

A REVIEW ON CAUSES AND EFFECTS OF DELAYS IN INDIAN CONSTRUCTION PROJECTS

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ABSTRACT

In India, several construction projects experiencing more delays which results in exceeding the initially fixed delivery time and cost. Delay in industrial Construction Project is one of the most common problems. Delay can be defined as time overrun or extension of time to complete the project. Delay is 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 industrial Construction Projects are taken from the pass literature review. The literature reviews are summarized and the delay framework is constructed based on literature review summary.

This review work attempts to find and investigate the main factors perceived to affect delays in projects. On this review, the basic delay causes in construction project reviewed on the past literature review. The frameworks and the delay critical review was obtained based on past literature reviews conclusion. The researcher achieves their aims to get the main cause of delay on building constructions by inviting the construction stakeholders specifically contractor, developers, designer, and client. The most conducted method to find the main cause of delays is Relative Important Index (RII) and Importance index based on the degree of severity and degree of frequency.

Keywords –Construction, Delay, Time, cost, Relative Importance Index (RII), etc.

I. INTRODUCTION

Construction Projects in India are scandalous for delays. Even the service of insights and Program Implementation (MOSPI) affirms that numerous projects are experiencing delays. In any case, the degree and the reasons behind the

postponements have suggestions huge Economic and Political perspective. For one, as a rule, these activities are financed citizen's cash. In this way, individuals ought to know how productively their cash in used by the authorities while making

procurements of open merchandise and benefits. Two, delays in Project execution implies that the general population and Economy need to sit tight for Construction Facilities Longer than it is vital. This thus restricts the construction capability of economy on the loose. Three, administrations gave by construction projects serve as info for some other segment of economy. Along these lines, time delays lead to increment in capital-yield –ratio for whole economy. Basically, postpones can decrease the productivity of accessible assets and limit the construction capability of whole economy. Therefore, the inadequacy of research on the subject is surprising.

This Construction industry is the second largest and basic input for socio-economic development of our country after agriculture, which has contributed an estimated amount of ₹ 928418 crore to the national GDP in 2014-15, a share of

around 8.04% (Planning Commission, Government of India). Though construction projects in India facing various problems, delay in construction is one of the major issues. It is defined as “the time overrun, either beyond the completion date specified in a contract or beyond the date that the parties agreed upon for delivery of a project”. It is considered as a common problem in construction projects. In most of the projects, there will be delays and their impact level varies on each project which depends on several factors such as nature and the type of construction, importance of the project, etc.

A. TYPES OF DELAY

Many construction projects suffer from delay. Suspension means 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

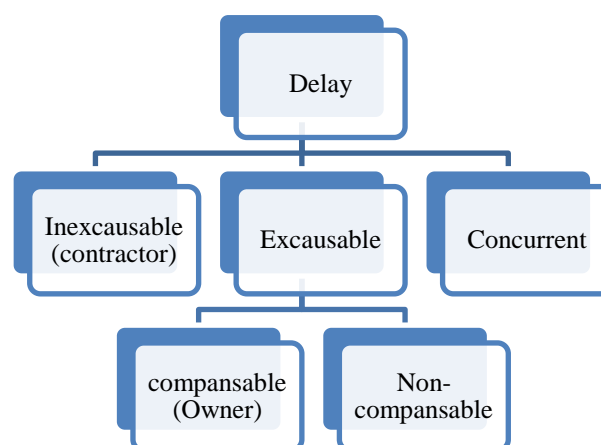


Fig. 1: Types of Delays

1) *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, are noncritical delays.

2) *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.

3) *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.

4) *Concurrent or non-concurrent delays*

The concept of concurrent delay has become a very common presentation as part of some 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.

II. LITERATURE REVIEW

Gunduz et al(2014) proposed to provide decision support tool that uses fuzzylogic

incorporation with relative importance index to measure the probability of delaysfactors in construction projects before bidding phase. With the help of literature review and interviews, the authors came out with 83 delay factors classified into 9 groups on based of literature review. Using relative importance index to rank responses of Interview questionnaire filled by 64 experienced construction professionals to assess delay factors importance with 5 points Likert Scale that resulted in top 5 factors:

- "Lack of experience of contractor"
- "Deficiency in planning and scheduling"
- "Poor site management and supervision"
- "Changes to the project by owner"
- "Delays due to material delivery"

Gunduz, Nielsen and Ozdemiret al (2013) aimed for the research to identify the delay factors in construction projects because delaysare considered being a serious problem in the construction industry. Through a detailedliterature review and interviews with experts from the Turkish construction industry, total 83different delay factors were identified and categorized into nine groups in alphabetical orderas follows: consultant related delay factors, contractor related delay factors, design relateddelay factors, equipment related delay factors, externality related delay factors, labour related delay factors, material related delay factors, owner related delay factors, and project related delay factors. The

demonstration of these groups of delay factors was achieved using the Ishikawa (fishbone) diagram because it is capable of showing factors, interrelations between different groups of factors, and consequences following from the factors. The paper then quantified the relative importance of delay factors and demonstrated the ranking of the factors and groups according to their importance level for delays. This objective was achieved through analysis of interview outcomes. According to the computed RIIs, all factors and groups were ranked. The paper addressed the most significant factors and groups of causes of 7 delays. The most and least important factors and groups were achieved through ranking results.

Doloi H. et al. (2012) have discussed in his research to analyse factors affecting delays in Indian construction projects. They selected set of 45 attributes. Their research first identified the key factors impacting delay in Indian construction industry and then established the relationship between the critical attributes for developing prediction models for assessing the impacts of these factors on delay. A questionnaire and personal interviews have developed the basis of their research. For data analysis, Factor analysis and regression modelling have been used to check the significance of the delay factors. From the data analysis, most critical factors of construction delay were identified as lack of commitment followed by inefficient site management and poor site coordination have been ranked third.

Le-Hoaiet al. (2008) conducted survey and studied delay and cost overruns in Vietnam's large construction projects with comparison with some selected countries. In his survey, twenty-one causes of cost and time delays suitable with building and industrial construction projects are identified and ranked. Evaluation of causes of cost and time delays are done with different model construction industries in Africa and Asia. The factor analysis method was applied to categorize the causes, as a result seven factors are determined, namely: lack of constraint and slowness, design, estimate and market, financial capability, incompetence worker and Government. These results might encourage practitioners to focus on time and cost overrun problems that might have been in their future or present projects.

El-Razek et al. (2008) stated causes of delay in building construction projects in Egypt. They identified 32 causes of time delay that were classified into nine (9) groups to fit the Egyptian construction industry. These groups were: Financing, materials, contractual relationships, changes, rules & regulations, manpower, scheduling & control, equipment, environment related causes. The main causes of delay in these construction projects are constraints in financing by the contractor while construction, design changes by client or his agent during construction, delays in contractor's payment by owner, partial payments during construction, and no utilization of qualified construction/contractual management. The analysis results show that the consultant is found as having more intermediate views, whereas clients and

contractors are seen having opposing views, usually blaming each other for delays.

Sambasivan and Soon *et al.* (2007) also adopted questionnaire method to establish the most important factors that causes and their effects of delay in the Malaysian construction industry. A method of questionnaire survey and relative importance index are used to identify the causes and effects of delay from all stakeholders like clients, consultants, and contractors. The most important top ten causes identified from the survey include, among others, improper planning of contractors, poor site management of contractors, insufficient contractor experience, insufficient client's finance and payments for accomplished works, problems with subcontractors, shortage in labour and material supply, lack of equipment and failure, mistakes during the construction stage and poor communication between parties

Assaf and Al-Hejjiet *al.* (2006) has been done a survey to find out the variables or factors that causes delay and their prominence as per each of the three key project participants i.e. clients, consultant and contractors in construction projects of Saudi Arabia. The field survey carried out includes fifteen owners, twenty-three contractors, nineteen consultants. Seventy-three variables of causes of delay are identified by studying literature review and results discussion with stakeholders involved in the construction projects. These factors are categorised into nine groups based on the following sources of causes of delay: factors related to client,

consultant, contractor, project, man power, materials, design-team, equipment, and external factors. Owners have explained that causes of delay are associated to contractor and labour. Their study points out the severe important causes of delay for the contractor are related to owner while client and consultants recognize highest frequent factor of delay is that awarding to the lowest bidder. The common cause of delay that all parties agreed is the change of orders by client during construction. Several common factors that causes delays between two stakeholders, such as improper planning and scheduling by contractors, delay in progress payments, poor site management and supervision by contractors, difficulties in financing by contractor and shortage of labour. All key stakeholders agree that the subsequent causes are the least important: accidents during construction, restrictions at site and traffic control, effect of social and cultural factors and changes in government regulations. However, the study revealed that the contractors identified that the main sources of delay were owners and consultant while both consultants and owners specify contractor and labour related delays are the significant sources of delay.

III. OBJECTIVE

Perhaps lot of studies carried out for delay findings and minimizing ill effects of delays in projects. Still there are lots of projects which run behind schedule and suffer heavy loss

Construction is ever changing challenging and dynamic industry. The research is

aimed to identify major causes of delay. To achieve aims, are identified as follows:

- To identify reasons of delay
- To identify effects of delay
- To identify methods of minimizing delay

IV. EXPECTED METHODOLOGY

A. *Delay Analysis Methods*

Delay analysis techniques can be classified into three separate categories: the Foresight Method, the Hindsight Method, and the Contemporaneous Method. The differences between these delay analysis techniques involve the baseline schedule used for measuring the delay, the point in time when the delay is measured, and the treatment, if any, of concurrent delay.

1) *Foresight Method*

Commonly thought of as the simplest and easiest, the Foresight Method generally employs two approaches: Impacted As-Planned, where only the owner-caused delays are identified, and Adjusted AsPlanned, where only contractor-caused delays are identified. In both approaches, the alleged delays are reviewed to determine where and how the revisions should be incorporated into the as-planned or baseline schedule. The result of these implanted activities is an adjusted project completion date, which demonstrates, either directly or indirectly, the owner's impact on the contractor's planned schedule of performance.

The Foresight Method is not generally favored by courts and boards, because it

ignores the as-built history of the project; it produces theoretical results; it does not measure the effect of delay on actual performance; and it assumes that the as-planned schedule does not change.

2) *Hindsight Method*

This method centers on an as-built schedule — a schedule depicting the dates that events actually occurred. Delaying events are normally depicted as distinct activities on the as-built schedule, which are invariably tied to the critical path. Typically, under this method, there are two approaches: As-Built Critical Path, which allocates time by determining the responsibility for the delays on the so-called critical path of the project, and Collapsed As-Built, which removes delays caused by one party to determine when the work would have been completed, if not for the delays of the other party.

The Hindsight Method has a number of disadvantages that include difficulty determining which work activities or delay events controlled the pace of the work; not considering what was critical at the time a delay occurred; not considering float through various paths at different periods of time; not accounting for concurrent delay; and not attempting to determine the individual impact of each delay.

3) *Contemporaneous Method*

This third method hinges on the principle that in order to determine the impact of delaying events, the status of the project must be established at the time those events occurred. In essence, the schedule needs, first, to be updated at the time of the

delay and, second, to be updated to incorporate any planning changes to coincide with the contractor's plan for pursuing the work. The goal of this method is to develop a freeze-frame picture of the project — identifying the delaying event, the impact of the delay, and the plan to complete the remaining work at the time the delay occurred.

Two approaches are commonly used as part of this method: Time Impact Analysis, which looks at a particular point in time and utilizes a series of chronological time slices to evaluate major scheduling variations that occurred during the project, and Window Analysis, which examines the critical path between two points in time and assesses the delay as it occurs.

B. THEORY OF ANALYSIS

1) Reliability analysis

Theory for Cronbach Alpha; Reliability test is conducted to check the stability and consistency of data by using cronbach alpha method. Reliability of the data is considered at low level when cronbach alpha is less than 0.3 which means the data is not reliable and cannot be adopted. Reliability is at high level when cronbach alpha is more than 0.7.

2) Relative Important Index (RII)

The RII was used to evaluate the ratings of the respondents. This approach was recommended in past studies as the appropriate analytical approach to group ratings of the variables in a given set. The analysis involved the computation of the RII, which is the representative rating

point for the collective ratings made for each variable in the subset

$$RII = \frac{\sum W}{A \times N}$$

Where,

RII= relative importance index

W = weighing given to each factor by the respondents (ranging from 1 to 5).

A = the highest weight (in this case is 5).

N = total number of respondents

The RII value have a range of 0 to 1 (0 not inclusive); the higher the RII, the more important was the cause of delays.

3) Correlation between the common factors of delay in construction industry

Spearman's rank correlation Spearman's rank correlation is a non-parametric test. Non-parametric tests are also referred to as distributions free Tests. These tests have the obvious advantage of not requiring the assumption of normality or the assumption of homogeneity of variance. They compare medians rather than means and, as a result, if the data have one or two outliers, their influence is negated. In this research the Spearman's Correlation is used. Correlation is a relationship measure among different parties or factors and the strength and direction of the relationship. In this research it is used to show the degree of agreement between the different parties. The correlation coefficient varies between +1 and -1, where +1 implies a perfect positive relationship (agreement), while -1 results from a perfect negative

relationship (disagreement). It might be said then that sample estimates of correlation close to unity in magnitude imply good correlation, while values near zero indicate little or no correlation. The Spearman's rank correlation coefficient r_s is used to measure and compare the association between the rankings of two parties for a single cause of delay, while ignoring the ranking of the third party. And it is calculated by the following formula:

$$r_s = 1 - \frac{6 \sum d^2}{n^3 - n}$$

Where, r_s is the Spearman rank correlation coefficient between two parties d is the difference between ranks assigned to variables for each cause n is the number of pairs of rank.

V. CONCLUSION

Study concludes that there exist various factors affecting completion time of project and their effects put construction projects at high risk that have effect on their performance. These causes are: delays in payment to contractor, information delays, poor project management, compensation issues, design changes, whether effects, labor strikes. Effects of these delays are cost overruns, time overruns, disputes and negative social impact.

The importance of delay causes in mining/manufacturing project in India has been identified clearly. Although this research was conducted in the commercial sector in India, the results may also be applicable for similar projects in other

developing countries. The identification of important delay causes helps a contractor in seeking extra time for completion from the customer. If the contractor wins in explaining the reasons of delay and gets a contractual extension of time than the customer is bound to pay extra claim to contractor. The contractor gain or loss is huge in terms of its credential in the market in terms of a successful presentation of delay analysis.

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