

Cost and Time Overrun Analysis in Construction Industry Using Questionnaire Survey

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Abstract — Delay of a construction project is defined as late completion of the project as compared to the planned schedule. A study is carried out on construction schedule delays and various delay analysis techniques to evaluate the causes of delay and their impacts in the construction project. Then a survey is conducted at various project sites using a questionnaire to find the major causes of delay faced during planning, construction and post construction stages by Client, Contractor, Project manager, and Owner. Then using a ranking method based on relative importance the major cause of delay is found. Thus determination of delays caused in finished construction projects helps in the scheduling of work timetable to a new construction project in an economically efficient and time saving way.

Key words: Cost analysis, Time analysis, Construction Industry

I. INTRODUCTION

In construction, delay could be defined as the time overrun either beyond completion date specified in a contract or beyond the date that the parties agreed upon for delivery of a project. It is a project slipping over its planned schedule. The delay in the project has an adverse effect on project success in terms of time, cost and quality. The objective of the project is To identify delay factors in construction projects, to rank the delay factors according to the importance level on delays in project, to find the tools to analysis and evaluate the time delay factors in the building & recommendations to control delay during construction phase for construction project.

II. METHODOLOGY

This study is based on the analysis of data collected from the completed project. So, it needs proper monitoring and analysis of the construction project. The data has been collected by tendering department,

contractor, account department and interviewing the officials of the construction companies, a study has broadly undertaken as follows:

1. Identify the project for the case study of time and cost overruns.
2. Proper studying of all available plans, schedules, estimates and work procedures details and collected all relevant data about the project.
3. Find out different factors causing schedule delays and cost overruns in construction projects by using the literature review.
4. Carefully prepared a questioner of 81 factors from previous investigations and literature reviews
5. Questionnaire was distributed to 15 members (design department, senior engineers, contractors, marketing department, assistant engineers, accounts, quality department, quantity department, a project in charges) who are worked for the project through online with the help of Google form. Questioner was organized in the form of scaling (1=very low, 2=low, 3= Medium, 4= high, 5=very high).
6. Analyze the data obtained from the survey and finding the important factors which are majorly caused using RELATIVE IMPORTANCE INDEX METHOD (RII) for schedule delay and cost overruns.
7. Listed out all shortcomings and make final conclusions and suggest possible remedial solutions for the upcoming projects.

Formula: Relative importance index method (RII) , $\sum W \div A \times N$, Where, W is the weighting given to each factor by the respondents ranging from (0-5), A is the highest weight (i.e., 5) in this case and N is the total number of respondents. Higher the more value of RII, more important was the cause of delays and cost overruns. The RII was used to Rank different causes this rankings made it possibly to cross

compare the relative importance of the factors are perceived by the three groups.

III. QUESTIONNAIRE SURVEY

This questionnaire consists of 63 causes of delay on which a detailed analysis will be carried out by using statistical concept. These causes are classified into 9 groups according to the sources of delay: factors related to project, owner, contractor, consultant, Architect/design team, materials, equipment, manpower and external factors. Data collection is the most critical part of the study since the accuracy of the data will determine the success or failure of the research. The data are obtained through literature studies and questionnaires that would be analyzed using appropriate analysis techniques in order to portray a clear perspective on performance management. Responses from the questionnaire will then be compiled and analyzed.

PHASE-I

1. What is your Profession/Occupation?

- Architecture Engineering
- Quantity Surveying Project Management
- Contracting Facilities Management
- Real Estate Civil Servant

Other (please specify.....).

2. What is your educational qualification?

- Diploma Degree Masters Ph.D

Other (Please specify.....)

3. What is your experience?

- 0-5 years 6-10 years 11-15 years Over 15 years

Questionnaire survey format sample 1

PHASE-II

1. How would you rank the influence of these factors on time and cost overruns in planning stage in the public sector construction industry?

PLANNING STAGE	Likert's Scale					
	0	1	2	3	4	5
a. Inadequate brief						
b. Inadequate specification						
c. Use of Standard Documentation						
d. Late Consultation with planning authority						
e. Inaccurate estimates						
f. Difficulties in a choice of site						
g. Inexperience of the Consultants						
h. Changes in key personnel						
i. Other (please specify.....)						

2. How would you rank the influence of these factors on time and cost overruns in construction stage in the public sector construction industry?

CONSTRUCTION STAGE	Likert's Scale					
	0	1	2	3	4	5
CONTRACTOR	Difficulties in financing project by contractor					
	Conflicts in subcontractors schedule in execution of the project					
	Rework due to errors during construction					
	Poor site management and supervision by the contractor					

Questionnaire survey format sample 2

IV. DATA COLLECTION AND RESULTS

We have conducted the survey for various company employees. Here we have collected the data in the form of Google forms.

PHASE-2

Scale Meaning

Level	Meaning
5	The factor has the biggest impact on the cost and time overrun of a project.
4	The factor has Very High Impact on the cost and time overrun of a project.
3	The factor has Low Impact on the cost and time overrun of a project.
2	The factor has Moderate Impact on the cost and time overrun of a project.
1	The factor has High Impact on the cost and time overrun of a project.
0	The factor has Very High Impact on the cost and time overrun of a project.

1. How would you rank the influence of these factors on time and cost overruns in planning stage in the public sector construction industry? *

0 1

a. Inadequate brief

b. Inadequate specification

c. Use of Standard Documentation

PHASE-1

d. Late Consultation with planning authority

e. Inaccurate estimates

f. Difficulties in a choice of site

g. Inexperience of the Consultants

h. Changes in key personnel

i. Other (please specify _____)

This question requires one response per row

2. How would you rank the influence of these factors on time and cost overruns in construction stage in the public sector construction industry? *

0 1 2

QUESTIONNAIRE ON STUDY OF COST AND TIME OVERRUNS IN CONSTRUCTION INDUSTRY

* Required

PHASE-1

1. What is your Profession/Occupation?

Architecture Engineering

Quantity Surveying Project Management

Site Engineering

Assistant Engineer(AE)

Others

2. What is your educational qualification?

Diploma

B-tech

M-tech

Ph.D

Others

3. What is your experience? *

0 - 5 years

6 - 10 years

11 - 15 years

government projects

Quality audits done after completion of the work

Extra claims by the owner at the end of the project

Contractual claims, such as, extension of time with cost claims

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Google Forms

3. How often do you in projects you are involved with using the following strategies to eliminate construction cost and time overruns in the public sector building construction? *

a. Avoiding earthwork and substructure construction activity during rainy season. *

Frequently

Occasionally

Rarely

Never

b. Providing facilities and accommodation for workers to avoid or minimise trade absenteeism.

Frequently

Occasionally

K.M.V PROJECT LTD	laxmiprasanna99876@gmail.com	B-TECH
PRADEEP CONSTRUCTION	rameshbanoth777@gmail.com	DEGREE
IJM (INDIA) INFRASTRUCTURE	lingaswamykappargala@gmail.com	DEGREE
KPC projects limited	harishkumar68765@gmail.com	B-TECH
VS construction	peashwar705@gmail.com	M-TECH
MGK construction	keshavareddy@gmail.com	M-TECH
Aakriti construction	kothas910@gmail.com	DEGREE
Shantha sriram construction	rudhraprasad584@gmail.com	DEGREE

Response Sheet

EXP.	DATE & TIME	PROFESSION	PLANNING STAGE HOW WOULD YOU RANK	
			Inadequate proof	Inadequate specification
	25/04/2021	Quantity		
06-10 YEARS	14:45:18	surveying	2	4
	27/04/2021	Quantity		
0-5 YEARS	13:50:19	surveying	3	4
	28/04/2021	Assistant		
0-5 YEARS	11.13.20	Engineer	5	3
	28/04/2021	Assistant		
0-5 YEARS	18:20:16	Engineer	1	4
	30/04/2021			
06-10 YEARS	12:26:10	Others	2	5
	01/05/2021			
0-5 YEARS	18:46:23	Others	4	5
	02/05/2021	Quantity		
0-5 YEARS	15:15:38	surveying	4	4
	04/05/2021			
6-10 YEARS	19:55:48	Site Engineer	3	4
	06/05/2021	Quantity		
0-5 YEARS	12:38:55	surveying	5	4
	06/05/2021			

	1.			
0-5 YEARS	10:44:23	Site Engineer	4	4

Analysis of respondents

So based on response got from various experience persons from google forms which is shown in above tables (those response will get in google forms) we need to calculate RII by using following formula

Relative importance index method (RII)

$$\sum W \div A \times N$$

NO	FACTOR	RII	PERCENTAGE (%)
1	Inadequate specification	0.82	82
2	Use of standard documentation	0.82	82
3	Rework due to errors during construction	0.94	94
4	Delay in obtaining permits from municipality	0.8	80
5	Weather effect on construction activities	0.9	90
6	Unqualified workforce	0.76	76
7	Quality audits done after completion of the work	0.82	82

Causes of delay based on RII

So after Calculation RII Based on the response got from Questionnaire survey we will able to identify Various causes of delay which are responsible for Time over run and cost Overrun so if we overcome those kind of causes then we can able to solve most of the problems in construction industry. In order to solve those kinds of problems certain recommendations have been suggested based on experience we got from various engineers, which is shown below

CAUSES OF DELAY	RECOMMENDATIONS
Weather Conditions	Conducting detailed and perfect surveys towards the field and previous weather data
Labour shortage	Early work force planning is essential for owner and contractors to effectively manage project labour risks. Then providing incentives/awards for workers like best employer of the year /month so that productivity and quality work will be increased.
Improper planning	Understand the level of supply and to produce detail planning and schedule.
Lack of facilities at site	Site management should be properly done to ensure power resource; basic facilities for worker are available to increase productivity by doing detail

	study in site conditions.
Material storage	Materials and machinery management is an important factor, material needs to be checked upon the delivery to ensure material quality at an early stage thus the replacement of the defect materials should be done
Lack of funds	Optimize cash flow in accordance with the requirements and make sure fund needed for the projects is available to execute the project
Inspection and permission from municipal authority	After the completion of construction inspection is done so that the project is done according to the guidelines

V. CONCLUSION

Every successful execution of the project, material management plays a crucial role and the utilization of equipment and the materials in the proper way leads to the success of the project. The result shows that many of the problems in construction industry mainly come from the execution of the project. Project execution requires controlling these kinds of factors to overcome this overruns, project management techniques of planning, controlling, monitoring, procedures are needed to be implemented.

Finally, we concluded that there are many factors which affect the cost and time overrun to some extent. Some of those factors are frequent design change by owner, poor maintenance of safety stock level, In use of advanced engineering design software, poor site management and supervision by contractor, equipment unavailability and failure, escalation of material prices affects project cost, ineffective planning and scheduling, decrease in rate of labour productivity mostly affect the time and cost overrun.

So some of the measures should be taken such as

- 1 Paying a lot of attention to project planning.
- 2 Material prices and labour rates should be updated continuously.
- 3 Resources should be readily available at site.
- 4 Attempt to stay within the scope that was originally planned.

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