

ANALYSIS OF PLANNING, SCHEDULING AND CONTROL IN A PROJECT

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Abstract— The increasing competitiveness and enormous involvement of commercial value in construction industry, planning and scheduling has attained an indispensable entity. The ongoing construction Industrial building located near Faridabad NHPC Metro Station is the site chosen for the project. The Industrial building constructed in an area of 70,000 sqf, the schedule cost to construct the industrial building is Rs.18.71 crores. The client for the construction project was Regent Garage Pvt. Ltd. By analyzing the existing schedule of a residential building project, the delays in the project is analyzed. The effect due to the delay in the project are categorized using the literatures. The effect due to the delay in the project are analyzed. The delays are avoided by giving suitable solution for the same. The project is rescheduled by using Microsoft Project software. The construction project is rescheduled using the literatures collected and more data's are included in the rescheduled prepared. By using the rescheduled the delays can be avoided and the cost can be controlled.

Keywords— *Scheduling, Construction, Reschedule, Industrial, control*

I. INTRODUCTION

Project manager have much to think about from project scope to team member dynamics ,from schedule to cost constraints, from dealing with executive stakeholders to identifying future state requirements. This foundation courses gives an applied and effective overview of project management and teaches techniques that will help you plan, implement , and completed project of all sizes with desired results, on time and within budget.

- **Planning**
- **Scheduling**
- **Control**

II. PLANNING

Construction planning is a fundamental and challenging activity in the management and execution of construction projects. A good construction plan is the basis for developing the budget and the schedule for work. Developing the construction plan is a critical task in the management of construction , even if the plan is not written or otherwise formally recorded. In addition to these technical aspects of construction planning, it may also be necessary to make organizational decisions about the relationship , between projects participants and which organizations to include in a project. For example, the extent to which sub – contractors will be used on a project is often determined during construction planning.

III. SCHEDULING.

The project schedule should include every element of the project sequenced in a logical order from the beginning of the project through completion. In addition, the schedule should define specific time periods for each activity in the schedule. The sequencing and summation of the individual time elements will define the overall project's duration. The level of details shown in a construction schedule will vary, depending on a number of different factors. Those factors include, but are not limited to, the type of schedule used, the contract requirements, the nature of the work, the contractor's practices, and so on. Overall, to represent the project schedule dramatically in a clear fashion the construction task that must be performed, the time allocated to each task, and the sequence of the task.

IV. CONTROL

Control means making full use of the tools provided by the scheduling and monitoring operations and refers to the process of analyzing data, investigating causes of backlog, determining solutions comparing the cost of these drag-out costs and preparing specific recommendations to the project manager. Practical results of project control range from detecting errors in planning to achieving better control over revisions in the engineer's shop, re-allocating manpower from low priority to high priority, pinpointing inadequate supervision, inefficient labour, eliminating effects of delays on project completion. Project control is needed when there is a problem in performance, cost and time.

V. LITERATURE REVIEW

The project has been derived from the literatures like the mechanisms of design activity overlapping in construction projects and the time cost-trade off function, cause of construction delay theoretical framework and an efficient method of construction scheduling using Microsoft project.

1. Activity overlapping Method

R. Sapras (2013) have explained the phenomenon of activity overlapping, which is an integral part of scheduling. As the activity overlapping has a significant impact on cost, emphasis was given to activity overlapping applied in this project. In the literature, researchers have used other terminologies for overlapping, such as engineering, parallel engineering, available literature about overlapping can be classified into two main areas such as product development and project execution.

2. Causes of Construction delay

S. Manaktala (2013) have categorized the various delays that may occur in a project. Owners and contractors have one common objective to complete the project in time and within budget. It is failure of the objective of time which leads to failure of budget and ultimately gives rise to disputes. "Time" is indicated invariably as of essence to the contract. Contractors do not find any such clause on their side and are made to dispute for their claims. Delay can be defined as time overrun or extension of time to complete the project. They have categorized the delay under the two main types of delay such as excusable delay and non-excusable delay.

3. Scheduling for construction projects

When it comes to construction management, maintaining a construction project schedule is one of the most important parts of a project. A well-planned schedule helps minimize downtime and ensure that all parts of the project are completed on-time and on-budget. Construction schedules are the basis of many financial outcomes. The development of early schedules can be useful for forecasting completion and milestones that can effect financial decisions. Baseline schedules are critical to keeping construction projects on-time and on-budget.

Bhupendar (2013) explained that we can make MSP properly reflect the consequences of an update displaying proper retained logic.

4. Construction Project Life Cycle

According to Lawrance, (2013) a project has been defined as having a beginning and an end(the life) and the project can be divided up into several stages. The project is then said to have a life cycle. The cycle does not usually repeat. For a construction project, there are several standard stages for the holistic pictures and with looking at.

5. Work Breakdown Structure (WBS)

Work Breakdown Structure is a process of dividing the project task into smaller manageable components for planning purpose. A complex project is made manageable first by breaking it down into individual component in a hierarchical structure, known as the work breakdown structure(WBS). The WBS is widely use by the project manager as a tool in the planning activity for the construction project (Newitt, 2005).

VI. OBJECTIVE OF THE PROJECT

- Based on the literature and the project chosen the objective of the project is formulated as
- To understand the scheduling made by using Microsoft project
- To analyse the cause of delays in the project.
- To analyse the effects due to the delays in the project.
- To identify suggestions for the delays.
- To reschedule with the observations derived from the analysed data.

VII. SCOPE OF THE PROJECT

Based on the literature and the project chosen the scope of the project is formulated as

- To analyse the existing schedule comprehensively and observe the possible enhancement in the schedule and hence reschedule using the observed data.

VIII. METHODOLOGY

In the construction planning and schedule preparation at first the data should be collected. The data's required for analyzing the planning and scheduling are scope of the project, specification of the project, bill of quantities, drawings etc. by analyzing the data's collected from the construction site we can get an idea how in the construction industry they are preparing planning and schedule for the project. The constraints in the construction site should be analyzed and suitable solutions should be given for that problem. Then by rescheduling for the same project can get an idea about the project rescheduling.

➤ **DATA'S CONTROLLED IN THE CONSTRUCTION SITE**

- **Scope of the project**
- **Bill of quantities (BOQ) of the project**
- **Master schedule of the project**
- **Material cost details**
- **Man power details**

➤ **Details of the project**

The purpose of the construction project is to construct a residential building.

Client of the project : regent garage pvt. Ltd
 Number of blocks : 1
 Types of blocks : A
 Number of floors : B+Stilt+G+2
 Area of block : 70000 sq. ft
 Estimated cost of the Project : Rs.100 crores
 Date of project started : Oct 2015
 Duration of the project : 24 months

➤ **Bill of Quantities**

Bill of quantities is a table which includes activities in the construction project, quantity of each activity, unit cost to do the activity and the total cost to finish the activity. The bill of quantities prepared in the construction site is shown in the Table below....

S.NO	ITEM DESCRIPTION	UNIT	QTY	RATE/ UNIT (RS)	AMOUNT (RS)
A	Earth work excavation	Cu.m	1250.40	273.69	3,42,222
B	Filling works				
1	Back filling in the foundations, basement and plinth				
a.	With available earth at site	Cu.m	703.09	102.77	72,257
b.	With earth brought from outside	Cu.m	3000	543.50	16,30,500
2	Supplying and filling with approved River sand with lime under foundations				
a.	Under Footing	Cu.m	110.20	1443.32	1,59,054
3	Miscellaneous				
a.	Slush removal from pits	PITS Cu.m	98.20	380.00	37,316

c.	NMR for Grid line marking	Month	0.05	22,000.00	1,100
d.	Marking & Making Grid Pillars	Nos	50	1400.00	70,000
Sub Total for Filling Works					19,89,867
C	Anti-termite treatment	Sq.m	1300	50	65000
	Waterproofing		2800	700	19,60,000
D	Plain cement concrete				
1	Providing and laying plain cement concrete at footing	Cu.m	43.78	2896.89	1,26,826
2	Providing and laying plain cement concrete at ground floor level	Cum	500	5200	26,00000
Sub Total for PCC Works					28,11,426
E	Reinforced cement concrete				
1	For Footing	Cu.m	1200	4279.70	51,35,640
2	For Grade beam	Cu.m	300	4279.87	12,83,961
3	Column concrete up to ground floor level	Cu.m	500	4279.87	21,39,935
4	Lift wall concrete in plinth level	Cu.m	500	4156.36	20,78,180
Sub Total for RCC Works					1,06,37,716
F	Form work				
1	For footing	Sq.m	3000	308.07	9,24,210
2	For Grade beam	Sq.m	3500	313.77	10,98,195
3	Column concrete in up to ground floor level	Sq.m	4700	325.18	14,63,310
Sub Total for Form Works					34,85,715
G	Masonry				
1	Providing and laying block work upto ground floor level	Sq.m	11200	752.68	84,30,016
Sub total for sub-structure					2,76,96,962

➤ **SCHEDULE PREPARATION**

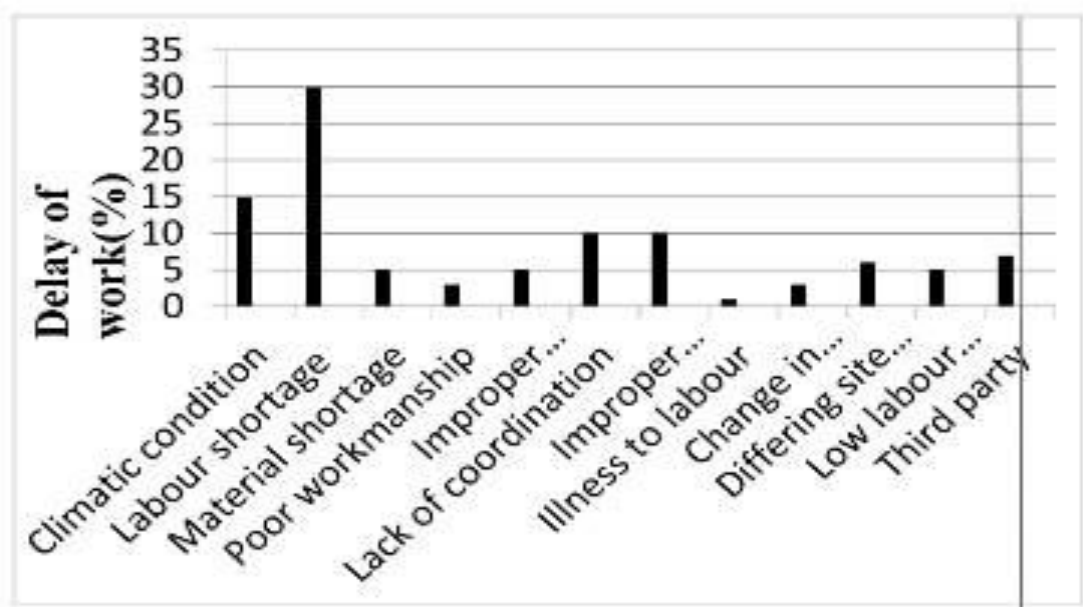
- The schedule is prepared according to the details collected from the site.
- The scheduling technique used in this schedule preparation is activity overlapping technique.
- Activity overlapping technique is an effective and well known technique for earlier completion of construction projects is to overlap the project activities or phases that normally would be performed in sequence.
- The holidays have been allocated according to the Tamilnadu government calendar
- The working time has been increased
- The resource required for the project has been included with the cost

➤ **GANTT CHART**

- A Gantt chart is a horizontal bar or line chart which will commonly include the following features:
- Activities identified on the left hand side.
- Time scale is drawn on the top or bottom of the chart.
- A horizontal open oblong or a line is drawn against each activity indicating estimated duration.
- Dependencies between activities are shown.
- A vertical cursor (such as a transparent ruler) placed at the review point make it possible to establish activities which are behind or ahead of schedule.

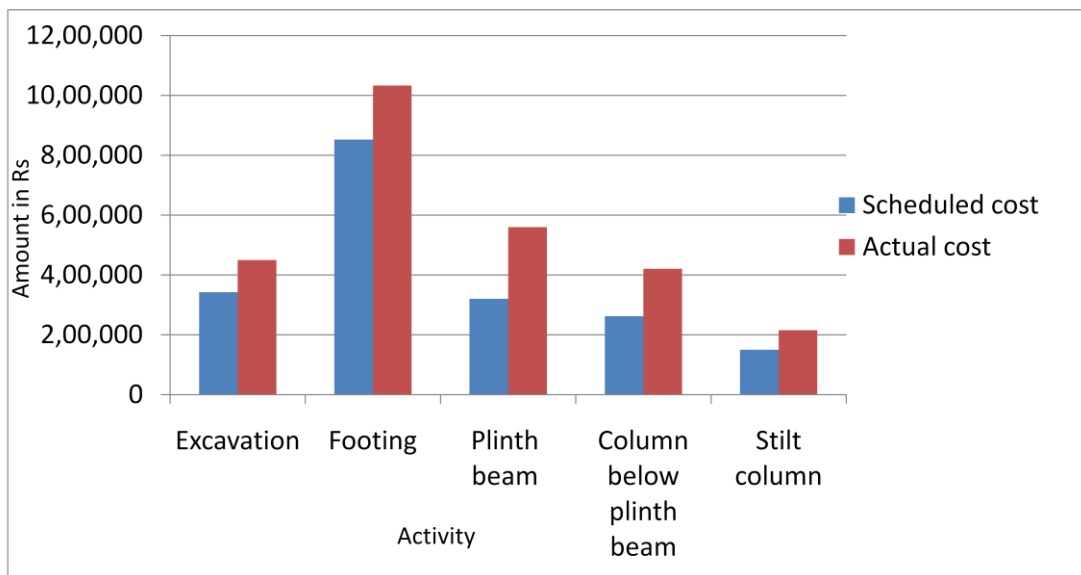
➤ **PERCENTAGE OF DELAY OF WORK**

The percentage of delay of work is prepared with causes of delay of work. There are many reasons for the delay of work in the project. The percentage of delay of work is calculated according to the delay of work due to the reasons like climatic condition, labour shortage etc. the percentage of delay of work due to the causes of delay..below shown in fig..



➤ **INCREASE OF COST IN THE ACTIVITY DUE TO DELAYS**

The cost has been increased dramatically due to the delay in the project. Generally the sub structure of work will take more time than the scheduled time. But the delay should be in control. But in the project that was taken, there is delay in the project. The delay in the project is in the activities like excavation, footing, plinth beam, column below the plinth beam and stilt column. The delay is mainly during excavation and it is due to rain fall. The dewatering process exceeds the time. The cost scheduled for the excavation activity has been increased due to dewatering. The cost for footing column, plinth beam, column below plinth beam and stilt column have been increased due to the marking and shuttering. The increase in cost for the sub structure activities is shown fig in below.....



IX.CONCLUSION

By analysing the planning, scheduling and control of the project:-

- The master scheduling of the site has been analyzed and the schedule has been updated up to the substructure
- From the updated schedule, delays have been identified and the causes for the delays such as climatic conditions , labour shortage and equipment shortage, material shortage , poor workmanship, impro[per communication flow, lack of coordination, improper scheduling, illness to labour , low labour productivity, third party, differing site condition, change in government policies have been analysed.
- From the bar chart of percentage of delay of work, as the maximum of 30% of delay of work is due to labour shortage, 15% of work is due to climatic condition and as the minimum of 3% of delay of work is due to poor workmanship have been identified.
- The effects due to the delays such as time over run and increase in the cost of the project have been analyzed . from the increase in cost in the activity chart, the scheduled cost for the activities excavation, footing ,plinth beam, column below plinth beam and stilt column was Rs.77 and the actual cost after the construction is Rs.1.5 crores.
- The scheduled cost of the construction block is Rs.18.72 crores due to the delay, the cost may increase upto Rs. 24 crores. So the actual cost can be reduced upto 25% by considering the recommendations of avoiding the delay in the project.
- To reduce the delay of the project the master schedule of the project has been rescheduled with excess of working hours, with holidays, with resource required for that project, with the update of work till yesterday and with the same overlapping technique used by them.

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