

DELAY ANALYSIS FOR AN ON-GOING RESIDENTIAL PROJECT

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ABSTRACT - The construction industry is the second largest industry of the Indian country after the agriculture. It makes an important role in the contribution to the national economy and provides employment to large number of peoples. There is a growing need for project controls or project manager on today's construction projects, every one of us is a manager of projects of our own life. We all work on different tasks with deadlines, planning and scheduling, tracking and delay analysis have become an essential part of any project for the timely and economical completion of the project.

The main purpose of this study is to identify the delay factors and the effect on the project completion by doing study in ongoing project. By analyzing the reasons for delay, possible recommendations are given. The major factors identified in this study are delays due to approval problem from government, changes in the staff, deficient management of engineers, lack of human resources and delay in procuring materials, untimely release of funds, and problems in drawings. The most important causes were delays in the major effects of delay are cost impact, 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

I. INTRODUCTION

Infrastructure is one of the most important of Indian Government at present days. The advancement of infrastructure today is the primary apparatus to achieving GDP construction targets. The construction business is the second biggest industry in India after the agriculture. It represents around 11% of India's GDP. Be that as it may, because of the private way of construction business, learning picked up in planning, planning and delay of construction process is infrequently dispersed. The achievements of a construction project depend on upon the support between the parties included, in particular the building owners, contractors and the project planners. Numerous angles could issues the execution of construction tasks. In construction, the word "delay" indicates to something occurring at a later time than decided, expected, determined in an agreement or

past the date that the parties settled upon for the delivery of a project. Delay is normal in construction project. Delay can be brought about by the Employer, the Contractor, and the outsider to an agreement can't control. Delay to achievement of a project could bring significant troubles on society and the project cost.

II. OBJECTIVES OF THE PRESENT STUDY

- The aim of the project is to the planning, scheduling and track the progress and delay analysis.
- Study the causes and effects of the delay and find out the important causes of the given construction project.
- The study has been done on the tracking whether the project progresses with the scheduled dates or not. The actual progress of work may be behind or ahead the original work schedule. The updating can be done using software such as Microsoft Project.

III. PROJECT MANAGEMENT

The management/administration of the construction projects requires information of present day management and additionally a comprehension of the designing and construction advancement. Constructions improvements have the particular arrangement of the aims and limitation or constraints for example, a required time outskirt for consummation.

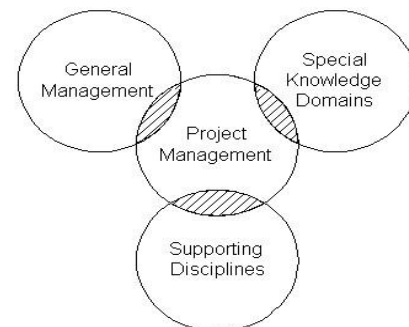


Figure.1. Basic Ingredients in Project Management

3.1 PROJECT LIFE CYCLE

The project manager and project team have one shared objective: to carry out the work of the project for the purpose of meeting the project’s goals. Every project has a start, a middle period during which actions move the project toward close, and a finish (either successful or unsuccessful). A project usually has the following four major phase’s initiation, planning, implementation, and closure. Taken together, these phases denote the path a project takes from the start to its end and are usually referred to as the project “life cycle.”

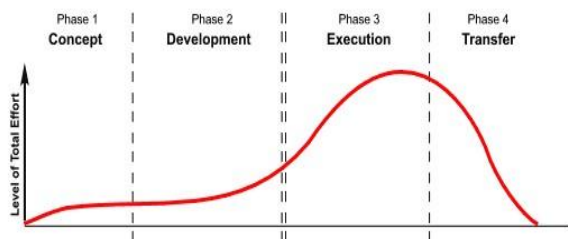


Figure.2.Project life cycle

3.2 PROJECT MANAGEMENT TRIANGLE

The project management triangle is used by managers to understand the difficulties that may arise due to implementing and achieving a project. There are three foremost interdependent constraints for every project; time, cost and scope. This is also known as Project Management Triangle.



Figure.3.Three constraints in a project management triangle

3.3 PROJECT TIME MANAGEMENT

Time is a terrible resource to waste. This is the most valued resource in a project, every conveyance that are supposed to make is time-bound. Therefore, without suitable time management, a project can head in the direction of a disaster. When it comes to project time management, it is not just the time of the project manager, but it is the time

management of the project team. Scheduling is the easiest way of managing project time.

IV. DELAY ANALYSIS

In construction, the word “delay” indicates to the something occurring at a later time than planned, expected, indicated in and agreement or far from the date that the gatherings settled upon for the conveyance of a project. The Delay is the backing off or slowing of work without stopping construction and that can prompt time overcome either far from the agreement date or past the date that the gathering have settled upon for the delivery of the project. Delay is very normal in construction projects. Normally delay can be created by the Employer, the Contractor, and the outsider contract can't control. Delay to close of a project could bring huge misfortunes on society and in addition the project cost. Consequently characterizing the authoritative obligation of the delay is the undoubtedly wellspring of conflict in construction projects for transportation foundation. Techniques utilized for scientific examination of delay are called as 'defer analysis strategies.

4.1 CLASSIFICATION OF DELAYS:

Delay can be grouped concurring into obligation by four important sorts:

1. Compensable
2. Excusable
3. Non-excusable
4. Concurrent
- 5.

4.2 DELAY ANALYSIS TECHNIQUES:

The most generally utilized delay examination procedures are

- Schedule Review
- As Planned Versus As Built Analysis
- Impact As Planned Analysis
- Collapsed As Built Analysis
- Time Impact Analysis
- Productivity Method

4.3 LIST OF FACTORS CAUSES SCHEDULE DELAY

Consultant associated factors

Contractor associated factors

Design associated factors

Equipment associated factors

External associated factors

Labour associated factors

Material associated factors

Owner associated factors

Project associated factors

4.4 METHODS ADOPTED TO OVERCOME DELAY

Overtime Work

Proper Planning and Schedule for Work

Reducing Delay on Critical Activities

Providing additional Storage space for Handling Materials

V. PROJECT MANAGEMENT SOFTWARE

Since the project management is one of the major primary elements for any type a business organization, the project management capacity ought to be upheld by software. Before software was conceived, project management was completely done through papers. When software came accessible for a reasonable cost for the business organizations, software advancement organizations began creating project management software.

5.1 TYPES OF MANAGEMENT SOFTWARE

- Desktop
- Web Based

5.2 MICROSOFT PROJECT

Microsoft Project is the one of world's most celebrated management software created and sold by Microsoft. The application is intended to help project supervisors in creating plans, assigning the resources to undertakings, and following advancement, managing budget plans and analyzing workloads. The Microsoft Project has been reached out with the Microsoft Office Project Server and Microsoft Project Web Access. Project server stores the Project information in all focal database. Project Web Access enables client to show and update this information over the Internet. Web Access enables approved clients to get to a Project Server database over the Internet. Resource definitions (Man, equipment and materials) can be shared between activities utilizing a common resource pool. Every resource

can have its own specific schedule which characterizes could you repeat that days and activity's and resource is accessible. Resource rates are consumed to amount resource task costs which are progressed up and compressed the resource level. Microsoft Project makes spending plans in view of task work and resource rates. As resources are allocated to the undertakings project and task work evaluated, Microsoft Project ascertains the cost rises to the work times the rate.

VI. DATA ANALYSIS

6.1 METHODOLOGY

This project is carried out in two phases.

- The primary phase consists of collection of data which is Bill of Quantities (BOQ) and productivity chart by the company. BOQ provides the quantity of each activity carried out during the project. Productivity chart helps us to get the essential manpower and duration of each activity to complete the project.
- The second phase consist of using MS-Project software to prepare project plan and schedule with the help of BOQ and productivity chart helps to allot the manpower resource for each activity. Tracking has been done by comparing the scheduled dates with the actual dates of the progress of the project.

6.2 SITE DETAILS

Project name: Construction of 198 no's pc quarters.

Project Type: Residential.

Client: Karnataka state police housing and infrastructure development corporation ltd.

Contractor: Government approved contractor

Number of flats: 198 no's

6.2.1 Location of the Project

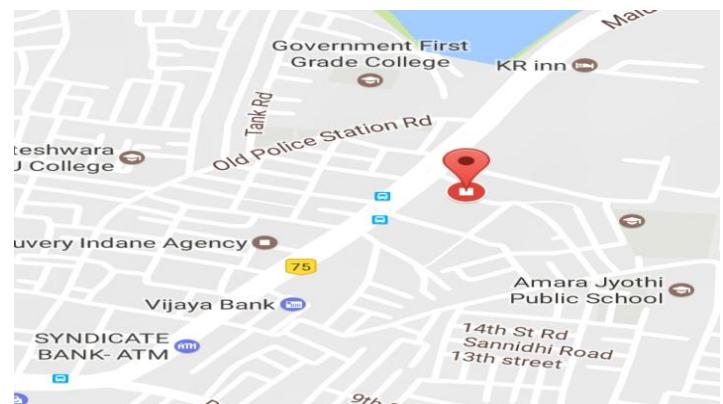


Figure.4. Location of the project

6.3 LIST OF STAKEHOLDERS INVOLVED IN THE PROJECT

- Client
- Architect
- Structural Consultant
- Electrical Consultant
- PHE and Fire Fighting Consultant
- Landscaping Consultant
- Project Management Consultant (PMC)
- Civil Contractor

6.4 BRIEF DESCRIPTION OF PROJECT

Building Structures: The project is designed for Ground +8 floors. All structural fundamentals are designed as per Indian Standards.

Super Structure: Super structure is the conventional RCC framed structure.

6.5 Specifications

Steel: All reinforcing steel will be High Yield Strength Deformed bars of grade Fe-500.

Concrete: Grade of concrete used is M25 with OPC cement of 340kgs, with 20mm down size graded granite metal coarse aggregates @0.70cum and fine aggregates @ 0.47cum.

9.4 PREPARATION OF PLAN AND SCHEDULE

The prepared plan and schedule is for construction of 198 no's pc quarters.in K.R puram banglore. The handing over of the project to the client is found to be 652 days from the date of work order.

This project is divided into two main tasks, Structural works and Finishing works.

In structural works, the first activity is the construction of foundation. This involves Marking, Excavation, Construction of PCC bed, Construction of RCC footing and Construction of Plinth Beams and Slab. The first step in the department approval for excavation which shall be carried out for 3 days.

The next activity is the excavation which is done for 30 days using excavators, truck and skilled labour, and next activity is department approval structural work is 1 days.

The next activity is pcc marking carried out in 1 days, the next activity is the laying of PCC bed which lasts for 25 days and is carried out after the completion of pcc marking. This is carried out by Masons and Mason helpers.

The next activity is the construction of RCC footing reinforcement and shuttering work which has duration of 42days. This activity involves providing reinforcement which will start after the completion of laying of PCC bed is carried out with the help of Barbender, Barbender helpers, shuttering carpenter and helper.in this way planning and scheduling carry to all tasks.

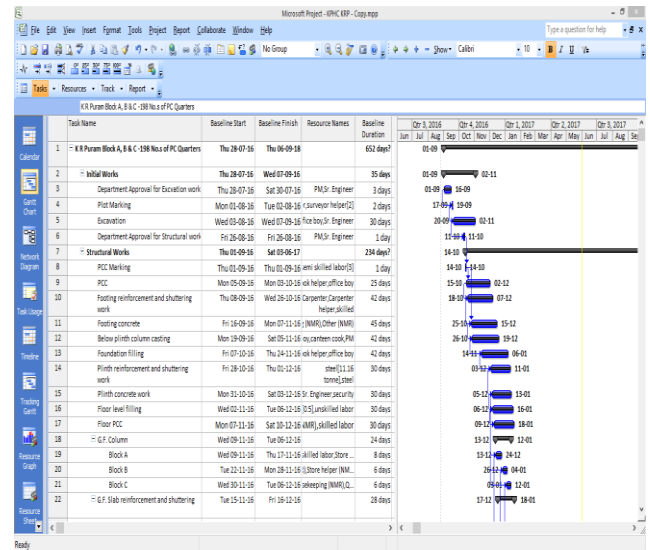


Figure.5. Planning and scheduling of the project

9.5 WORK BREAKDOWN STRUCTURE (WBS)

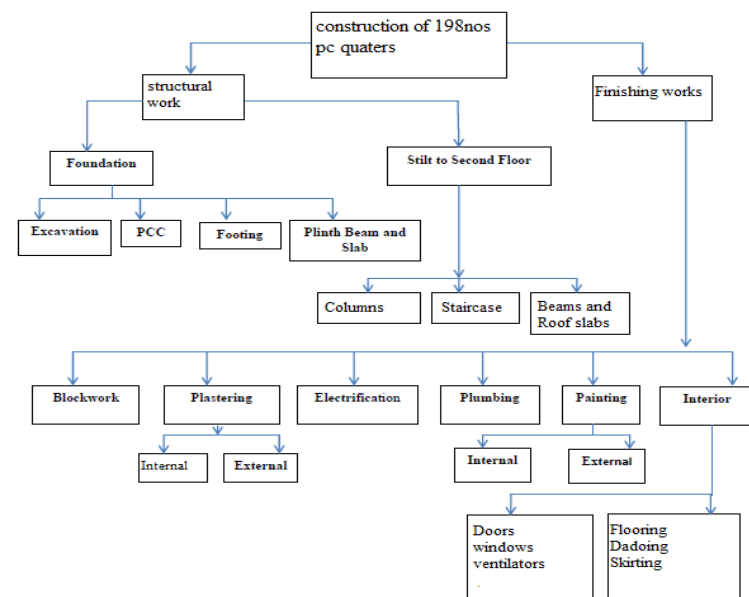


Figure.6. Work Breakdown Structure (WBS)

9.6 LABOUR PRODUCTIVITY CHART

Table.1. Labour productivity chart

Labour Productivity Chart						
Sl.no	Description	Activities	Units	Labour		Output
				Skilled	Unskilled	Per day (Shrs)
1	Formwork	Formwork for Footing	SQM	1	1	10
		Formwork for Column	SQM	1	1	10
		Formwork for Beam	SQM	1	1	15
		Formwork for Slab	SQM	1	1	12
		Formwork for Staircase	SQM	1	1	4
2	Reinforcement	Reinforcement Cutting and Bending and placing	KG	1	1	350
3	Concreting	Concreting for Foundation	CUM	1	3	15
		Concreting for Columns	CUM	1	3	15
		Concreting for Slab or Beam	CUM	1	6	30
		Concreting for Staircase	CUM	1	9	7
4	Finishing	Block Work	CUM	1	1	2
		Plastering for External Works	SQM	1	1	15
		Plastering for Internal Works	SQM	1	1	10
		Flooring, Skirting, Dadoing	SQM	1	1	15
5	Fixing	Doors	Nos	1	1	8
		Windows	Nos	1	1	8
		Ventilators	Nos	1	1	12
6	Painting	External Works	SQM	1	0	12
		Internal Works	SQM	1	0	15

X. RESULTS AND CONCLUSION

The summarization of this project is the identification of the delays and the necessary recommendations needed are suggested to overcome the problem of delay. The delays differ from one construction project to the other. A different way of approach is needed to understand the causes of delay and to overcome the problems.

The concluding of this project is the construction of residential building 198 no's of flats (Ground Floor+8) is planned and scheduled to 652 days from 28-8-16 to 06-09-18.

Table.2. Cost incurred due to delay

Sl no	Activity	Delay in days	Cost per day	Total Cost due to Delay in (Rs.)
1	Dept. approval for excavation work	11	7200	79200
2	Excavation	8	32600	260800
3	Pcc	17	48933	831861
4	Footing reinforcement and shuttering work	2	217098	434196
5	Below plinth column casting	5	21434	107170
6	Foundation filling	5	18200	91000
7	Plinth reinforcement and shuttering work	4	30646	122584
8	Plinth concrete work	5	23115	115575
9	Floor level filling	6	6822	40932
10	Floor PCC	5	21233	106165
11	Column shuttering, reinforcement and concrete work	47	101040	4748880
12	Beam and slab reinforcement and shuttering work	10	151804	1518040
13	Masonry work	2	78932	157864
14	Plastering work	3	47997	143991
			Total Cost in RS.	8758259

As per project planned

Project duration: 652days

Planned budget: 281570021.80

After updating progress and tracking of the project up to 15-5-17.

Actual budget: 92914311.51

Schedule performance index: 0.72 since it is less than 1, the project is behind the schedule.

The above table shows the possible losses when a few of the activities are considered that are delayed due to one or the other reason. The project is still in progress and update up to 15th may 2017, delay about 130 days and due to delay of this project total loss for all the above activities considered up to Rs.8758259.

The below chart shows total cost due to delay in Rs vs reasons for the delay

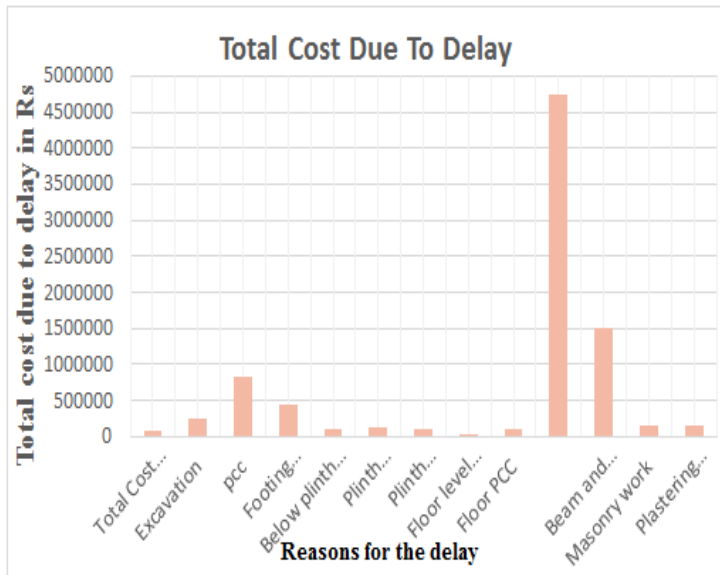


Chart 1: Total cost due to delay

The study summarizes the reasons that cause the delay in the activities of the construction work. Possible reasons for the delay caused in the activities were tried to identify and the impact that occurred due to delay were analyzed. The reasons that cause the delay were identified into: untimely release of funds from the office, approval problem from government more often changes in the staff, deficient management of engineers, lack of human resources and delay in procuring materials. These delays lead to the increased budgeted cost, consuming more time in the completion of the project, The analysis shows that overcome these delays by doing a proper planning, scheduling.

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