

Delay in Construction Projects – A Study of Scenario of Pondicherry Region

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Abstract:- In this study the various causes of delays in construction projects and their effects in constructions in Pondicherry region are briefly discussed. Factors that affects the time over-run in building constructions are identified with help of literature and evaluated for the case study region. This study analyzes the reasons of delay from perspective of contractors, owners and consultants involved in any construction works. Various types of delays are studied. Factors influencing delay in construction projects are studied from various research papers in journals and thesis works are studied. Factors influencing delay in construction projects to a larger extent are identified and their consequences in construction projects is also studied.

Keywords:- Pondicherry, over-run , RII , Consultant's Perspective.

I. INTRODUCTION

Timely completion of project as per schedule is an indicator of efficiency. In reality , un-certainty is high in construction process and involves many unpredictable delays causing from various sources. Performance of the various parties involved in project, availability of resources, financial strength of owner organization , contractual relations of parties and prevailing environmental conditions are the various sources of delay. Delays during construction projects creates adverse impacts on the performance of the construction projects. Therefore, Delays in construction projects is a critical problem in the construction industry. Investigation to this problem is necessary to overcome the time overrun situations and avoid un-necessary difficulties and confusions. Proper mitigation measures had to be taken to prevent the consequences of delay. The influence of resource constraint factors in constructions delays in the Indian construction industry needs a broader and repetitive research. Assessment of the frequency of time overrun and their extent to which delay may occur, and the factors influencing time overrun can provide insights for better planning of a construction project, controlling these factors for the overall improved project's performance.

II. PROJECT BACKGROUND

Construction as a industry is the largest sector next to agriculture in India. This industry forms the backbone of the Indian Economy. It not only provides infrastructure for all other industries but is also one of the largest single sectors in the economy on its own, according to gross domestic product (GDP). Construction projects are becoming more complex and highly-risky due to cost overrun. These overruns often results in either delay or incompleteness or other such difficulties. The various factors that contribute to the failures can be classified as (i) external and (ii) internal. The external items, such as political impact, natural calamity etc, are beyond our control. Hence the internal factors are only considered for this study, such as factors caused by human like labour , project related factors, project procedures followed and project management to determine the variables influencing the over costing of the construction projects.

III. STUDY METHODOLOGY

The purpose of the present research is to study the influences of the resource constraints on the time overrun of construction projects. An extensive literature review was done to analyze the factors influencing the time over-run in construction projects. A questionnaire was developed considering the factors that causes time over-run in construction projects in India. A pilot study was done before surveying using the questionnaire. The level of completeness in the questionnaire design in identifying the factors prevailing Pondicherry region is verified using the pilot study. The questionnaire was distributed among various construction professionals of various organization and the data were collected from them. This data is used to study and determine the major factors causing delay.

A. Data Analysis

Relative Importance Index (RII) is used to calculate the relative importance of factors as perceived by the respondents. Then the indices are used to determine the rank of each factors that cause delays in construction projects. Comparing the relative importance of the factors as perceived by the respondents is made possible by the ranking of each factor. The average of each factor contractor's perspective , owner's perspective and consultant's perspective are determined and the factors were ranked representing the perceptions of consultants, owners and contractors.

B. Relative Importance Index

Relative importance index is used to find out the ranking of different factors from owner’s perspective , consultant’s perspective and contractor’s perspective. The Relative Importance Index (RII) was computed as:

$$RII = \frac{\sum_{i=1}^5 w_i X_i}{\sum_{i=1}^5 X_i}$$

where, i is the response category index ranging from 1 to 5 where 1 is Very high, 2 is High, 3 is Medium, 4 is low and 5 is very low.

X_i represents the frequency of the ith response given as percentage of the total responses for each factors.

Relative Importance Index (RII) is used to determine the relative importance of the factors causing the time overrun in construction projects. The same method was adopted in this study within various groups (i.e. owners, consultants and contractors). Five point scale ranging from 1 to 5 is adopted and transformed it to the relative importance indices (RII) for each factor where 1 represents very low and 5 represents very high.

C. Types of Delay

Compensable delays are due to acts or omissions of the owner or someone for which the owner is responsible.

Excusable delays but non-compensable delays are delays that cause due to the occurrences in which none of the parties involving in the construction are responsible.

Delays occurring due to faults in contractor’s actions or sub-contractors or material suppliers are known as inexcusable delays.

When two or more delays occur simultaneously or overlap to some degree either of which, had the delays occurred separately would have affected the ultimate completion date. Such delays are called Concurrent delays.

Critical delays are the delays that affects the progress of project, time, and compensation. Succeeding activities that are not on the critical path of the schedule get disturbed by critical delays.

D. Effects of Delay

- ✓ Time over run
- ✓ Cost overrun
- ✓ Disputes,
- ✓ Arbitration,
- ✓ Litigation
- ✓ Total abandonment

IV. FACTORS THAT INFLUENCE TIME OVERRUN IN CONSTRUCTION PROJECTS

Thirty three factors were identified as the factors causing time overrun in construction projects, from the literature survey and experts opinion. Four categories are creating using the the identified factors namely material-related factors, manpower-related factors, equipment-related factors and finance-related factors.

Groups	Factors
Material related factors	Shortage of construction materials , Materials selection , changes in types of materials and their specifications during construction, very slow delivery of materials , Poor quality of materials , Damaging of materials in storage , Damaging of sorted materials while they are needed urgently , poor-procurement , proportions in offsite prefabrication , Imported, Ordered materials and plant items , difficulties in manufacturing special materials
Manpower related factors	Shortage of labour , lack of skilled labour , Migrant labour , labor injuries, disputes between labours, labour strikes , Unqualified work force team , conflicts among labour , Obtaining permits for migrant labour , poor motivation to labour , Lack of communication , lacking mobilization , poor labour attendance
Equipment related factors	Complications in hiring , Equipment availability , complication in using advanced technology equipment , Transportation of equipment , Idle time of equipments , Disruption of accessories , Poor maintenance of equipments
Finance related factors	Financing of contractor during construction process , Finance between owners and contractors , un-availability of financial incentives , Cash inflow and cash outflow , slabs of payments during construction

Table 1:- Factors Causing Time Overrun

The top most influencing factors are considered as critical factors that cause delays in construction projects.

A. Owner’s Perspective

The main factors are **shortage of labour** (RII = 84 %) ranked in the the first position, with an importance index, which shows the importance of work continuity in finishing the project in desired time. Disputes due to shortage of labour between the parties involved in the project affects the

sequence of project activities leading to the time overrun. Similarly, the important factors were **cash flow** (cash inflow & outflow) (RII=82%), followed by shortage of construction materials (RII= 79%), materials selection , changes in types and their specifications during construction (RII= 78%), financing by contractor during construction (RII= 77%), finance between owner and contractor (RII= 77%) , lack of skilled labour (RII= 75%), slow delivery of materials (RII= 75%), poor quality of materials(RII=75%),

slabs of payments during construction (RII= 75%) , damage of materials in storage (RII= 73%) that most influence the time overrun .

B. Consultant's Perspective

The main factors of the imported, and ordered materials and plant items (RII=71%) is ranked in the first position in causing delay in this category. Lack of motivation is the second top most factor to cause the time overrun (RII=70%). Lack of Communication (RII= 69%) is determined as the third important factor in causing delay , followed by slabs of payments during construction (RII=69%), finance by contractor during construction (RII=69%), unqualified work force team (68%), disruption of accessories (RII=68%), shortage in construction materials (RII=68%), unavailability of financial incentive (RII=68%), availability of equipment (67%), damaging of sorted materials while they are needed urgently (RII= 67%), and finance between the owners and contractors (RII = 67%).

C. Contractor's Perspective

The main factors ranked are materials selection , changes in types and their specifications during construction in the first position, and the importance index is RII= 68%, which shows the importance of cash for the progress of project. The second most important factor ranked by the respondent contractors was poor maintenance of equipment (RII= 66 %), and followed by poor procurement of materials (RII= 65%), shortage in constructing materials (RII= 64%), finance between the owner and contractor (RII= 64%), shortage of labour , lack of skilled labour, lack of mobilization, equipment availability, poor quality of imported materials, are same percentage (RII=63%) and imported, and ordered materials and plant items (RII= 63%).

V. CONCLUSION

Conclusions drawn from the perception of owners , contractors and consultants in identifying and evaluation of factors causing delay in the construction projects are presented. From the obtained results, factors in the top fourteen position in the importance index ranging from 63% - 68% are identified as the most important factors in causing delay in construction projects . From the obtained results, it is concluded, that the main factors that cause delays in constructions in Puducherry region are changes in types and specifications of materials during construction , selection of materials , shortage of materials, poor maintenance of , finance between contractors and owner , shortage of labour, poor-procurement of materials, lack of skilled labour, equipment availability, delays in delivering imported materials, poor quality of materials, complication of advanced technology equipment, cash Flow (Inflow & Outflow), slab of payment during construction, and financing by the contractor during construction. The time overrun index has been derived from the case study with a strength of 68%. The major groups of factors like Shortage of Labour is 32%, resource availability 23%, finance issues 16%, resource supply related (15%) and labour involvement 14%, have contributed to the construction time overrun. This should be taken into consideration while planning and scheduling in order to minimize the construction time overrun. By having the knowledge of expected delays in advance, the planners can prepare the schedule of the project, accommodating the expected deviation. By planning and scheduling of activities in a continuous manner during construction, and monitoring the project with time and resources, will minimize the time and cost overruns.

Group of delay cause	Relative importance index	Rank
Finance group	0.63	1
Material group	0.63	2
Equipment group	0.62	3
Labour group	0.59	4

Table 2:- Results of the Group Importance Index For Overall Causes

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