



Delay analysis method in Indian construction industry

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Abstract

The construction industry in India is an important sector due to its enormous contribution to the country's economic development. This in terms of employment opportunities and attraction of Foreign Direct Investments which grossly contributes to the country's GDP. However due to the geographical, political, social and financial situation of the country, many construction projects are prone to delay. These delay often results into the dispute between the various parties involved in a project due to their own interests. The main aim of this paper was to find out the current scenario in Indian construction industry about the delay analysis methods and Delay protocols used by the professionals. The research design was quantitative, where the data was collected from clients, consultants and contractors using questionnaires. The results obtained indicate that the top major causes of delay related disputes are due to lack of knowledge and use of Delay Analysis Methods and Delay related protocol in our country. They disputes also add to the work suspension, legal actions taken by the parties which further delay the already delayed project.

Keywords: construction, delay, delay analysis methods

1. Introduction

Construction is the backbone of the development of any country. Every year government invests a large amount of money into public infrastructure and other projects. Delay in completion of such kind of projects usually result in the cost overruns and the delay in operation of any such kind of facility will lead to lost revenue to the owner

In construction, delay could be defined as "the time overrun either beyond completion date specified in a contract or beyond the date that the parties agreed upon for delivery of a project" (Desai & Bhatt).

2. Problem Statement

According to Ministry of Statics and Programme Implementation (MoSPI), Government of India, during year 2016-17 a total number of 1222 major(costing ₹150-₹1000 crore) & mega (costing more than ₹1000 crore) projects were on monitor. A total 364 projects were behind the original schedule (ranging 1 to 261 months) and the cost overruns for these delayed projects are around 20.11% w.r.t. original approved cost.

Delay of projects often leads to disputes and arbitration which again include extra cost and time. For resolving claims related to extension of time and compensation it is very important to analysis the cause of delay and its impact on the project completion based on which EOT and compensation related claims can be addressed well.

3. Aims & Objective

This study aims to identify the various DAMs from literature and to identify the various methods or DAMs to analyze the delay and EOT related claims that are being used by professionals in Indian construction industry.

This research work will be carried out keeping the following objectives in mind:-

1. To review delay analysis techniques.
2. To identify the various delay analysis techniques from literature review.
3. To investigate delay analysis techniques in use by field survey.
4. To study SCL protocol and AACE Forensic schedule analysis

4. Methodology

First the DAMs are reviewed and its application is discussed based on extensive literature review. A questionnaire was evolved on basis of CIOB European survey to identify the DAMs prevalent in the construction industry. A survey was conducted among the various stakeholders of construction industry in National Capital Region (NCR) of India.

5. Literature study

There are a number of DAMs that can be identified from the construction literature but the only few are globally accepted and preferred by the professionals Arditi, Pattanakitchamroon (2006) identified four methods while six methods were identified for their comparative analysis by Nuhu Braimah (2013). Alkass, Mazerolle & Harris (1996) identified six methods and one methods Isolated Delay Technique is also proposed. Hegazy (2012) identify five methods for comparison between them.

Delay Protocol by Society of Construction Law also recommends 6 techniques for analyzing the delay. Forensics Schedule analysis by AACE international accept four DAMs to be used for analyzing the construction delay. A comparative result from literature is shown in below tabular from.

Table 1

		Year		DAMs Identified
1	Alkass, Mazerolle & Harris	1996	1	Global impact technique
			2	Net impact technique
			3	Adjusted as-built cpm technique
			4	But for' or collapsing technique
			5	Snapshot technique
			6	Time impact technique
2	Arditi, Pattanakitchamroon	1998	1	As-built bar chart
			2	Scatter diagram
			3	Critical path method
			4	As-built subtracting impacts
3	Bordoli and Baldwin	2006	1	As-planned vs. As-built method
			2	Impact as-planned method
			3	Collapsed as-built method
			4	Time impact method
4	Khalid & Mohan	2011	1	Global impact
			2	Impacted As-Planned
			3	Time impact
			4	Window-IDT
			5	Window-But For
			6	Window-snapshot
5	Hegazy	2012	1	Global impact method
			2	Net impact method
			3	As-planned impacted method
			4	Planned but for method
			5	As-built but for method
6	Nuhu Braimah	2013	1	As-Planned vs. As-Built
			2	Impacted As-Planned
			3	As-Planned But for Collapsed As-Built
			4	Window Analysis
			5	Time Impact Analysis
			6	As-Planned vs. As-Built
7	Maduranga, Palamakumbura & Dissanayake	2016	1	Impacted As-Planned
			2	As-Planned But for
			3	Collapsed As-Built
			4	Window Analysis
			5	Impacted As Planned Analysis
8	SCL Delay Protocol	2017	1	Time Impact Analysis
			2	Time slice window analysis
			3	As planned vs. as Build window analysis
			4	Retrospective Longest Path Analysis
			5	Collapsed As Built Analysis

6. Research Design

The research was designed to get responses from clients, consultants and contractors of construction companies in regards to the various delay management techniques and delay analysis methods.

The research methodology chosen for this study comprised of intensive literature review, and to get questionnaire filled by building construction stake holders in NCR region of India and a statistical analysis of the Survey.

7. Questionnaires

In order to determine the perception of different stake holders in Indian construction Industry regarding factors of construction schedule management and various DAMs that are being used, a questionnaire was developed. This was the main tool used to collect the data from our target respondents.

Questionnaire was comprises of three sections:

- Section 1 had questions regarding respondent's personal information.
- Section 2 had questions about the demographic information of the respondents.
- Section 3 had question related to construction schedule management and DAMs.

For designing the questionnaire an extensive literature review is carried out to find various delay factors, schedule management methods and various DAMs. A questionnaire survey that is being conducted by "The Chartered Institute of Building, United Kingdom" is thoroughly examined and questionnaire was evolved based on that survey.

8. Sampling

In this study random sampling technique is adopted.

Questionnaire was floated to fifty five stakeholders of construction industry which are currently working in NCR region of India.

The target group consist of all stakeholders of construction sector including site engineers, project managers, Architecture, Planning engineering, Structural engineering, Building surveying/Quantity surveying etc who were asked to fill the questionnaire.

9. Data Collection

Based on the study design, the questionnaires were sent to the respondents through emails and three construction sites are personally visited to get questionnaire filled. Follow up was done via emails to constantly remind them on the importance to participate in the survey and also crucial nature of the time line to resend the questionnaires. Only questionnaires that were fully completed were accepted. Those partially filled were not considered for the analysis.

10. Data Analysis

10.1 Respondents

A total of fifty six number of professional has responded to the questionnaire but only fifty one are chosen for the analysis after rejection of uncompleted responses out of which forty four percent are civil engineers, twenty three percent are architects, fifteen percent belongs to the construction management, three percent respondents are plumbing consultants, six percent belongs to planning and structural engineering each and the remaining three percent are programming and scheduling engineers which are represented in below chat:

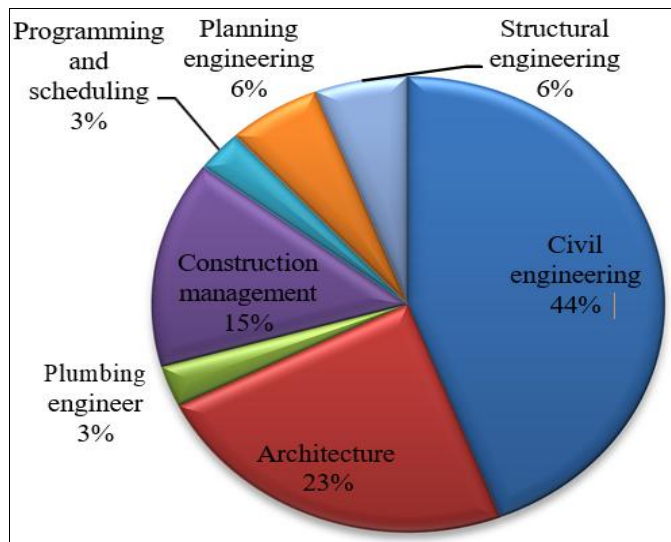


Fig 1: Respondents

10.2 Work Experience

Majority of the respondents has experience Up to five year experience group i.e. sixty five percent of the total while twenty three percent has the experience between six to ten years and six percent belongs to sixteen to twenty group and more than twenty year group each

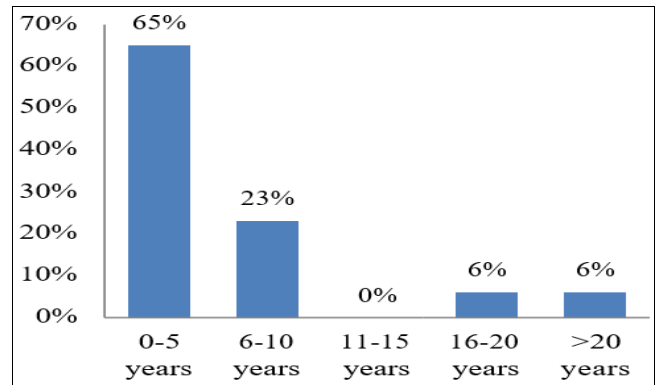


Fig 2: Work Experience

10.3 Field of expertise

Respondents are selected from different field of expertise which is shown in below pie chart. Thirty eight percent are involved in housing projects; thirty five in institutional buildings, twenty one percent in commercial building and six percent of respondents has expertise in telecommunications and power projects.

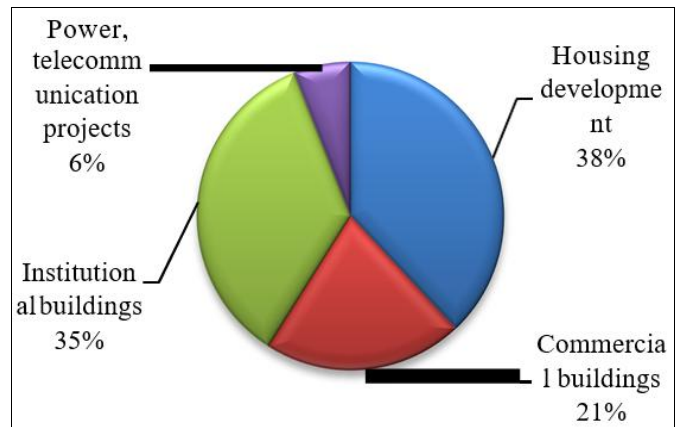


Fig 3: Field of Expertise

10.4 Software used for schedule preparation

Out of fifty one respondents maximum of them (twenty six) are using MS Excel for preparing their schedule, MS projects is used by eleven respondents while thirteen of them are using primavera and one respondent responded for ZOHO projects.

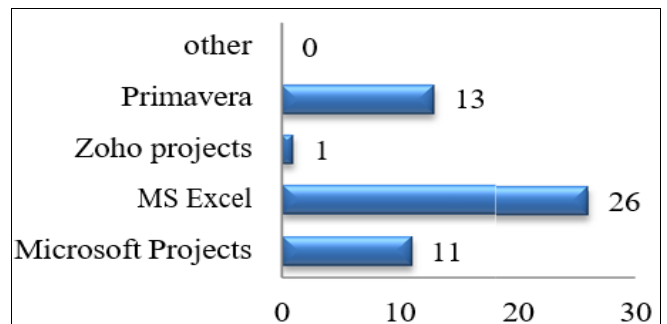


Fig 4: Programming software used for scheduling

10.5 How Delay is analyzed and Extension of time is granted?

When the respondents were asked about how the delay is analyzed and extension of time is granted then sixty five respondents says that the engineer in charge will decide while twenty three percent says they are using delay analysis methods (DAMs), nine percent of them are not aware about the process while three percent says that they don't even understand the question

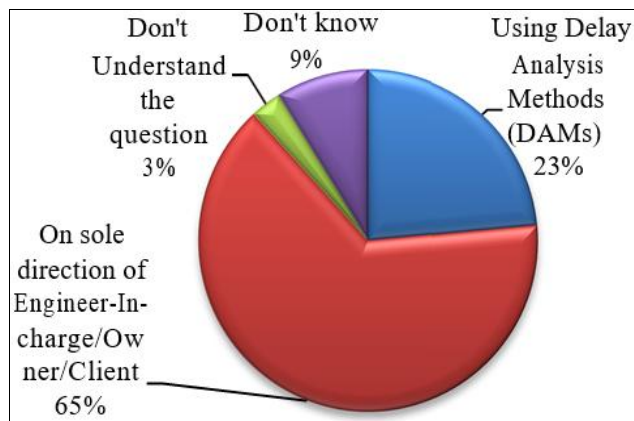


Fig 5: How Delay is analyzed

11. Conclusion and Recommendations

Construction schedule delays in a project can cause major problems for contractors and owners, resulting in costly disputes, controversial issues and adverse relationships between all the project participants.

From this study that had been carried out in NCR region of India it is found that very less number of professional uses DAMs of delay analysis and granting extension of time instead they solely depends upon the decision of Engineer-in-Charge or owner. This approach does not justify the EOT granted against the delay occurred in projects.

Delay protocol such as SCL Delay Protocol and AACE Forensic Schedule Analysis should be incorporated in our contract forms for avoiding delay related disputes in construction

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