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An Analytical Study on Significant Causes and Effect of Delays in Construction Project

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Abstract: ***A construction project is successful if it is completed in given timeframe or on time. There are various reasons which lead to failure of the project. Construction delay is one of them. Delay in projects downturns the development in all other related fields. It is well known that most of the construction project in Kerala is exposed by delay. It affects the progress of construction industries in Kerala. Thus, comprehensive study on delays in construction is very important. The aim of this research is to analyze the causes of delays, the effects of delays and methods of minimizing construction delays in Kerala. The objectives of the study were achieved through a valid questionnaire that was obtained from contracting companies, consultants and owners in Trivandrum district and to assess the relative importance of these causes using statistical methods. The causes were categorize in five main group as client related, contractor related, consultant related, project related and external factors depending on their nature and mode of occurrences. Based on the valid response, this study identified the delay causes and analyzed the importance and frequency of delays using the relative importance index. From the analysis, it is clarified that the construction delays in Trivandrum district are mainly due to contractor related issues. Thus delays resulting from several reasons typically leads to time overrun additional expenses, dispute and litigation. This paper presents an analytical study of construction delays in Trivandrum district.***

Keywords: Delays, causes of delays, effects of delays, minimizing delays

1. Introduction

The problem of delay in construction is a global phenomenon. In construction, the word “delay” refers to something happening at a later time than planned, expected, specified in a contract or beyond the date that the parties agreed upon for the delivery of a project. Delay is the slowing down of work without stopping construction entirely and that can lead to time overrun either beyond the contract date or beyond the date that the parties have agreed upon for the delivery of the project. Delay occurs frequently in construction work. Most of the contracts specify that a liquidated damage for each day or week shall be paid to the owner for delay. The contractor may assume the risk of liquidated damage caused by the delay for which is responsible. However, a substantial part of the delay is caused by factors for which he has no control. Inclement weather, civil disorder, unavailability of drawings and decisions from the owner are examples of such delays. To reduce the risk upon the contractor, many contracts specify that an extension of time is to be granted for the delay beyond the control of the contractor.

The owners naturally demand good quality work within a reasonable cost. At the same time, owners do not want to share the risk of additional expenses that may arise during the course of work. Particularly in India, the contract allocates risks heavily towards the contractor. Competition among the contractors forced them to this regard the pricing for risk. Contracts are so drawn that a contract during the course of work may find that the representative of the owner in a position to accept or reject unilaterally many risk related claims. The situation provides a strong financial power to the post of the engineer-in-charge and tends to breed corruption which is not uncommon in construction work. Unfortunately, the quality of construction in the presence of corruption is invariably lowered and the owner suffers in the long run. Therefore, the owner allocates the risks judiciously during the development of the contract document so that it helps the owner in the long run..

2. Literature Review

The following are some of the studies which describe the proper delay analysis before the execution of the project and proper delay management will be fulfilled in the project.

This study of Geraldine John Kikwasi (Ardhi University, Tanzania) is descriptive, designed to obtain views from clients, consulting firms, regulatory boards and construction firms in regard to causes and effects of delays in construction projects and concludes that there still exist a number of causes of delays and disruptions and their effects put construction projects at great risk that have an effect on their performance. These causes are: design changes, delays in payment to contractors, information delays, funding problems, poor project management, compensation issues and disagreement on the valuation of work done. Similarly the effects of these delays are: time overruns cost overrun, negative social impact, idling resources and disputes.

Prakash Rao, B. and *Joseph Camron Culas “Causes of delays in construction projects – a case study” In this paper the case study are developed by two authors. The results of this study are the construction delay occurs mostly during the construction phase. The right methodology of construction is to be adopted. Proper co-ordination with all the contractors involved in work is a must. In addition to this, the contractors

should be aware that delays are mostly caused by the poor labor's skill, supervisor not able to coordinate the project very well and also low quality of material used in the construction projects. Therefore, contractor needs to give awareness on these three factors stated above in order to minimize the construction delays' problems.

Mukuka M.J, Aigbavboa C.O., and Thwala W.D (2014) study examines previous literature on construction projects cost and schedule overruns, with the specific aim of identifying the causes and effects of cost schedule overruns in construction projects. Literature further identified the following as the major effects of cost overruns, delays during construction, supplementary agreement, additional cost, budget short fall, adversarial relationship between participants of the project, loss of reputation to the consultant, the consultant will be viewed as incompetent by project owners, high cost of supervision and contract administration for consultants, delayed payments to contractors, the contractor will suffer from budget short fall of the client and poor quality workmanship. Furthermore, literature showed the major effects of schedule overruns to be time overrun, cost overrun, dispute, arbitration, litigation, and total abandonment of projects.

Ms. Leena Mali1 and Mr. A. A. Warudkar2 (2016) did research on causes of delay in Pune region The survey results indicated that the majority of delay factors are relevant to shortage of labours, lack of high technology of mechanical equipment, site mobilization. Most factors related to consultant it is due to not understanding the client necessities, not having proper project information, absence of some detail in drawing etc. In other factors due to which delay occurs are project conditions like providing services from utilities (water and electricity), complication in work due to weather. Delay also occurs due to external factor like change in government, regulation and location, unqualified of labours etc

3. Objectives

Main objectives of the study are:

- To identify the major causes of construction delays in Trivandrum district.
- To assess the relative importance of these causes using statistical methods.
- To suggest suitable recommendations to control construction delays in Trivandrum district.

4. Data Collection

The causes of construction delays in Trivandrum district are identified by primary and secondary data collection. Primary data collection was done by consulting various experts, working in the construction industries in Trivandrum district. Secondary data collection was done by studying various literature reviews regarding the construction delays in various parts of the world.

5. Questionnaire Survey And Interview

First prepare questionnaire for data collection .The questionnaire design practice advanced on the communicating basis. Question in the respondent profile were created to collect information such as job, experience of work, locations of the current and previous work and contact information. Mainly survey aims the contactors, subcontractors and project managers. By the end of the data collection 52 causes of construction delay were indentified. These causes were categorized into client related, contractor related, consultant related, project related and external causes. Then a questionnaire was developed to determine the probability of occurrence and severity of impact of each of the 52 causes from the viewpoint of the selected respondents. About 15 clients, 15 consultants and 15 contractors who had undertaken construction projects of cost less than 50 crores, were selected for this questionnaire survey.

6. Indentifying The Delay Factors

- **Client Related Factor**

1) Slow decision making
2) Suspension of work
3) Slow payment for completed works
4) Late in revising and approving design drawings by client
5) Delay in handing over site to Contractor
6) Change of scope by client
7) Type of project bidding and Negotiation.
8) Unrealistic project duration
9) Preparation of project layout
10) Ineffective delay penalties
11) Poor quality control/assurance

- **Consultant Related Factors**

1) Inadequate experience of consultant
2) Delay in approving design by consultant
3) Errors in design of structure
4) Ineffective data collection and survey before design
5) Waiting time for approval of test and inspection
6) Delay in supply of design drawings
7) Unclear and inadequate details in drawing.
8) Insufficient data collection and survey before design.
9) Un-use of advanced engineering design software
10) Conflicts with other parties and Financial problems.

- **Project Related Factors**

1) Effect of subsurface conditions (e.g., soil, high water table, etc.,)
2) Traffic control and restriction at job site
3) Unavailability of utilities in site or delay in providing services from utilities such as (water, etc.)
4) Accidents during construction
5) Problems with neighbours
6) Shortage of construction materials
7) Delay in material delivery
8) Equipment breakdowns
9) Lack of hi-tech and advanced equipment.
10) Shortages of labours.
11) Low productivity level of labours.

- **Contactor related factors**

1) Poor project planning and scheduling
2) Poor site management and supervision.
3) Contractor's Financial capacity
4) Rework due to error in construction
5) Delay in subcontractor's works
6) Lack of experience of supervisor/ quality control personnel
7) Delay in preparation of working drawing.
8) Improper construction methods implement
9) Conflicts between contractor and other parties.
10) Poor communication and coordination.

- **External Factors**

1) Unforeseen site conditions
2) Environmental restriction
3) Changes in governmental regulations and law
4) Slow permit by government (municipality & other local bodies)
5) Delay in performing final inspection and certification by 3rd party
6) Fluctuation in cost and currency
7) Force majeure as war, earthquake, tsunami, etc.,
8) Strikes by personnel/workers unions
9) Problems in land acquisition
10) Increase in government taxes

7. Data Analysis Approaches

Data analysis is carried out by Relative Importance Index method

Relative Importance Index (RII) method

Relative Importance Index method is used to determine the relative importance of the various causes of delays. For each of the 41 causes, RII was determined for both probability of occurrence and severity of impact. This method is adopted in this study within various groups (i.e. clients, consultants and contractors). It is given by,

$$RII = \Sigma W / (A*N)$$

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. Higher the value of RII, more important was the cause of delays.

8. Effects of Delays

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

9. Conclusion

Study concludes that, from the viewpoint of contractors, the most frequently occurring causes of delays are slow payment for completed works, slow decision making, late in revising and approving design drawings by the client and fluctuations in cost and currency. But from the consultants view, type of project bidding and negotiation, preparation of project layout and poor quality control by the client and slow permit by the government are the most frequently occurring causes. But clients indicated that the contractor related causes of delay such as lack of skilled labour, lack of experience of supervisors/quality and contractors financial capacity as well as external factors such as slow payment for completed works and strikes by personnel/workers union are the most frequently occurring causes of delays.

10. Recommendation

According to above mentioned findings, following points can be recommended in order to minimize and control construction delays in Trivandrum district:

- Contractor's financial capacity should be checked before signing the contract.
- The contractors should be careful while selecting the supervisory staff and quality control personnel
- Avoid situations leading to strikes by workers.
- Workers should be provided with adequate allowances and bonus for extra work done

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