

Delay Analysis in Infrastructure Projects

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Abstract- *The construction industry is second largest sector contributing to economy after agriculture. India's population growth and economic growth requires improved transport infrastructure including roads, railways, aviation and waterways. There is problem of delay in such projects not only in India but its worldwide phenomenon. Delays causes time lag as well as cost overrun which is not affordable in developing economy as it has limited resources. To avoid such delays different factors causing delay should be identified and analyzed. This report discuss delay in infrastructure projects considering various factors causing delay. A questionnaire was prepared considering various factors causing delay and sent to various experts and people with experience in infrastructure industry for ranking of various factors. This data was used to analyze various factors causing delay*

Indexed Terms- *Delay, tender, schedule, infrastructure*

I. INTRODUCTION

Indian economy is mainly based on agriculture. The construction industry is second largest sector contributing to economy after agriculture. India's population growth and economic growth requires improved transport infrastructure including roads, railways, aviation and waterways. There is problem of delay in such projects not only in India but its worldwide phenomenon. Delays causes time lag as well as cost overrun which is not affordable in developing economy as it has limited resources. Delays are common problem delays means extension of time in completion of projects. Delays are classified as non-excusable and excusable delay.

II. OBJECTIVE

The primary goal of construction is to finish the project as specified, on schedule and within the budget

with proper utilization of all the resources like manpower, material, money and equipment. The main objectives of this study are:

1. To identify different causes of delay in Infrastructure project.
2. To analyze delay factors.
3. To quantify delay duration taking a case study.

ROCEDURE FOR PAPER SUBMISSION

III. PROBLEM STATEMENT

Delay analysis is important in construction project as it will affect in project duration and cost. To avoid the project, delay different factors causing delay should be analyzed and managed properly. Different recommendation or delay management strategy will be helpful for smoothening of the construction project. Some research works have been carried out in other developed countries and few in India. So, more investigation is required in Indian construction projects for recommendation of some guidelines to minimize project delay

IV. LITERATURE REVIEW

Refer to the paper by Zaki M. Kraie and James E. Diekmann on —Concurrent Delay in Construction Projects published in Journal of Construction Engineering and Management, December, 1987 which conclude the present method for dealing with the concurrent delay. Concurrent delays are two or more delay occurring at the same time and have always been difficult to resolve.

Refer to the paper by Jonathan Jing sheng Shi, S. D. Cheung and David Arditi on Construction Delay Computation Method published in Journal of Construction Engineering 5 and Management, January, 2001 which conclude method of computing activity delay and assessing their contribution to project delay. Delay is one of the most common

problems in the construction industry. The demand consists of a set of equations which can be easily coded by the computer program that allow speedy access to project delay information and activity contribution. This method is also applicable to any intermediate construction stage for evaluating in progress project delay

V. METHODOLOGY

The study area of this project is delay analysis. Initially literatures were collected and studied. Based on the knowledge gained on literatures, the project is carried out. It involves:

1. Collection of data causing delay of construction projects from interviews and questionnaire survey.
2. Study the factors causing delay and to find out factors.
3. Delay analysis based on delay obtained from questionnaire survey.
4. Obtaining results and analyzing the factors causing delay.
5. Delay analysis- a case study.
6. Conclusion.

VI. CASE STUDY

SAMRUDDHI MAHAMARG (TPT Nagpur Mumbai Expressway Pkg IX) is expressway project undertaken by government of Maharashtra. It is proposed six lane concrete road connecting two major cities of Mumbai and Nagpur. The following case study is based on major bridge proposed at CH 435.329 km in Jatwada, Aurangabad, Maharashtra.

Country: India
 Location: Jatwada, Aurangabad, Maharashtra
 Purpose: Transportation
 Status: Under Construction
 Construction begun: 2018
 Opening date: 2021
 Design engineer: HSB Infra Engineer India pvt. ltd
 EPC Contractor: MEIL
 Client: MSRDC
 Type of structure: Major bridge

A. Work performance of Major bridge project: -
 The major bridge project implementation including erection of main structure, casting of psc girders,

testing and commissioning. The structure being in semiarid region working period is considered for 10 months from (Jan-May) to (Aug-Dec) The extension of time, delay in handing over of the land and site possession in a progressive manner in line with the construction schedule without affecting the works. There are also some political reasons which affect the performance of project.

Therefore, following are the hindrances in the performance of Major bridge project

1. Environment factors
2. Political environment
3. Factors related to labor and time.

B. Hindrances in project –

Table 1- Hindrances in project.

Sr No	Description of Hindrance	Start date of Hindrance	End date of Hindrance	Period of Hindrance and days
1	Work stopped due to COVID 19 Lockdown imposed by central government	22 March 2020	10 May 2020	50
2	Work stopped due to shortage of labour	10 May 2020	9 June 2020	29
3	Work stopped due to flooding caused by rain.	9 June 2020	6 August 2020	52
4	Work stopped due to protest by	3 June 2021	7 June 2021	4

local people over death of villager on construction site			
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As per revised schedule total duration of project = 460 days

Therefore;

Net effective delay = revised schedule duration – tender schedule duration

$$= 460 - 404$$

$$= 54 \text{ Days} = 8 \text{ weeks.}$$

C. Quantifying Delay in Project

A schedule of work done in construction project incorporating those delays in Major bridge project has been prepared. This schedule has been compared with tender schedule of Major bridge project to find net effective delay duration.

D. Details of tender schedule and revised schedule for project:

As per tender schedule construction work was to start by 27 March but due to unavoidable hindrances revised schedule was planned starting from 6 August 2020, hence delay of 132 days was observed between tender schedule and revised schedule

Table 2- Details of tender schedule and revised schedule.

Sr No	Description of work	Tender date	Revised schedule date	Delay Duration
1	Casting of structure (substructure, superstructure & girders)	30 March 2021	5 May 2021	35
2	Launching of girders	10 April 2021	7 June 2021	58
3	Casting of deck slab	26 April 2021	14 June 2021	50
4	Finishing work	30 April 2021	18 June 2021	49
5	Crash Barriers	5 May 2021	30 June	55

As per tender schedule total duration of project = 404 days

E. Cost overrun due to delay:

1. Cost of Machinery to Company;

Table 3- Cost of machinery.

Sr No	Machinery (Including Diesel)	Weekly cost	Cost for 8 weeks
1	Excavator	45000	360000
2	Hydra	5000	40000
3	Crane	8750	70000
4	Generator	6250	50000
	TOTAL	65000	520000

2. Cost of employees to Company;

Table 4- Cost of employees.

Sr No	Type of employee	No of Employee	Weekly cost	Cost for 8 weeks
1	Labors	40	1000	320000
2	Supervisor	2	5000	80000
3	Engineer	3	7500	180000
4	Manager	1	17500	140000
5	Project manager	1	37500	300000
	TOTAL		68500	10,20,000

Therefore, total cost to Company = Cost of Machinery + Cost of Employee

$$= 520000 + 1020000 = 15,40,000 \text{ Rs}$$

F. Images from site

Fig 1- Actual location of site.



G. Result Obtained from Case Study:

1. The major bridge project is delayed by 54 days (8 weeks).
2. The cost overrun caused due to delay is – 15,40,000 Rs.

CONCLUSION

This gives all the combination of factors and categories responsible for construction delays. Ratings given by respondents are not same as the response from different organization have different point of view on factor causing delay. The data from the questionnaire survey were analyzed. This results into a consolidated list of factors according to their ranking. From the study top six factors has been found which are majorly responsible for delay in any construction projects are: Lack of communication (Rank 1) Equipment breakdown (Rank 2), Shortage of labors (Rank 3), Delay in sub-contractor work (Rank 4), Shortage of equipment (Rank 5) and Low productivity level of labors (Rank 6) were the major causes for the delay in the Construction projects. It has been also concluded that the delay duration was quantified and the net effective delay is 54 days.

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