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Reduce Time Overrun of High-Rise Building Projects in Vadodara City Using RII Method

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***Abstract*— A common problem in construction projects is time overruns. It depends on the project's size and type. This paper focuses on the classification and identification of time overrun factors in High-building projects in Vadodara city. A total of 66 factors of delay were identified under 9 different categories. Then a questionnaire survey is done to find the major causes of delay faced by owner, Contractor, Designer, Consultant, material, labour, equipment, project, and external. From the analysis of the questionnaire major causes of delay were identified with the help of Relative Important Index (RII) method.**

Keywords— Time overrun, factors of time overrun, time management, Quantitative method, RII method.

I. INTRODUCTION

Time overrun is one of the most serious issues in the construction industry. Construction time overrun is the change between a project's actual contract period at the time of tender and its final contract period on which construction project finished. The project is running behind schedule. The project's success is negatively impacted by the delay in terms of schedule, budget, and quality. The objective of the project is,

- To identify factors of time overrun during construction.
- To analyze the importance of sensitive projects and finishing the work as early as possible.
- To find the most critical factors that directly affect to project timeline using RII method.
- Give suggestions to the construction team for effective measures by analyzing the most critical factors.

II. LITERATURE REVIEW

Several studies have been carried out to determine the causes of delays in construction projects. According to Anup Wilfred, Muhamad Sharafudeen (2015), The major delay causes in Indian Construction Industry is identified through literature review and a questionnaire survey conducted among the Clients, Contractors and Consultants. These delay causes were then ranked using two techniques: Relative Importance Index and Importance Index based on degree of severity and frequency of occurrence.[7]

Towhid Pourrostam and Amiruddin Ismail (2012), A questionnaire survey was conducted to solicit the causes and effect of delay from consultants and contractors. The perspective of contractors and consultants has been analyzed to rank the causes of delays based on their Relative Importance Index.[6]

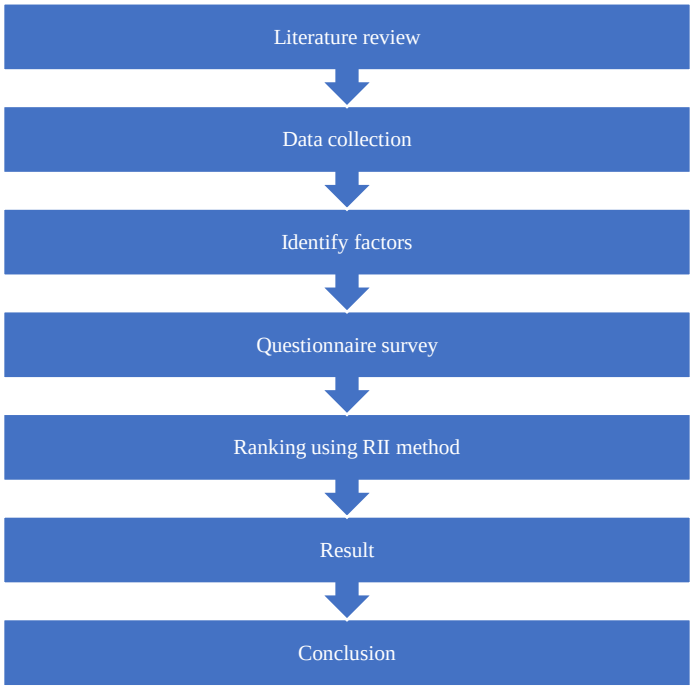
M. E. Abd El-Razek, H. A. Bassioni, and A. M. Mobarak (2008), This paper aims to identify the main causes of delay in construction projects in Egypt from the point of view of contractors, consultants, and owners. The overall results indicated that the most important causes are: financing by contractor during construction, delays in contractor's payment by owner, design changes by owner or his agent during construction, partial payments during construction, and non-utilization of professional construction management.[5].

A. Previous study on causes of delay in construction

Researcher	**Country**	**Major causes of delay**
Anuradha Arya	India	Slowness in decision making
		High quality of work required
		Owner interference
		Poor communication and coordination
		Delay in approving shop drawings
		Unrealistic contract duration imposed
		Late in revising and approving design documents
		Conflicts between partners

Suhas G. Awari	India	Finance Difficulties
		Poor site management
		Poor communication with other parties
		Poor qualification of technical staff
		Delay in site mobilization
		schedule conflicts with sub-contractors
		Reconstruct due to change in design
		Improper construction methods
		Delays in sub-contractor's work
		poor performance by contractor
		Conflicts between contractor and owner
		Ineffective planning and scheduling
Kartik Kalkani	India	Design changes during construction
		Delays in producing design documents
		Insufficient data collection and survey before design
		Lack of experience of designer engineers
		Unclear and inadequate details in drawings
		Misunderstanding of owner's requirements by design engineer
		Complexity of project design
		Delay in approving drawing, specifications, or instructions
Anupam Khedkar	India	Delay in inspection
		Delay in reviewing and approving
		major changes in the scope
		Inflexibility of consultant
		Conflicts between consultant and design engineer
		Lack of experience
		Poor co-ordination
Ar. Meena. V	India	Delay in material delivery
		Received damaged material at site
		manufacturing special materials
		Late procurement of materials
		Changes in material types
		Delay in progress payments by owner
		Change orders
Salim S. Mulla	India	Shortage of skilled labour
		Labor strikes
		Poor productivity of labors
Jagbir Singh	India	Equipment breakdowns
		Lack of skilled operators
		Shortage of equipment
		Low productivity
		Inadequate modern equipment
Diksha Jadhav	India	Type of construction contract
		Type of project bidding
		Legal disputes between various parties
		Ineffective delay penalties
Prasad K.V	India	Hot weather effect during construction
		Rain effect during construction
		Unavailability of utilities
		Shortage of labour
		Unqualified workforce
		Nationality of labour
		Low productivity level of labour
		Poor soil condition
		Changes in government regulation
		Differing site conditions
		Accidents during construction
		Delay in final inspection and certification by a third party

III. RESEARCH METHODOLOGY



A. DATA COLLECTION

From the review of the literature, several factors that lead to building project delays were found. Among the list of identified factors responsible for time overrun, the related factors to high rise building construction were separated via a preliminary survey. As a part of the preliminary survey, unstructured interviews of contractors, consultants, builders, and experts were conducted to finalize factors. A questionnaire was then prepared for data collection. The finalized questionnaire was distributed to the contractors, architects, engineers, project managers, supervisors, foreman or experience person. The respondents were asked to rank the Frequency of occurrence of these factors on scale of 1-Very poor, 2-Poor, 3 -Moderate 4-High, 5-Very high.

B. DATA ANAYSIS APPROACH

Relative Important Index: The sample for this study is relatively small. As a result, analysis of delay factors (owner, Contractor and Consultant) in order to obtain significant results. Data was analyzed by calculating Relative Important Index (RII).

$$RII = \frac{\Sigma W}{A \times N}$$

Where,
RII is the Relative Importance Index,
W = weighting given to each factor
A = Maximum weight
N = number of respondents.

IV. DATA ANALYSIS

A Total of 80 sets of questionnaires were sent through google form and hard copy to various construction companies Owners, Architect, Consultants and Contractor, Engineers, Project managers located in Vadodara city. Out of 80, 69 completed sets were received back which were evaluated with Microsoft Excel program to find the important factors causing time overrun in construction.

Table I. Data Analysis Result

Sr.no	Factors affecting time overrun	RII	RANK
1	Finance Difficulties	0.758	1
2	High quality of work required	0.725	2
3	Complexity of project design	0.689	3
4	Shortage of skilled labour	0.619	4
5	major changes in the scope	0.615	5
6	Delay in approving shop drawings	0.613	6
7	Poor site management	0.601	7
8	Design changes during construction	0.598	8
9	Unclear and inadequate details in drawings	0.587	9
10	Insufficient data collection and survey before design	0.579	10
11	Delay in reviewing and approving	0.561	11
12	Poor productivity of labours	0.560	12
13	Accidents during construction	0.544	13
14	Poor soil condition	0.538	14
15	Reconstruct due to change in design	0.515	15
16	Ineffective planning and scheduling	0.510	16
17	Poor qualification of technical staff	0.498	17
18	Poor co-ordination	0.479	18
19	Delay in progress payments by owner	0.475	19
20	Delay in material delivery	0.465	20
21	Shortage of labour	0.458	21
22	Type of project bidding	0.451	22
23	Unqualified workforce	0.449	23
24	Inadequate modern equipment	0.434	24
25	Type of construction contract	0.431	25
26	Conflicts between consultant and design engineer	0.429	26
27	Lack of skilled operators	0.417	27
28	Delays in sub-contractor's work	0.412	28
29	Lack of experience of designer engineers	0.406	29
30	Rain effect during construction	0.399	30
31	Received damaged material at site	0.398	31
32	Equipment breakdowns	0.386	32
33	Unrealistic contract duration imposed	0.377	33
34	Late in revising and approving design documents	0.375	34

CONCLUSION

The overall result shows that top five most critical factor for time overrun in high-rise buildings are Finance Difficulties, High quality of work required, Complexity of project design, Shortage of skilled labour, major changes in the scope. To minimize financial difficulties owner have to make timely payment to contractor and also contractor has been require strong financial background, for high quality work more time needed so schedule should allow maximum time require for good quality work, for the complexity of project design architect should not make the design of project difficult and it should be kept as easy and simple as possible and try to avoid changes in drawing during construction and make a agreement on scope of work under contractor.

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