Study of Delay Management in a Construction Project - A Case Study

B. Indhu¹, P. Ajai²

¹M.tech, Student, ²Assistant professor, Dept of Civil Engineering, SRM University

Abstract— The problem of delays in construction industry is a global phenomenon and there is no exception. The main purpose of this study is to identify the delay factors and the effect on the project completion by doing a case study in ongoing projects. By analysing the reasons for delay, possible recommendations are given. The major factors identified in this case study are delays due to contractor, client and also due to nature’s act like rain. The most important causes were delays in contractor's payments, shortage of material in construction, change in material, the weather condition, shortage of manpower (skilled, semi-skilled and unskilled labour), frequent change of staffs, poor site management and improper management of the engineers. Some of the delays are delay in submission of drawings, space constraints, and delay in payment by client, delay in material supply and local problems like strikes. The major effects of delay are cost impact, reduced labour productivity, postponement in work, change in labour allocation etc. Not all delays can be rectified, but few of them can be overcome by improving management responsibilities.

Keywords— causes of delay, effects of delay, recommendations to overcome delay, cost overrun, time overrun

I. INTRODUCTION

Delay as referred in construction is prolonged construction period and disruptions of events that disturb the construction programme. Delays and disruptions are among the challenges faced in the course of executing construction projects. Delays as well as disruptions are sources of potential risks that current studies are looking into ways to manage.

II. OBJECTIVE OF THE STUDY

The main objective of this study is:

- To identify the major causes of delays in construction project.
- To identify the effects of delays in construction project.
- To recommend strategies for minimizing delay in the project based on the findings of the study.

III. LITERATURE REVIEW

Thorough studies of literatures were done. From these literatures it was concluded that many researchers have conducted surveys on the causes and impacts of delay in the construction industry by conducting a pilot study that sought advice from experienced civil construction practitioners, including clients, consultants, and contractors.

Zaki Kraiem, Et Al. (1987), Delays can be classified according to liability by three major types:

1. Compensable
2. Excusable
3. Non-excusable

(1) Compensable Delay is those which is within the control of, is the fault of, or is due to the negligence of the owner. These delays can occur under different situations. They can be caused by the owner's failure to furnish the site to the contractor by an agreed date, faulty design, or incomplete drawings and specifications. There are many other ways in which a contractor could be delayed by the owner, such as changes in scope, suspension of work, differing site conditions, late delivery of owner supplied materials, and the owner's failure to disclose information vital to the contractor. For this type of delays, the contractor is entitled to a time extension and damages for extra costs associated with the delay.

(2) Excusable Delays are those which occur when the contractor is delayed by occurrences which are not attributable to either the contractor or owner. Three major elements can represent the excusable delays:

- Unforeseen events.
- Events beyond the contractor's control.
- Events without fault or negligence.

(3) Non-excusable Delays are those in which the contractor's own actions and/or inactions have caused the delay. They can result from the fault of the contractor, his subcontractors, material men, or suppliers. In this case, the contractor is entitled neither damages nor time extensions from the owner. In fact, the owner could conceivably be able to recover delay damages from the contractor.
The amount of the recovery is generally determined from liquidated damage provisions included in the contract.

Tommy Lo Et Al. (2006), This study was aimed, first, at gathering the perceptions of civil construction practitioners on how significant are the causes of delay; and, second, investigating the construction industry in terms of its output quantity, the quality of work, its environmental friendliness, site safety, its workforce and the system of supervision are applicable to and effective at mitigating the corresponding delays with reference to a ranking order established using the mean score method.

Ajibade Ayodeji Aibinu, Et Al. (2006), this study assesses the causes of delays by focusing on actions and inactions of project participants and external factors. The study analyzed quantitative data from completed building projects to assess the extent of delays, and data obtained from a postal questionnaire survey of construction managers to assess the extent to which 44 identified factors contributed to overall delays on a typical project they have been involved with. The factors were finally categorized into client-related; contractor-related; quantity surveyor-related; architect-related; structural engineer related; services engineer-related; supplier-related; subcontractor-related; Delays not caused by the project participants demarcated as “external factors”.

Ciou-Mei Chen, Et Al. (2004), the purpose of this study is to implement the developed methodology on a project management system. This study first detailed the processes of delay analysis, which provided a fundamental to select a suitable development tool for implementing delay analysis processes. This study tried to eliminate some pitfalls existed in previous delay analysis methodologies with considering lost productivity, and proposed an innovative delay analysis method. The proposed analysis procedures were summarized as follows:

1. to collect the as-planned schedule, as-build schedule and construction daily reports.
2. to clarify whether the delayed activity has the impact of lost productivity.
3. to collect productivity-related information, including resource usage, finished item with quantity, and minutes.
4. to identify delayed schedule caused by lost productivity.
5. to calculate regular and impacted productivities.
6. to calculate impacted as-built schedule.
7. to calculate the variance between the impacted as-built schedule and the as-built schedule.
8. to summarize all schedule variances.

Frank Fugar, Et Al. (2010), this study investigates the causes of delay of building construction projects in Ghana to determine the most important according to the key project participants; clients, consultants, and contractors. The possible causes of delay were identified from the literature and they are as follows:

- Material
  - Shortages of materials on site or market
  - Late delivery of material
- Manpower
  - Shortage of unskilled labour
  - Shortage of skilled labour
- Equipment
  - Equipment failure or breakdown
  - Unskilled equipment operators
- Financing
  - Delay in honouring payment certificates
  - Difficulties in assessing credit
  - Fluctuation of prices
- Environmental
  - Bad weather conditions
  - Unfavourable site conditions
- Changes
  - Client initiated variations
  - Necessary variations
  - Mistakes in soil investigation
  - Poor design
  - Foundation conditions encountered on site
- Government action
  - Delays in obtaining permit from municipality
  - Public holidays
  - Discrepancy between design specification and building code
- Contractual relations
  - Legal disputes
  - Insufficient communication between parties
  - Poor professional management
  - Delay in instructions from consultants
  - Delay by subcontractors
- Scheduling and controlling techniques
  - poor site management
  - poor supervision
  - lack of programme of works
  - accidents during construction
  - construction methods
  - underestimation of costs of projects
  - underestimation of complexity of projects
  - underestimation of time of completion
Haseeb, (2007), The main objective of this study is the identification of factors of delay and their effects on the success and completion of project. The most common factor of delay are natural disaster in Pakistan like flood and earthquake and some others like financial and payment problems, improper planning, poor site management, insufficient experience, shortage of materials and equipment etc. Several factors cause the overall delay in the construction project such as some within contractor’s liability and some are within owner’s liability. It is hard to distinguish due to overlapping nature of the events that which party or parties are responsible and what ingredients of the delay cause. It is mostly seen that delay problems are cause of dispute, negotiation, lawsuit, total desertion, litigation and abandonment. The parties included in contract through claims agree on the additional capital and extra time linked with construction delay. The consequences of delay are different for different parties. The general consequences are the loss of wealth, time and capacity. For owner, delay means the loss of income and unavailability of facilities. For contractor, delay means the loss of money for extra spending on equipment and materials and hiring the labour and loss of time.

IV. RESEARCH METHODOLOGY

The study area of this project is delay management. Initially ten literatures were collected and thoroughly studied. Based on the knowledge gained on literatures, the project was carried out.

Collection Of Data:

As-Planned Schedule: The as-planned schedule illustrates the initial work plan to achieve the scope of work conforming to the contract requirements. The as planned schedule which was put up in MS Project software was collected from the site office.

As-Built Schedule: The as-built schedule reflects the actual succession of the events that happened during execution of the project. It is established from careful inspection of project reports and documents.

Revised Schedule: The adjusted schedule serves to quantify and identify the impact of schedule variances on the project. It is useful in determining the effects of different types of delays on the project completion date.

Comparision Of Collected Datas:

Both planned as well as revised schedule are collected. By comparing both the data we can calculate the delay period of each activity. This helps us in analyzing the delay reasons of each activity and identifying the effects of delay in detail.

Recommendations:

By continuous site visits and observations the delay reasons are analyzed and the mistakes made are sorted out. With this analysis possible recommendations to overcome delay are suggested.

V. CASE STUDY

Two construction sites were chosen in Chennai region. Both of them were residential buildings. 15 blocks were chosen for the case study from two different sites 2A and 2B.

1. CASE STUDY OF 2A

Project type: S+5 Residential Apartments
Duration of the project: 20 months
Planned date: Feb 2012 to Oct 2013
Actual start time: August 2012.
Revised completion time: March 2014.
Details of building: 5 blocks (A1, A2, B1, B2, and B3)

2. CASE STUDY OF 2B

Project type: G+8 Residential Apartments
Duration of the project: 20 months
Planned date: Feb 2012 to Oct 2013
Actual start time: August 2012.
Revised completion time: March 2014.
Details of building: 8 blocks

3. REASON FOR DELAY BASED ON CASE STUDY

- Debris which is excess of dead mortar was dumped in silt area. 24 loads of debris were cleared from the site (1 load=300 cubic feet). Due to this there was wastage of sand. Scarcity of sand could have been avoided if dumping of debris was found out earlier by site engineer or Project Manager or by Head Office people during their visits. Cost overrun in using man power for cleaning debris. Cost overrun due to rent given for the machine for clearing debris.
• Non sequential progress of works. Work was not followed as per procedure instead it was followed as per availability of resources.
• Changes in project in charge. Almost 15 project managers were changed within one year.
• Delay in delivery of material due to scarcity or delay in payment.
• Non availability of work front by other contractors.
• Missing of materials due to local problems like theft.
• Increase in over heads when compared to zero cost rates.
• Client checking both quality and safety. Hence reworks caused delay.
• Low Productivity of labours.
• Delay in batching plant hence increased in unskilled labours at initial period.
• Delay in approval samples from client.
• Miss out of few materials while quoting tender by the tendering department.
• Assumptions of duration of item of work meet up at site.
• Lift area delay due to client scope. Manpower and material was not supplied in time by client.
• Only four bar bender were available in place of 15 due to payment delay from head office.
• There is a delay in fixing of hand rail due to absence of labour. Whole family of labour are working here. Since there was funeral for them to attend everyone had to go and the work was stopped. Since it was started by them, they had to finish it and no one else can be replaced.
• Brick material got over and bricks were not ordered in advance. Hence there will be a delay in brick works. This is due to the careless mistake of Site engineer since need of bricks were not notified earlier.
• Delayed due to rain. Due to rain two months were delayed because foundation was collapsed since there was a mass earthwork. Dewatering was affected due to continuous rain.
• Improper planning of indent.
• No stock yard available for storing the materials and hence material wastage
• Due to quarry strike, sand material was delayed. It took few days to decide to replace sand with Msand.
• During the month of July, august and December labours were shifted from 2B to 2A due to pressure to complete 2A in the first place. And so there was a delay of one month.
• General wall thickness is 230mm. But here 200 mm was considered as per drawing requirement from client. So a fly ash brick of that size which was ordered was delayed.
• Improper management of planning and billing engineer is also one of the major reasons for payment delay.
• Manpower shortage due to water problem in labour shed for one day.
• No quantity surveyor was appointed.
• There is no experience in staff in this relevant field work like residential project. They have experience in warehouse projects or other commercial building projects.
• No proper planning of work approaches available from head office. Only outline details are given.
• Reworks are done from past 5 months and this will be continued for another 3 months for owner’s satisfaction.
• Improper planning of labour holidays like holi, dusherra etc. Labours won’t be available during these festivals. Hence there was delay due to manpower shortage.
• Work has been stopped since there is a delay in payment due to delayed work order and hence payment for labour as well as cement was not given.
• Work order was taken for one month but change of activities causes payment delay.

VI. DELAY ANALYSIS

Causes Of Delay: A common risk to project is failure to start work on time. Very long delays can be caused by variations, legal or planning difficulties, shortage of information, lack of funds or other resources, and other reasons which may lead to delay of the site possession. All of these factors can place a project manager in a difficult position and if the project is not allowed to start on time it can hardly be expected to finish on time. Delay caused by contractors attributes most often is classified into five main items: failure to evaluate the site or design, management problem, inadequate resources, poor workmanship, and subcontractor failures. Other causes of delay are attributed to improper management of materials and loaded by lack of an explicit and detailed model of the project materials management process and due to lack of skillful management where less attention is paid to resources allocation, i.e., human, financial, and material resources.

1. Delay caused by Head Office
• Frequent change of project managers. Almost 15 project managers have been changed throughout the year.
• Appointment of staffs in the site who are not experienced in the same type of construction project.
• Delay in release of payment from the head office.
• Delay in sanctioning of material from head office.
Detailed planning of the project is not available by the head office.

2. Delay caused by Engineer
   - Delay in indent planning by billing Engineer.
   - Delay in planning of resources from tendering department.
   - Requirement of materials for future use, not noticed by the site engineer.

3. Delay caused by lack of resources
   - Insufficient shuttering materials.
   - Concrete plants are not available to fulfill requirement.
   - Improper planning of labour holidays like holi, dussehra etc.
   - No stock yard available for storing materials leads to material wastage.

4. Delay caused by client
   - Drawing delays.
   - Delay in supply of materials like windows for flats.
   - Delay in supply of manpower for lift works.
   - Owner’s customisation and reworks.

VII. RECOMMENDATIONS

- Initially lethargic attitude of management team must be avoided. This is one of the main reasons for delay. Supply of material at the site at the right time should be taken care by the site engineer.
- Shuttering materials must be made available as per requirement in advance.
- Enough concrete plants must be installed.
- Quantity surveyor must be appointed.
- Labour holidays must be taken into consideration while scheduling.
- Stock yard must be build to store materials in site.
- Release of payment from head office must be done as soon as possible.
- Avoid frequent change of staffs.
- Staffs in site should be appointed with experience in the same field.
- Payment to the labour must be given in the right time without fail because most of the delay in the project is due to shortage in labour.
- Indent planning must be done in advance to avoid material supply delay since material is also one of the major delay reasons.
- Sanctioning of any material from head office must be done as soon as possible.

- Planning of resources from tendering department must be done in advance.
- Construction must be carried out in correct sequence.
- Materials required must be forecasted earlier by site engineer and ordered in advance.
- Proper planning details i.e. micro level planning must be provided by head office.

VIII. CONCLUSION

The study summarises the main causes of delay that affect construction project. Case studies of two construction projects were done to identify and analyse the reasons and affects of the delay. The most important causes identified were: delay in payment by the head office, frequent change of staffs, poor site management, improper management of the engineers, delay in supply of material and lack of manpower. Similarly the effects of these delays are: time overruns cost overrun, negative social impact, idling resources and disputes. An analysis of the responsibilities of delay causes suggests that a joint effort based on teamwork is required to overcome delays. In summary, this project summarized some reasons behind the delays caused in these sites and proposes some possible recommendation to overcome those delays. Further research is needed to investigate the limitations and potential improvements to causes of delays within each construction site.

REFERENCES


