

# COST AND TIME CONTROL FACTORS FOR HIGH RISE RESIDENTIAL CONSTRUCTION PROJECTS

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**Abstract** - Technology plays vital role to improve construction efficiency and productivity, hence resulting in project time line reduction. There are numerous factors which caused delay, however it is practically not possible to work on each and every factor. So more focus is required on those factors which contribute maximum delay. These factor may differ countrywide for example say due to environmental effects, environmental laws, and safety norms. Any kind of delay due to dispute, can lead to bad effects viz. entering in court of law for various parties, productivity loss, impact on income, and termination of contract. This paper shows key factors, which are delaying the in construction projects in Pune, India [17]. This paper study of listing down the various factor of delay & take inputs from experienced project managers, site engineers of the residential high rise building. Fourty eight experienced professionals from various companies participated in this study. Fourty five cost and time impact factors [15] were identified for preparing survey questionnaire. The outcome of study helps policy defining personnel and practicing agents to understand the actual factors causing cost increase & delay.

**Keywords:** High rise, cost factors, time factors, correlation, project control, survey, delay.

## INTRODUCTION

Objective of any project is to complete the project in time line, within stipulated budget along with achieving other project objective such as quality, zero accident during construction, low maintenance cost for future [14]. Project control techniques by project managers involves continuously measuring progress, evaluation of plans and taking corrective actions as and when required (Kerzner, 2003)[11]. Software viz. Microsoft Project, Microsoft excel, Primavera, etc. can be used to track projects. Practically so much of projects have problems on overruns parameters for time & cost, even though the software`s are available. Across various countries study is already done to search the of affecting factors for overruns for cost and time for different projects. Survey for 50 agents viz. consultant, contractor and client was carried out at Nigeria and research analysis found major parameters creating delay in construction and cost overruns are financing, poor management of contracts and accounts payable, site condition changes, material shortage, changes in design and various suppliers. Major parameters affecting overrunning cost were found out as changes in price, incorrect estimation, and add on scope of work. Survey with 31 managers was done by Kaming (1997) [12] for these overrun parameters. Major six variables (changes in design, in efficient labours, improper plans, insufficient availability of raw material, gaps in estimation of material, less skilled labour etc.) were identified for time overrun. Major four variables (price rise because of inflation,

incorrect bill of quantity, short of project management and type of project experience) for cost overrun. Kumaraswamy and Chan (1998) [3] conducted exhaustive study for Hong Kong having four hundred questionnaires. Finding was major 4 causes of delay viz. design data, waiting time for approvals, inefficient site management, gaps in design data, etc.

## Research methodology

Fourty-five causes of delay were found after the interview and survey. A questionnaire survey was prepared to find the impact of on various organization for the defined causes. Information was collected from various construction organizations. Research questionnaire is divided into five levels such as very high, high, medium, low and very low and marks given as 5, 4, 3, 2, & 1 respectively. Each level rate the impact of factors through which the background for potential delay and cost control in the construction projects can be verified. These causes are shared with experienced professionals in order to have a clear idea. Based on previous studies two questions for each factor were asked:

- 1) What is the impact of each cause on Cost control? 2) What is the impact of each cause on Time control?

Major factors under study identified causes of delay [6] are design changes, conflict between project parties, inaccurate evaluation of projects time, project complexity. There are some causes which are related to country. This research included additional major delay factors which are identified as the Low skilled manpower, shortage of labor, insufficient drawings, inadequate planning & timeline for project, Cash flow problems and Government policies changes. There are many reasons why delays occur. For example, construction rework, poor organization, material shortage, equipment failure, change orders, act of God and so on. In addition, delays are often interconnected, making the situation even more complex. Many important reasons for delay related to owner decisions, performance indices for contractor, and advance planning during the project design step. The study reveals that main causes of delay were related to designing people, changes asked by user, weather condition, situation at site, not on time delivery, financial situation and rise in required quantity. The study guides to understand the specific attention to parameters will support various practicing people in reducing disputes for contracts. Delays have a direct relationship with non-performance of suppliers.

## Data collection

The data were collected from forty eight individuals for various construction projects. The data can be analysed through the following statistical formulas, Here T = total respondents, who responded for the all parameters with value having range from 1 to 5. The relative importance index can be devised as below:

$$RII \text{ (Relative importance index)} = \text{Summation of } I \div (M \times T)$$

Where I is the total intensity or weightage given to every factor by responding persons. The scale for which is from 1 to 5. M is the maximum rank available (i.e. 5 in this case) and T is total number of respondents those who replied the question. [2]

Table No. 1

Cost Overrun Parameters

Below is the example for 3 respondents & total survey was carried out for 24 respondents

Project Name		Trirose				BLUEWOODS				Lifeville						
Construction Company		Yashada Developers				Yashada Developers				Govind Developers						
Sr. No.	Cost Overrun parameters	Very high	High	Medium	Low	Very Low	Very high	High	Medium	Low	Very Low	Very high	High	Medium	Low	Very Low
1	Insufficient contractor experaince		4						2				4			
2	Difficulties in obtaining permits			3				4					4			
3	Fluctuation in labours, materials availability			3				3						3		
4	Delay in approving drawings			3				4						3		
5	Force majeure			3						1			4			
6	Lack of training and experience of PM	5						3				5				
7	Low skilled manpower		4					4				5				
8	Inappropriate methods fo constructions.		4					4					4			
9	Restricted access				2					2						2
10	Poor site management & supervision				2					2				3		
11	Increases in scope of work		4					3					4			
12	Cash flow problems			3						2				3		
13	Speed of owner decision making progress			3						2				3		
14	Unforeseen condition on ground				2						1			3		
15	Strike		4					3					4			
16	Non-performance of subcontractors and selected su	5						3				5				
17	Lowest bid win					1				2						2
18	Delay in progress payment			3				3					4			
19	Change in Design		4					4						3		
20	Government policies change				2					2				3		
21	Unpredictable weather conditions				2						1			3		
22	Quality of equipment & raw materials				2			3						3		
23	Liquidity of the organization				2			3						3		
24	Shortage of labour			3				4					4			
25	Rework due to errors during construction				2			4					4			
26	Complexity of Project			3				4				5				
27	Incorrect financial & payment methods	5						3					4			
28	Inaccurate cost estimation		4							2			4			
29	Inflation			3				3					4			
30	Flaws in design documents			3				3					4			
31	Delay in Design			3				4					4			
32	Inaccurate evaluation of projects timeline			3			5							3		
33	Natural calamities				2			3								1
34	Wastage of materials			3						2						1
35	Discrepancies in contract documentation		4					4					4			
36	Conflict between project parties	5						4					4			
37	Extra items in work order			3				4								1
38	Difficulties in project financing		4					3					4			
39	Insufficient experience of consultant				2			3						3		
40	Risk and uncertainty related with projects			3			5					5				
41	Late deliveries					1					1			3		
42	Equipment breakdown					1		3								2
43	Change in order by owner				2						1			3		
44	Quality control process				2			3								2
45	Insurance & accidents			3							1					1

Table No. 2

Time Overrun Parameters

Below is the example for 3 respondents & total survey was carried out for 24 respondents

Sr. No.	Project Name	Trirose				BLUEWOODS				Lifeville			
		Very high	High	Medium	Low	Very high	High	Medium	Low	Very high	High	Medium	Low
	Construction Company	Yashada Developers				Yashada Developers				Govind Developers			
	Time Overrun parameters												
1	Insufficient contractor experaince		4					3				3	
2	Difficulties in obtaining permits		4					3				3	
3	Fluctuation in labours, materials availabilty		4					3					2
4	Delay in approving drawings		4				4					3	
5	Force majeure			3				3					1
6	Lack of training and experence of PM		4				5				5		
7	Low skilled manpower	5					4				5		
8	Inappropriate methods fo constructions.			3				3					2
9	Restricted access				1				1				2
10	Poor site management & supervision				2				2			3	
11	Increases in scope of work	5						3			5		
12	Cash flow problems	5						3				3	
13	Speed of owner decision making progress		4				4						2
14	Unforeseen condition on ground			3					2			3	
15	Strike				2						1		3
16	Non-performance of subcontractors and selected supplie	4					5				5		
17	Lowest bid win				1				2				2
18	Delay in progress payment		4					3				3	
19	Change in Design	5					4				5		
20	Government policies change				2						1		1
21	Unpredictable weather conditions				1						1		3
22	Quality of equipment & raw materials				1				2			3	
23	Liquidity of the organization		4								1		3
24	Shortage of labour		4				5					3	
25	Rework due to errors during construction			3				3					2
26	Complexity of Project		4				5				5		
27	Incorrect financial & payment methods		4				4				5		
28	Inaccurate cost estimation				2				2				2
29	Inflation		4					3					2
30	Flaws in design documents			3			4					3	
31	Delay in Design		4					3				3	
32	Inaccurate evaluation of projects timeline	5					5					3	
33	Natural calamities			3							1		2
34	Wastage of materials				2				2				2
35	Discrepancies in contract documentation		4				4				4		
36	Conflict between project parties		4				5					3	
37	Extra items in work order				1						1		2
38	Difficulties in project financing		4								1		2
39	Insufficient experience of consultant				1						1		3
40	Risk and uncertainty related with projects		4				5					4	
41	Late deliveries				1						1		2
42	Equipment breakdown				2						1		2
43	Change in order by owner				1						1		1
44	Quality control process			3				3				3	
45	Insurance & accidents				1			3				3	

Table reflects the outcome for time control & cost control parameters used for the survey questions. Table also shows cost & time control parameter impact in scale of 1 to 5 according to the respondents. (5 being the higher impact and 1 is the lowest impact)

## Conclusion

With the analysis resulted from the questionnaire survey, the major project control affecting parameters were studied in deep by interviewing experienced people, which makes the project management and control very difficult. This further make a way to understand the measurable actions to minimise the risk due to these parameters. The purpose of the paper is achieved with number of interview with deep understanding, the same is listed in the survey questionnaire. Major five impacting parameters can be used with the primary focus due to their significant effect contributed. It is also worth noting that the measures may seem obvious to the experienced practitioner but will be useful to the less experienced and people new to the project management profession. The study should be viewed as the first effort of developing solutions for mitigating the major cost control and time control parameters. Clearly, further development is needed to cover more impacting factors beyond the top five. In addition, the effectiveness of these mitigating measures during the project control process needs to be investigated in future research.

## Future scope

The future scope of the paper is to analyse the fourty five parameters for cost control and time control for various sites. After this the relative importance index can be calculated to understand the relative positioning of factors for both time and cost control. Ranking of these factors can be done based on the relative importance index. Moreover this paper also has future scope to check on these parameters about whether how they are related for cost control and time control. We can calculate Coefficient of correlation to express the interrelation of these cost control and time control parameters. Here we will use a MS project software for scheduling and proposed a new different parameters for time and cost control.

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