

# Review of Delays in Building Construction Projects

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**Abstract**— Delay in Building Construction Project is one with all the foremost common issues. Delay can be defined as time overrun or an extension of time to complete the project. Delay is a situation when the actual progress of a construction project slower than the planned schedule or late completion of the projects. The causes of delay in Building Construction projects are a unit taken from the pass literature review. The literature reviews are a unit summarized and therefore the delay framework is made to support the literature review outline.

**Keywords:** Delay, Causes, Construction Project, Time, Cost, Parametric & Non Parametric Tests

## I. INTRODUCTION

Delays are one amongst the most important issues facing by the development trade. The delays in construction project have important money and social impact to all or any parties concerned within the project. Construction delay could be a major downside facing by the development trade. In most construction projects, there are delays and their impact level varies from project to project ranging from a few days to years. It is typically understood that the development delay is that the most important factors moving to deliver the project on time, within budget, and expected quality. It can be found rarely that a project was completed within the specified time. There are varied negative effects of delays like lawsuits between homeowners and contractors, increased costs, loss of productivity and revenue, and contract termination. Effects of delays that preponderantly effects or loss of Interest by the neutral, blacklist by the Authorities, waste of Money and Time, Declination of Reputation etc. Delays caused by contractors will typically be attributed to poor social control skills. Lack of planning and a poor understanding of accounting and financial principles have led to many a contractor’s downfalls. In this study, the most important factors inflicting delay and their effects in the massive residential construction comes in India.

## II. OBJECTIVE OF STUDY

- To identify the source of delays in construction projects.
- To study cost of delay and methods to mitigate delays.
- To study the effect of delays in construction projects.
- Analysis of data collected of live projects regarding delays of activity.
- Give the discussion and suggestion for minimum of effects of delays in construction projects.

## III. TYPES OF DELAY

Many construction projects suffer from delay. Suspension means a stoppage of work directed to the contractor by a form from the client, while delay is a slowing down of work without stopping it entirely

- Critical or Non-Critical Delays

Delays that affect the project completion or in some cases a milestone date are considered as critical delays, and delays that do not affect the project completion, or a milestone date, is noncritical delays.

- Excusable or Non-Excusable Delays

All delays are either excusable or non-excusable. An excusable delay is a delay that is due to an unforeseeable event beyond the contractor’s or the subcontractor’s control.

- Compensable or Non-Compensable Delays

A compensable delay is a delay where the contractor is entitled to a time extension and to additional compensation. Relating back to the excusable and non-excusable delays, only excusable delays can be compensable. Compensable delays are caused by the owner or the owner's agents.

- Concurrent or Non-Concurrent Delays

The concept of concurrent delay has become a very common presentation as part of any analysis of construction delays. The concurrency argument is not just from the standpoint of determining the project’s critical delays, but from the standpoint of assigning responsibility for damages associated with delays to the critical path.

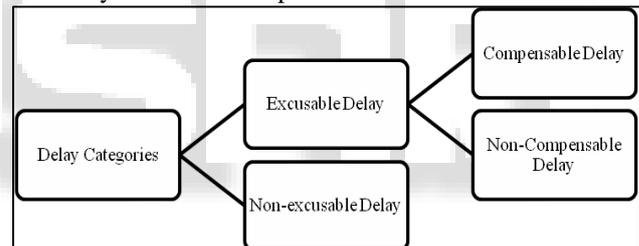


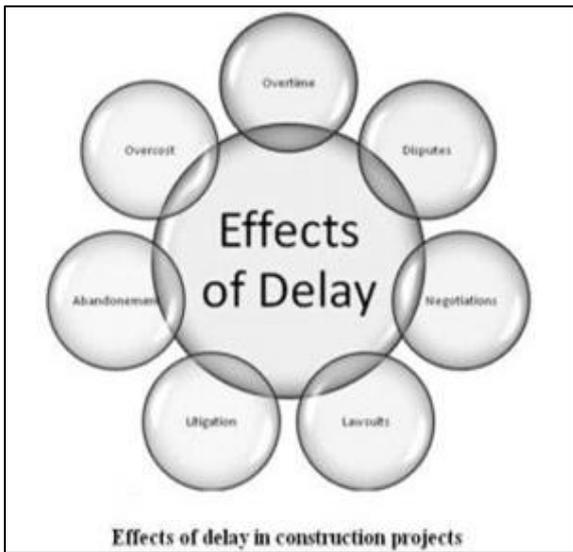
Fig. 1: Types of delays

### A. Causes of Delay

Project related delay
Owner related delays
Contractors related delays
Consultant related delays
Design related delay
Material related delays
Equipment related delays
Labour related delays
External factors related delays

### B. Effect of Delay

Overtime
Over cost
Disputes
Total abandonment
Litigation
Arbitration



IV. LITERATURE REVIEW

Past literature Year	Title of Research
2010	Jyh-Bin Yang and Pei-Rei Wei. Causes of Delay in the Planning and Design Phases for Construction Projects (This paper study identified the delay causes and analyzed the importance and frequency of delay using the relative importance index.
2011	N. Hamzaha, M.A. Khoirya, I. Arshada, N. M. Tawilb and A. I. Che Anib Cause of Construction Delay .Theoretical Framework
2012	Doloi H. et al . -Factor analysis and regression to modelling were used to examine the significance of their factors.
2013	Pablo González; Vicente González, Ph.D.; Keith Molenaar, Ph.D., M.ASCE; and Francisco Orozco, Ph.D. -Analysis of Causes of Delay and Time Performance in Construction Projects
	Murat Gunduz, Ph.D., A.M.ASCE; Yasemin Nielsen, Ph.D.; and Mustafa Ozdemir- Quantification of Delay Factors Using the Relative Importance Index Method for Construction Projects in Turkey.
2014	Andrew S. Chang and Fang-Ying Shen.- Effectiveness of Coordination Methods in Construction Projects
2015	B. Fahathul Aziz1, D.Senthil Kumar- Impact of uncertainty factors in construction projects
2016	Dr. Ashraf samara et al -.Causes and Effects of Delay in Public Construction Projects in Jordan
2017	Shruthi Sivaprakasam S.Dinesh J. Jayashree -A Review on Causes of Delay inConstruction Projects.

2018	Subhav Singh, Anju Bala , Saurav Dixit, Deekshant Varshney- Critical Analysis of Causes of Delay in Residential Construction Projects in India.
2019	Abdurezak Mohammed Kuhil and Neway Seifu -Causes of Delay in Public Building Construction Projects: A Case of Addis Abeba Administration, Ethiopia

Table 1:

S.No	Parametric Tests	Non parametric Tests
1.	One-Sample Z-test,	Sample Sign Test- Use this test to estimate, the median of a population and compares it to a reference value or target value.
2	Two -Way ANOVA	Friedman Test- This test is used to test for differences between groups with ordinal dependent variables. It can also be used for continuous data if the one-way ANOVA with repeated measures is inappropriate
3	T-Test	Goodman Kruska’s Gamma- a test of association for ranking variables
4	One- Way ANOVA	Kruskal-Wallis Test- Use this test instead of a one-way ANOVA to find out if two or more medians are different. The Ranks of the data points are used for the calculations, rather than the data points themselves.
		Mood’s Median Test- Use this test instead of the sign test when you have two independent samples
5	Independent Samples T-test	Mann-Whitney Test- Use this test to compare differences between two independent groups when dependent variables are either ordinal or continuous
6	Linear Regression Analysis	The Mann-Kendall Trend Test- looks for trends in time-series data
7	Correlation Coefficient	Spearman Rank Correlation.- Use when you want to find a correlation between two sets of data

Table 2:

A. Cons & Pros

- More statistical power when the assumptions of the parametric tests have been violated. When assumptions have not been violated, they can be almost as powerful.
- Fewer assumptions
- Small sample sizes are acceptable.
- They can be used for all data types, including nominal variables, interval variables, or data that has antlers or that has been measured imprecisely.
- Less powerful than parametric tests if assumptions have not been violated.
- More labor-intensive to calculate by hand (for computer calculations, this isn't an issue).

V. RESEARCH METHODOLOGY

The research methodology contains two phases. The first phase included a literature review and interviews. The literature review was conducted through books and international management journals. As the outcome of this phase, 18 delay factors causes of delays in construction projects were identified. These causes are :Approval, Materials related, Labours related , Equipment related, Financial issues & Cash flow, Mistakes during construction, Government policies, Client related, Contractor related, Prefeasibility studies, Deviation in drawings/Design related, Weather condition & Environmental factors, accidents, quality control/assurance, economic condition, Agreement issues, AdOption of advanced technology. The second phase includes the ranking of the uncertainty factors which are causes of delays in construction projects. These factors are ranked by the Relative Importance Index (RII).

A. Data Analysis

The data analysis will be done by a relative importance index technique Relative Importance Index technique: S.M.Renuga and Balasubramanian Malathi[1] used the Relative Importance Index method to determine the relative importance of the various cause of delays. The same method is going to be adopted in this study. The five-point scale ranged from 1(not much) to 5 (very important) will be adopted and will be transformed to relative importance indices (RII) for each factor as follows:

$$RII = \sum W/A * N \tag{1}$$

Where, W is the weighting given to each factor by the respondents (ranging from 1 to 5), A is the highest weight (i.e. 5 in this case), and N is the total number of respondents. The RII value had a range from 0 to 4 (0 not inclusive), higher the value of the RII, more important was the causes of delays. The RII was used to rank the different uncertainty factors that cause delay. These ranking made it possible to cross-compare the relative importance of the uncertainty factors as perceived by the respondents.

B. Questionnaire Survey

The Questionnaire was completed at the meeting with the project manager, planning engineer this method had the added benefit of making a clarification to respond about the uncertainty factors and gives chances to surveyor to explore possible uncertainty factors influencing the construction projects. These uncertainty factors in means of importance scale are carried out by the relative importance index method (RII).The uncertainty factors are ranked according to the RII values and the top 10 uncertainty factors are identified.

S.No	Types of Delays	Frequency of Occurrence (α)				Severity of Effect (β)					
		Very Small	Small	Normal	Large	Very Large	Very low	Low	Medium	High	Very High
	Contractor Related Delays	1	2	3	4	5	1	2	3	4	5
1	Poor site management and supervision										
2	Financial difficulties										
3	Unsuitable construction method										
4	Mistakes during construction										
5	Inadequate contractor experience										
6	Defective works										
7	Poor subcontractor performance										
8	Improper planning										
	Client Related Delays										
1	Client interference										
2	Slow decision making										
3	Contract modification										
4	Change order										
5	Financial difficulties of client										
6	Un cooperative client										
7	Slow payment of completed work										
8	Unrealistic contract duration										

Table 3:

	Consultant Related Delays										
1	Mistakes in design										

2	Changes in drawings/specifications																			
3	Incomplete documents/drawing																			
4	Defects in design																			
5	Inadequate supervision to contractor																			
6	Delay of work approval																			
7	Late issue of instruction																			
8	Slow correction of design problem																			
9	Late valuation work																			
10	Slow inspection of completed works																			
	Material Related Delays																			
1	Shortage of material																			
2	Material procurement problem																			
3	Material fabrication delay																			
4	Unforeseen material damages																			
5	Slow delivery of ordered materials																			
6	Noncompliance of material to specification																			
	Contract-Relationship Related																			
1	Conflict between parties																			
2	Difficulties of coordination between parties																			
3	Lack of communication between parties																			
	Plant/Equipment Related																			
1	Equipment shortage																			
2	Wrong selection																			
3	Low efficiency																			
4	Equipment delivery problem																			
5	Inadequate skill of operators																			
6	Equipment breakdown and maintenance problem																			
	Labour Related Delays																			
1	Labour disputes/strikes																			
2	Weak motivation																			
3	Lack of skilled labour																			
4	Low productivity																			
5	Shortage of manpower																			
6	Labour injuries/accident in site																			
7	Absenteeism																			
	External Factors																			
1	Act of God																			
2	Inclement weather condition																			
3	Price fluctuation																			
4	Government regulation																			
5	Problem with neighbor																			
6	Unforeseen site condition																			
7	Civil disturbance																			
8	Slow process of Building permit																			

## VI. CONCLUSIONS

- The Aim Of This Paper Is To Identify The Delay Factors In Construction Projects Because Delays Are Considered To Be A Serious Problem In The Construction Industry.
- Construction Delay Is A Critical Function In Construction Projects.
- In General, The Amount Of Time-Delay And Cost-Increase (Overrun), Increased With An Increase In The Total Cost Of A Residential Project.
- Cost Overrun And Time Overrun (Extension Of Project Duration) Were The Two Most Frequent Effects Of Delays Which Significantly Affects The Construction Projects.

- There Are Loss And Expense Claims Arising From Delay And Fluctuation Claims During The Delay Period, Which Have Significant Effects On Cost Overrun.

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