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Factors Influencing Construction Time Delay on High Rise Projects In India

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Abstract

In Construction Project delay can be defined as the time over-run from the agreed upon a time which can be written & signed in the form of contract or verbal mutual agreement. Construction Projects often face delays and uses unnecessary time due to various factors and reasons, and hence suffer from unfavourable consequences. This study will identify the significant delay factors from an intensive literature review, supplemented by delay factors in major Indian construction projects based on empirical data. A total of eight ongoing construction projects were selected for the study. And a questionnaire is also used to collect reasons for the delay, their frequency, importance, and severity. 53 valid responses received from the project managers. SPSS 21 tool package is used for statistical analysis and the tests performed were Severity index and the correlation between the attributes. The findings of the study concluded that the maximum severity for delaying projects is due to Design Variation followed by Lack of Proper Planning, and Shortages of Skilled Labour.

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Keywords: Delay; Projects; Construction Management; India.

1. Introduction

Construction Industry is a huge industry which is the most important in creating jobs when it comes to India. However, most of the times it has seen the downturn because of many internal as well as external reasons. Never the less the most important of them is the time delay and cost overrun which hampers the project success immensely in a sense that the project which was very viable to take in the preliminary stage is giving loses at the time of execution. In fact, this is the most important reason why many of the projects are left incomplete and developers move on to the next project [1]–[3]. However, with RERA act came into existence now the developers can't just be left the project without completing it and moving on to the next project, So this is very important to understand the effect as well as factors affecting the Time delays & cost over-run. This thesis is done mainly for the Time delay factors which has identified and ranked different factors. This result is specific to the Indian Country context however, this result will not be much different for other developing countries as well when it comes to Time delay factors [4]–[6].

In most of the countries in the world, experience and the research has found out or revealed that all the successful projects should be completed within the designated time frame for a project. Therefore, the causes of delays or time overrun is an important aspect which should be studied in detail as it affects the profitability of the project. A lot of

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researchers, in their research or papers, have been able to identify such factors that actually affect the delays in a construction project and this affects the economy as well as organizations health. The time overrun in a construction project is usually a cause link to scope, quality and cost for different tasks or work [2], [7]–[9]. No matter how much we speak about the various studies or research been done in analyzing the various factors affecting the delays for various construction projects in India and around the world, we still need to a deeper understanding on this matter to improve it for achieving better results. Indian economy has very impactful manufacturing and another sector which contribute largely to GDP. But construction is still an untouched area which only contributes approximately 5.5 % (1990's data) of overall GPD growth. However, the Indian Construction industry is now expected to be the backbone of the Indian economy & currently, it contributes about 53 % to the GDP, according to the latest report published by the government [10]–[12].

2. Literature Review

In the Construction industry, there are a lot of variables that derives the project and decide its fate in terms of how successful it has met its intended purpose. The construction Industry is always expected to be a growing one especially when we talk specifically with reference to developing countries [13], [14]. In India there are lot many development projects of more than 100 crores are being carried out different states of the country and thus requires huge funds which is a very scarce resource and is important if the country wants to be among the developed ones from the developing ones, this transfer of status is not easy and requires a lot much constructions to be carried out in the next span of 10 years or so. In order to do such type of construction, India needs to plan thoroughly so that there are no much wastages of resources and the projects meet its the purpose. All the construction work needs to be planned in terms of how the work will be executed, who is responsible for that particular work, outlining the scope and requirements, major deliverables, no. of tenders to be floated for a particular project, no. of parties involved in a project (Kim, 1982).

A project can be defined as an endeavour which is temporary in nature and has a definite timeline to follow. It uses resources such as man, materials, plants and equipment's to be able to complete its intended purpose or scope. One thing we all should keep in mind being a constructional professional is that no matter how best we plan our course of action, it will have some lapses and we all know about Parkinson's Law is if anything that can go wrong in a project then it will eventually so we planned according to it also. For a project to be successful, a project must be completed within the requirement and limits of Scope, Quality, and Time & Cost. Thus, one should especially take care about this 4 things in a project and this is what most researchers research about in order to find a standard solution but has been said that each project is unique and thus all things are dynamic in nature and require updating with each new project [15]–[18].

Table 1

S.No	Reference Number	Attributes
1)	[19], [20],	Inaccurate Material Estimate
2)	[5], [21], [22]	Unexpected Weather Condition
3)	[9], [23], [15], [24], [25]	Shortage of Materials
4)		Shortage of Equipment.
5)	[21][14]	Shortage of Skilled Labour.
6)	[26], [26], [27]	Inaccurate Productivity Rate calculation
7)	[8] , [27]–[29]	Location Constraint of Project.
8)	[30]	Lack of Proper Planning

9)	[3], [31], [32]	Poor Productivity of Labour
10)	[21], [22]	Design Variation
11)	[34]–[36]	Inaccurate Productivity estimation of Equipment

I. Supernova (Sec 125, Noida):- The Project is delayed by about 34 months from its initial schedule baseline. The residential building has more than 5o floors.

II. Panchsheel (Sec 75, Noida):- This Project has 22 floors and is been delayed by 19 months and is expected to have more delay.

III. Xerbia Greens (Hinjewadi, Pune):- The Project has 18 floors and is been delayed for 16 months and is currently under construction.

IV. Xerbia MarketYard (Hinjewadi, Pune):- This has 15 floors and the project mainly consist of studio apartments and is being delayed by 16 months from the schedule.

V. The other projects which were studied in this research are Rohan Albania, Pebbles Urbania, Parande Pune Ville, Jewel of India, and Wave City.

The common elements among all the projects discussed above have been delayed by more than 15 months and are large because of the factors being characterized as the factors influencing Construction delays.

3. Research Methodology

On referring to the past records and trends on Construction Productivity in all the major developing countries, we were able to shortlist some of the factors which were the primary causes in delays of the project (Assaf S. A.-K.-H., 1995). We have selected this 12 factors and conducted the survey in the form of questionnaire which was distributed to most of the high rise residential projects who were already in delays more than 6 months & located in Noida & Pune where the Project In-charge or Project Manager was asked to fill up his responses (Peter F. Kaming, 2010). The Questionnaire mainly asked them to rank these 10 factors according to them in terms of priority and what according to them has most significantly delayed the projects. All the project managers were asked to rank all the factors from 1 to 5 with 5 being the most important factor & 1 being the lowest importance in terms of delay.

3.1. Data collection

The questionnaire floated to about 53 Project Managers who are currently working or has done high rise residential Projects in India. This sample does represent the whole population as it is been already discussed in one of the papers (Kim, 1982). Several of the papers have used this same methodology for their research (Assaf S. A.-K.-H., 1995) (Peter F. Kaming, 2010). Most of them answered over a phone call or through meeting and few handfuls of people have filled in the form floated, Some of them has agreed to reveal their identity in the research paper but the majority of them has asked to be confidential as it has lots of secret information regarding the schedule and budget of the project. One of the Project managers was Nimesh Patel Sir who is working on a project of high rise residential building in Pune as Project Manager from consultant side and name of the organization is GLEEDS INDIA & Similarly, Thirty-two (32) managers mainly construction manager working on a high rise residential projects in India were asked to give response against a set of questions in the form of questionnaire.

Table 2

S.No.	Variables of Delays	Frequency		Importance		Severity	
		Rank	Index	Rank	Index	Rank	Index

1.	Inaccurate Material Estimate	2	0.76	5	0.62	4	0.48
2.	Unexpected Weather Condition	10	0.45	9	0.52	10	0.23
3.	Shortage of Materials	7	0.52	6	0.61	7	0.32
4.	Shortage of Equipment's	6	0.58	10	0.5	9	0.29
5.	Shortage of Skilled Labour	4	0.61	3	0.8	3	0.49
6.	Inaccurate Productivity Rate calculation	8	0.49	4	0.7	6	0.34
7.	Location Constraint of Project	10	0.24	11	0.4	11	0.1
8.	Lack of Proper Planning.	3	0.62	2	0.82	2	0.51
9.	Poor Productivity of Labour	5	0.59	7	0.6	5	0.36
10.	Design Variation	1	0.9	1	1.0	1	0.9
11.	Inaccurate Productivity estimation of Equipment	9	0.50	8	0.59	8	0.30

4. Result and Discussion

Table 3, shows the various factors according to importance index & frequency index and from which the severity index is calculated and noted down. Severity index of various factors is the product of Importance index and Frequency Index of individual factors. According to the values the 1st rank of the severity index among the factors was Design Variation & subsequent ranks were 2nd (Lack of Proper Planning), 3rd (Shortages of Skilled Labour), 4th (Inaccurate material estimate), and 5th (Poor Productivity of Labour), A correlation matrix of all the factors have been developed and accordingly the interdependency among them is known like Inaccurate Material Estimate & Unexpected Weather Conditions have 0.59 correlation value which we all know shows a direct relationship with each other & similarly with Design Variation and location of project constraint has value of -0.478 and thus have a strong relationship between them. It is been then founded or calculated for all the 11 factors from the Correlation matrix which is shown in Table 4. The above results have suggested that one of the key factors in the delays of the project is Design variation or we can say Scope change from the client side. This type of delay is accompanied by several other delays from the other remaining factors as shown with the correlation between all the factors.

5. Conclusion

Reviewing all the projects and project managers who were part of the survey, it has been observed that time overrun is very common for most of the projects and in some cases are accompanied by cost overrun in the majority of the high rise residential construction projects in Noida & Pune. The important factors governing the time over-run or delays are Design variation or scope change, lack of proper planning, shortage of resources & inaccurate Productivity calculation. While the data which were used for this findings are specific to the Indian context, the results generally agree with the findings of the earlier findings of developing countries & thus, its fairly easy to say that on and all this are the major reason for a project to be delayed across the developing countries.

Table 3

	Inaccurate Material Estimate	*Unexpected Weather Condition*	*Shortage of Materials*	*Shortage of Equipment's*	*Shortage of Skilled Labour*	*Inaccurate Productivity Rate calculation*	*Location Constraint of Project*	*Lack of Proper Planning*	*Poor Productivity of Labour*	*Design Variation*	*Inaccurate Productivity estimation of Equipment*
Inaccurate Material Estimate	1										
Unexpected Weather Condition	0.591	1									
Shortage of Materials	-0.091	-0.435	1								
Shortage of Equipment's	0.144	-0.504	0.322	1							
Shortage of Skilled Labour	0.125	-0.347	-0.05	0.0943	1						
Inaccurate Productivity Rate calculation	0.206	0.0154	-0.11	0.3479	0.418	1					
Location Constraint of Project	0.104	-0.181	0.095	0.395	-0.13	-0.0513	1				
Lack of Proper Planning	0.309	0.4775	0.011	-0.0587	-0.40	0.0085	0.102	1			
Poor Productivity of Labour	0.165	-0.261	0.394	0.3022	-0.16	-0.0621	-0.260	0.101	1		
Design Variation	0.154	0.286	-0.3	-0.2494	-0.11	-0.0038	-0.470	0.099	-0.2056	1	
Inaccurate Productivity estimation of Equipment	0.172	0.0821	-0.51	0.1428	0.741	0.4624	-0.057	-0.15	-0.3739	0.198	1

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