontractor's insolvency	0.785	9
Alteration in works	0.785	10
Changes in initial design plans	0.78	11
Client's bankruptcy	0.78	12

Delay in resolving claims	0.775	13
Shortage of plant equipment's	0.76	14
Delay in production target	0.75	15
Corruption tendencies	0.75	16
Delay in agreeing variation/day works	0.734	17
Underestimating convolutions in project	0.728	18
Legislative constraints	0.719	19
Difficulties in foundation	0.64	20
Changes due to harsh weather	0.625	21
Delay in payment from client	0.607	22
Labour strikes	0.59	23
Improper workmanship	0.559	24
Unforeseen ground conditions	0.543	25
Adapting to new regulations	0.519	26
Civil interferences	0.5	27
Estimating error	0.475	28
Delay in retention release	0.44	29
Misestimate of project	0.435	30
Improper planning and fraudulent activities of subcontractor	0.423	31
Fire accidents	0.421	32
Delay in interim certificates	0.368	33
Ignorance of health and safety of labours	0.355	34
Improper selection of materials	0.35	35
Site overhead	0.346	36
Inferior quality of work	0.342	37
Fluctuations in interest rate	0.34	38
Changes in currency exchange rates	0.32	39
Poor communication between parties	0.314	40

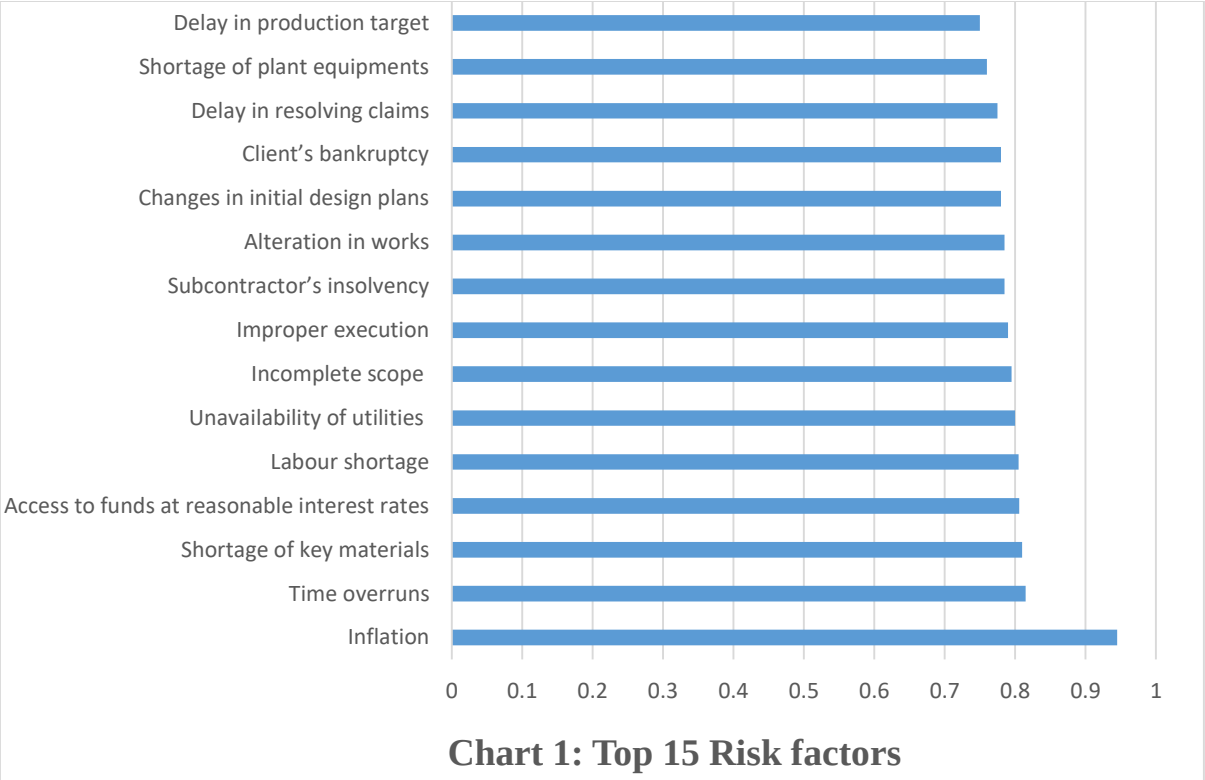

Chart 1: Top 15 Risk factors

VII. CONCLUSION

Variation in total cost flow and time period of project can be avoided or minimized when their causes are identified. The main objective of this study was to identify the significant risk factors in construction projects and asses them in order to know their criticality by using relative importance index (RII).Now, according to their respective RII values , rank is provided to each of the risk factor which ultimately shows its severity. The study concluded that the 15 most significant risk attributes which were responsible for increase in cost and time of project were inflation , time overruns, shortage of key materials ,access to funds at reasonable interest rate, labour shortage , unavailability of utilities ,incomplete scope, improper execution, sub-contractor's insolvency, alteration in works, client's bankruptcy, changes in initial design plan, delay in resolving claims, shortage in plant equipment, delay in production targets. Above findings must be prioritized by each and every construction firm in order to know the impacts of various risks, if existing control measures are adequate or if more should be done, mitigation to be done accordingly.

VIII. REFERNCES

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