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EFFECT OF TIME AND COST OVERRUNS ON BUILDING CONSTRUCTION PROJECTS

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Abstract: The construction industry plays an important role in Indian economics. Successful completion of project depends upon two major factor time and cost .Hence, there is need to overcome cost and time overruns in construction projects. The objective of this study is to identify the factors causing time and cost overruns. To achieve this objective, a case study of residential construction project is taken. The questionnaire survey for 50 respondents is carried out. The data analysis is done using relative importance index(RII) method and the factors causing major overruns are found out by ranking method. Suitable measures are suggested to minimize the impact of time and cost overruns on the building construction projects.

Index Terms **-Time Overrun,Cost Overrun,Relative importance index, Construction project**

I. INTRODUCTION

Construction industry plays an important role for the economic development of any country. However this industry is facing severe problems which directly affects the time, cost and quality performances of construction projects. The construction projects are affected by number of factors during construction phase and post construction phase. As a result, successful completion of project within the desired time and cost is become a challenging task.

Cost overrun is described as the ratio of the change in the original contract amount to the original contract award amount. For the ease of comparison, the cost overrun can be converted into a percentage value. Mathematically it can be expressed as:

Cost overrun = Final Contract Amount – Original Contract Amount

Time Overrun is the phenomenon in which the project gets delayed beyond its expected completion time due to certain difficulties i.e. more time is required to finish the project than initially planned. The time overrun variable is defined as the difference between the estimated project duration and the actual time taken to complete the project. Time or Money used unnecessarily is of course 'time' and 'money' wasted.

Time and cost are the lifelines of every project. It is of supreme importance to study, analyze and evaluate the common factors leading to these constraints and suggest the best mitigation measures to overcome time and cost overrun constraints. Hence, an efficient control system must be employed to achieve desired results. Effective and meaningful control must begin at design stage and should be backed up by proper and scientific estimation and data analysis

II. OBJECTIVE OF THE STUDY

The main objective of this study is to identify the major causes of delays of building construction projects using a case study in Satara city. Accordingly, possible ways of minimizing them are suggested. It is noted that the clients, consultants, and contractors don't give importance to evaluate the time and cost overruns at the end of project. Also research and studies in this field in Satara are few. The specific objectives of the study are as follows:

1) To study the concept of time and cost overrun from the available literature.
2) To collect data by conducting Questionnaire survey.
3) To carry out data analysis using Relative importance index and thereby ranking of factors using Likert's Scale.
4) To recommend possible Solutions/Prevention to avoid cost and time overrun.

III. RESEARCH METHOD

Research method is the systematic stepwise process to carry out any survey work. This study is carried out through several phases that include literature reviews, research papers, data collection, discussion and conclusion. From the literature review 40 influencing factors were identified causing for time and cost overrun in residential construction projects.

For this purpose, a case study of residential construction project located in Satara city was selected.The data collection was carried out through questionnaire survey. The questionnaires were distributed to contractors, consultants and the staff involved in the respective project. The respondents involved in the survey had several years of experience in handling residential construction projects. Assessment of causes of time & cost overruns was carried out using 4-point Likert scale from 1 to 4 representing can be neglected, low influence, medium influence & high influence respectively. Data analysis was done calculating Relative Importance Index (RII) by following formula, adopted from Memon et al. 2002 as RII is best suitable method to do the ranking analysis.

$$\mathbf{RII} = \frac{\sum_{i=1}^{4} \mathbf{W} * \mathbf{X}}{\mathbf{A} * \mathbf{N}}$$

Where, RII = Relative Importance Index
W = Weighting given to each factor by respondents and its ranges from 1-4
X = Frequency of it response given for each factor A =Highest weight (i.e. 4 in case)
N = Total no. of participants.
From RII results, the ranking for different factors was determined to discover the influencing factors causing time overrun in construction projects.

IV. RESULTS

4.1 Data Collection

For data collection, a total of eighty(80) sets of questionnaires were sent to the people working in the organization of the selected residential construction site located in Satara. Out of 80, fifty (50) completed sets were received back which were evaluated with Microsoft Excel program in order to find the importance factors causing time & cost overrun in construction. Significance of major influencing factors causing construction time & cost overrun was identified in the questionnaire survey. Respondents were asked to rank the factors with 4-likert scale as:

1. Can be neglected
2. Low influence
3. Medium influence
4. High influence

4.2 Data Analysis

Data were analysed by using Relative Importance Index method (RII); the factors were ranked by dividing the factors in various phases such as before construction, during construction, external reasons, management problem, and shortage in resources.Following table shows the analysis of data by RII method and giving the ranks to each influencing factor. In table no.2, C & T means factor caused for Cost overrun & Time overrun.

Table 1. Data Analysis by RII

	INFLUENCING FACTORS	Weight (1-4)				RII	Rank
		1	2	3	4		
BEFORE CONSTRUCTION							
1	Inaccurate estimate of cost and time (C & T)	8	12	18	19	0.81	1
2	Poor bidding process (T)	19	9	14	8	0.555	8
3	Faulty designs (C & T)	8	11	13	18	0.705	2
4	Intentional low-bidding (C)	4	19	24	3	0.63	7
5	Improper site planning (T)	8	11	17	14	0.685	3
6	Delay in Approval of Drawings (T)	10	10	14	16	0.68	4
7	Land acquisition problem (T)	9	12	16	13	0.665	6
8	Errors in Contract Documents/ Schedule (T)	3	16	24	7	0.675	5
DURING CONSTRUCTION							
9	Redesigning (C & T)	5	12	27	6	0.67	3
10	Disputes and clashes on site (T)	8	18	12	12	0.64	4
11	Use of costly material/poor market survey (C)	8	13	15	14	0.675	2
12	Poor quality of work/ Rework (C & T)	10	5	15	20	0.725	1
13	Non adherence to the contract conditions (T)	6	27	13	4	0.575	7
14	Primitive technologies used (T)	15	10	9	16	0.63	5
15	Location of site/ lack of proper access(T)	11	16	18	5	0.585	6
EXTERNAL REASONS							
16	Irregular Flow of Finance (C & T)	2	10	27	11	0.735	1
17	Fluctuation in Price (C)	8	9	13	20	0.725	2
18	Cut in Water & Electrical Supply (T)	20	8	6	16	0.59	8
19	Weather Conditions (T)	3	24	14	9	0.645	7
20	Political & Other External Influence (T)	9	10	16	15	0.685	5
21	Wire/ Theft of Materials (T)	9	15	12	14	0.655	6
22	Government Influence (T)	12	9	8	21	0.69	4
23	Work Stay Due to Act of God (T)	8	10	16	16	0.7	3
MANAGEMENT PROBLEMS							
24	Lack of Experience (T)	8	12	15	15	0.685	7
25	Delay in Decision by Client (T)	12	10	8	20	0.68	8
26	Delay in Decision by Architect (T)	13	7	13	17	0.67	9
27	Delay in Decision by Consultant (T)	11	10	5	24	0.71	4
28	Delay in Decision by Contractor (T)	10	12	6	22	0.7	6
29	Delay in Payment for Work Order (T)	4	8	4	34	0.84	1
30	Inadequate Safety Measures/ Accidents (C & T)	5	16	12	17	0.705	5
31	Lack of Supervision (C & T)	8	20	5	17	0.655	10
32	Lack of Co-ordination between Different Parties involved (C & T)	5	15	11	19	0.72	3
33	Lack of Efficient Staff (T)	7	6	19	18	0.74	2
SHORTAGE IN RESOURCES							
34	Delays in Purchasing of Materials (C & T)	10	12	8	20	0.69	4
35	Delay in Supply of Material (T)	5	15	12	18	0.715	3
36	Delay in Procurement/ Supply of Equipments (T)	8	18	14	10	0.63	6

37	Equipment Breakdown/ Non Availability (T)	7	22	11	10	0.62	7
38	Improper Material Management (T)	6	14	8	22	0.73	1
39	Improper Labour Management (T)	4	14	16	16	0.72	2
40	Labour Strike (T)	12	15	4	19	0.65	5

V. DISCUSSION OF RESULTS

5.1 Before Construction

Based on the ranking, Figure 1 shows the top three most influencing factors caused for time and cost overrun before construction were:

a. Inaccurate estimate of cost and time(RII= 0.81) (C & T)
b. Faulty design (RII= 0.705) (C & T)
c. Improper site planning (RII= 0.685) (T)

5.2 During Construction

From fig. 2, based on ranking, during construction the top three most significant factors caused for both cost & time overrun were:

a. Poor quality of work / rework (RII-0.725) (C & T)
b. Use of costly material/poor market survey (RII-0.675) (C)
c. Redesigning (RII- 0.670) (C)

5.3 External Reasons

From figure 3, based on ranking, following are the top three external significant factors caused for both cost & time overrun were:

a. Irregular Flow of Finance (RII-0.735) (C & T)
b. Fluctuation in Price (RII-0.725) (C)
c. Work stay due to Act of God (RII-0.7) (T)

5.4 Management Problem

From Figure 4, based on ranking, the top three factors caused for time & cost overrun regarding management problem were:

a. Delay in Payment for Work Order (RII-0.840) (T)
b. Lack of Efficient Staff (RII-0.740) (T)
c. Lack of Co-ordination between Different Parties Involved (RII-0.720) (C & T)

5.5 Shortage in Resources

From Figure 5, based on ranking, following top three factors caused for cost and time overrun because of shortage in resources were:

a. Improper Material Management (RII-0.730) (T)
b. Improper Labour Management (RII-0.720) (T)
c. Delay in Supply of Material (RII-0.715) (T)

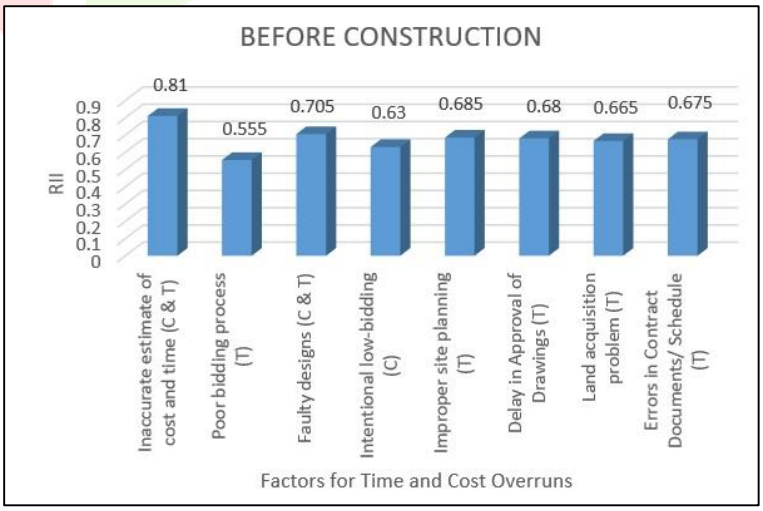

Figure 1. RII of influencing factors before construction

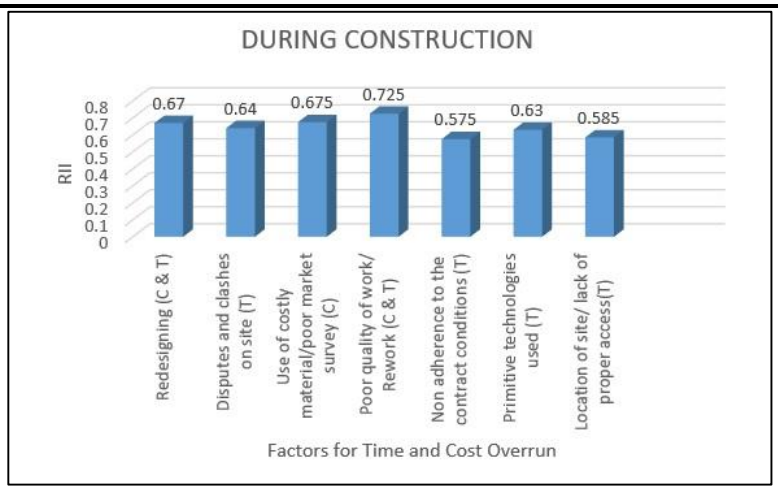

Figure 2. RII of influencing factors during construction

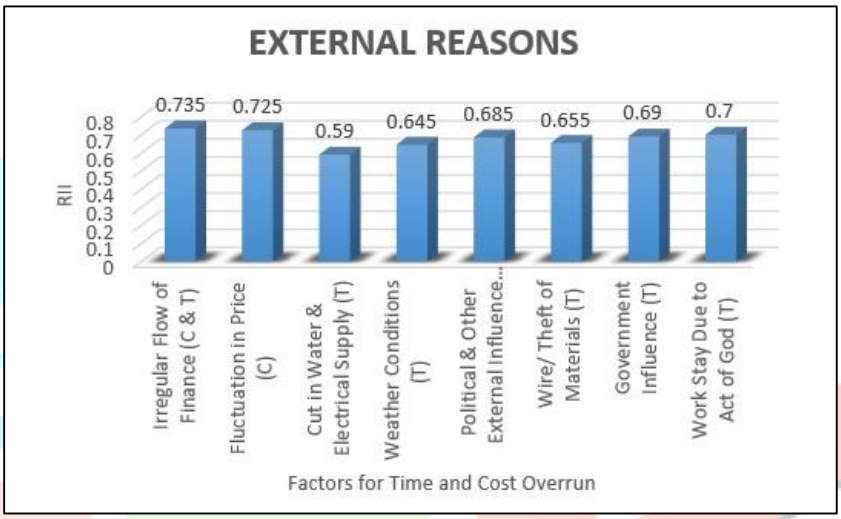

Figure 3. RII of influencing factors due to external reasons

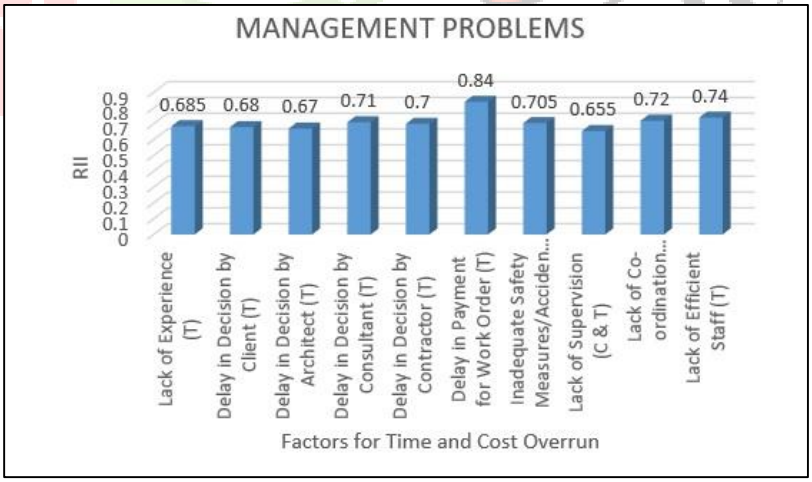

Figure 4. RII of influencing factors due to management problems

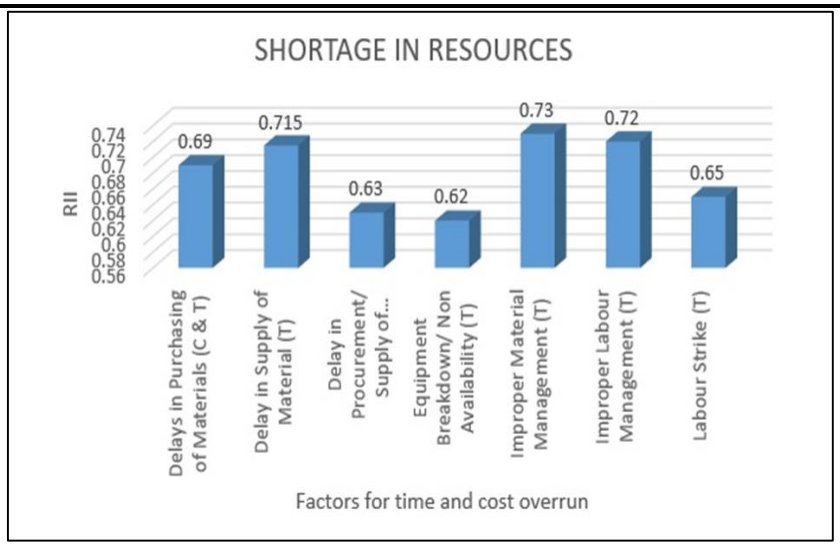

Figure 5. RII of influencing factors due to shortage in resources

VI. CONCLUSION

After doing the analysis using case study, most influencing factors caused for time & cost overruns are provided. The relative importance index (RII) can be used as an effective tool for analysis on time & cost overruns.The following learnings with some remedial measures for the observed causes of time & cost overruns are:

- Most of the labours working in construction site are coming from other state and having a poor knowledge regarding the new techniques in construction. Proper training programs can be adopted to increase the efficiency and skill of labours.
- Finally management also needs to increase the efficiency of works by conducting labour welfare, recognition programs for the motivation of labours.
- It will not possible to execute the construction projects within the desirable time and cost without sound implementation of planning. Hence, management needs to focus on effective and sound planning.
- The project manager should record whether all the activities are completed according to the estimated schedule weekly and then take the sign of the contractor. This practice may reduce time as well as cost overrun considerably.
- Industrial engineering and management techniques such as method study, value engineering, etc., can help in reducing time duration of activities and giving up of unnecessary items/activities
- 'Monitoring groups' can be established, which may consist of representatives of the project as well as inter-linked agencies and the parties concerned. The groups could monitor and review the progress of the complete system -the project and the inter-linked activities/projects.

REFERENCES

[1] Adam, A, Josephson, P, Lindahl, G. (2014) Implications of cost overruns and time delays on major public construction projects, Proceedings of the 19th International Symposium on the Advancement of Construction Management and Real Estate, 7-9Nov 2014

[2] Aftab Hameed Memon , Ismail Abdul Rahman , Ade Asmi Abdul Aziz (2012) " The cause factors of large project's cost overrun: a survey in the southern part of peninsular Malaysia" International Journal of Real Estate Studies, Volume 7, Number 2

[3] Ahsan, K., & Gunawan, I. (2010). Analysis of cost and schedule performance of international development projects. International Journal of Project Management 28(1), 68-7

[4] Albert, P.C. Chan., David Scott & Ada, P.L. Chan (2004), Factors affecting the success of a construction project, Journal of Construction Engineering and Management.

[5] B.V. Khode, S.V.Bhalerao(2018), A survey on assessment of time and cost overrun of Indian national highways project , IJCSMC, Vol. 7, Issue. 3, pg.33 – 42

[6] M. R. Apte (2016), Schedule overrun and cost overrun in the construction of private residential construction project: case study of pune India , International Journal of Technical Research and Applications Volume 4, Issue 2

[7] M.V. Raju, S.S. Asadi(2017), Evaluation of cost and time impacts to overruns in construction industry , International Journal of Civil Engineering and Technology

[8] N K Gupta(2018), Avoiding Cost Overruns of Residential Construction Projects in Western Part of Pune City, India , International Research Journal of Engineering and Technology
[9] Santosh Kumar Prajapati(2016), Impact of Cost and Time Overrun on Building Construction Projects, IJEDR ,Volume 4, Issue 4