

Factors affecting delay and its effect on performance of residential construction project in Nasik city

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Abstract – Delays are one of the biggest problem in construction firms. Indian construction industry also faces this problem. Only few projects get delivered within time and cost. Completion of work beyond planned schedule is construction delay. These delays can be minimized only when delay causes are identified. This study takes integral part to find causes of delay and its effect in Nasik city. This study is based on literature review and questioner survey. Total five groups are contributed such as architect, contractor, consultant, engineer and owner. The questioner was distributed to 50 expert participants. Top ten factors and their effect are analyses by the average index and relative importance index method. Owners experience in construction project, design errors made by engineers, design change by owner or his agent, difficulties in financing project, poor communication and coordination with other parties, delay in obtaining permits from municipality are the most important factors of delay in Nasik city. Time overrun and cost overrun are the common effects of delay in construction industry.

Keywords-Construction delay; causes of delay; effect of delay; cost overrun; time overrun; Nasik city.

I. INTRODUCTION

India is the one of the fastest growing economy in the world. The construction sector is counted as one of the most active sector affecting the Indian economy. Indian construction industry is an integral part of Indian economy and it is most important part of economic development, investment, in growth of urbanization and industrialization. Delays are one of the biggest problem construction firm's faces. In construction industry "delay is defined as time overrun either beyond completion date or beyond the delivery date."

Indian construction industries have faced various problems and delay of time is one of the major problem in it. Completing construction projects within estimated cost and time or schedule is very difficult task for construction industries. Delay may cause some serious effect such as time overrun, cost overrun, dispute, litigation, etc. There are so many factors contribute in delay of construction projects and its effect. There is necessity to identify the factors responsible for the reasons of delays, as well as their effects on the construction industry so that we can minimise or avoid them.

Delays can lead to many negative effects such as time overrun, cost overrun, litigation, disputes, total abandonment, arbitration, etc.[7] A lot of researches have been made to study delay causes and their effect in different countries. Financing to the project, shortage of labor and material, poor communication and coordination with other parties, design change by owner or engineer, escalation of material prices, slow decision making, owners experience, low

productivity of labour, climatic conditions and site supervision are the some important delay causing factors.

II. OBJECTIVE OF STUDY

Objective of this study is to find factors causing delay in residential construction project of Nasik city, India and their effect on performance of residential construction projects.

III. METHODOLOGY

Research methodology of this study contains three main steps. First step includes literature survey. The literature review was conducted through books, research papers, journals, internet, etc. As the outcome of this step is causes of delay for residential construction project and their effect were grouped in consultant related, owner related, engineer related, contractor related, architect related, labour related, equipment related and material related. Second step includes the questionnaire survey conducted with 50 experts in construction industry as contractor, consultant, engineer, owner and architect. Questionnaire was prepared in two parts. First part contains personal information of respondent is experience, qualification, site details, etc and second part contains factors causing delay and its effect. Questionnaire was distributed to expert participants of Nasik construction industry. Third step contains result analysis and conclusion with average index method and relative importance index method.

IV. DATA ANALYSIS

In this the detail analysis of collected data and results will be shown. The respondent were requested to evaluate factors and effects based on five-points scale starting with for not important-1, for less important-2, for average-3, for important-4, for very important-5. Among the 50 questionnaire set distributed there were 50 sets replied by the experts. It covers 100% of total distributed form.

4.1 Average Index Analysis

The average index analysis is calculated for each factor and effect by using:

$$\text{Average Index} = \frac{\sum 1 X_1 + 2 X_2 + 3 X_3 + 4 X_4 + 5 X_5}{\sum X_1 + X_2 + X_3 + X_4 + X_5}$$

Where x_1 = number of respondents for not important, x_2 = number of respondents for less important, x_3 = number of respondents for average, x_4 = number of respondents for important, x_5 = number of respondents for very important. The overall level of importance and evaluation in local construction industry are summarized under such categories:

"Table 1. The level of importance and evaluation for Average Index Analysis"[6].

Average Index	Level of Importance
0.00 Average Index 1.50	Not Important
1.50 < Average Index 2.50	Less Important

2.50 < Average Index 3.50	Average
3.50 < Average Index 4.50	Important
4.50 < Average Index 5.00	Very important

4.2 Relative Index Analysis

$$\text{Relative important Index} = \frac{\sum 1 X_1 + 2 X_2 + 3 X_3 + 4 X_4 + 5 X_5}{5 \sum X_1 + X_2 + X_3 + X_4 + X_5}$$

V. RESULT

Following is the result for analysis of data collected by different groups, factors causing delay and their relative importance index shown in table 2.

“Table 2. Factors causing delay analysis data”

Causes	Factors causing delay	RII	Factors causing delay	RII
About architect	Insufficient data collection and survey before design	0.76	Complexity of project design	0.66
	Use of advanced engineering design software.	0.62	experience of design team in construction projects	0.78
	Mistakes and delays in producing design documents	0.8	Delay in obtaining permits from municipality	0.78
	Unclear and inadequate details in drawings	0.76	Delay in performing final inspection and certification by a third party	0.64
	Design errors made by designers	0.84	Changes in government regulations and laws	0.74
	Design changes by owner or his agent during construction	0.84		
About consultant	Experience of consultant in construction projects	0.74	Inaccurate site execution	0.70
	Conflicts between consultant and other parties	0.66	Inadequate project management assistance for execution	0.76
	Delay in approving major changes in the scope of work by consultant.	0.74	Late in reviewing and approving design documents	0.74
	Unused of advance engineering design software	0.76	Poor communication and coordination with other parties	0.8
	Conflicts between joint-ownership	0.54	Poor communication and coordination with other parties	0.78
	Delay in progress payments	0.74	Experience of owner in	0.88

About owner			construction projects	
	capable representative	0.82	Change orders by owner during construction	0.76
	Slowness in decision making	0.76		
About Contractor	Change of subcontractors	0.72	Communication and coordination with other parties	0.82
	Contractor experience	0.7	Poor site management and supervision	0.76
	Inappropriate construction methods	0.78	Rework due to changes & errors	0.7
	Incompetent project team	0.76	Difficulties in financing project	0.82
	Project planning and scheduling	0.76		
Contractor (About equipment)	Equipment allocation problem	0.66	Low efficiency of equipment	0.74
	Frequent equipment breakdowns	0.72	Shortage of equipment	0.64
	Improper equipment	0.82	Slow mobilization of equipment	0.62
	Inadequate modern equipment	0.66		
Contractor (About labour)	Absenteeism	0.7	Shortage of labour	0.78
	Low motivation and morale of labour	0.62	Slow mobilization of labour	0.62
	Low productivity of labour	0.64	Strike	0.74
	Personal conflicts among labour	0.64	Unqualified/inadequate experienced labour	0.72
Contractor (About material)	Delay in manufacturing materials	0.66	Damage of sorted materials	0.74
	Shortage of construction materials	0.8	Escalation of material prices	0.78
	Changes in material types and specifications during construction	0.74		
Engineer (About equipment)	Equipment allocation problem	0.64	Low efficiency of equipment	0.70
	Frequent equipment breakdowns	0.72	Shortage of equipment	0.60
	Improper equipment	0.74	Slow mobilization of equipment	0.68
	Inadequate modern equipment	0.86		
Engineer (About labour)	Absenteeism	0.8	Shortage of labour	0.82
	Low motivation and morale of labour	0.7	Slow mobilization of labour	0.76
	Low productivity of labour	0.72	Strike	0.66
	Personal conflicts among labour	0.56	Unqualified/inadequate experienced labour	0.90
Engineer (About material)	Delay in manufacturing materials	0.72	Damage of sorted materials	0.72
	Shortage of construction materials	0.82	Escalation of material prices	0.86

	Changes in material types and specifications during construction	0.72	
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“Table3. Effect of Factors causing delay analysis data”

Effect of Delay	RII	Effect of Delay	RII
Time overrun	0.8600	Arbitration	0.5851
Cost overrun	0.8450	Total abandonment	0.4700
Disputes	0.6500	Litigation	0.4000

CONCLUSION

This paper concludes the main findings from questionnaire survey as the following are the top ten factors which cause delay in Nasik city. The top ten factors that causes delay in construction project in Nasik city as perceived by architect, engineer, contractor, consultant and owner are ‘unqualified / inadequate experienced labour’ having relative index 0.9. Second factor is ‘Experience of owner in construction project’ having relative index 0.88. Third factor ‘Escalation of material prices’ with 0.86, ‘Inadequate modern equipment’ with 0.86, ‘Design errors made by engineers’ with 0.84, ‘Design change by owner or his agent’ with 0.84, ‘Shortage of construction material’ with 0.82, ‘Difficulties in financing project’ with 0.82, ‘Poor communication and coordination with other parties’ having 0.82 and ‘Shortage of labour’ is the 10th important factor having relative importance index 0.82.

The effect of factors causing delay in Nasik city are "time overrun" in the 1st position with relative index 0.8600, "cost overrun" in the 2nd position with relative index 0.8450, "Dispute" in the 3rd position with relative index 0.6500, "arbitration" in the 4th position with relative index 0.5851, "Total abandonment" in the 5th position with relative index 0.47, "litigation" in the 6th position with relative index 0.400.

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