

Construction Scheduling Using Project Management Software

Chidambarakumar.M.G& Gomathi Sankar.G
Under Graduate Student
Department of Civil Engineering
P.S.R. Engineering College,
Sivakasi, India

Ashok Manikandan.SAssistant Professor
Department of Civil Engineering
P.S.R. Engineering College,
Sivakasi, India

Abstract—Planning and scheduling is very important in construction project. Proper planning, scheduling and tracking are the major parameter in construction industry. The systematic flow of work is adopted by using Critical Path Method and Programme Evaluation and Review Technique. Without proper controlling and scheduling will cause cost overrun and consequently increases project duration. In order to minimize the complexity in manual calculation Project Management Software can be preferred. Oracle Primavera P6 is one of the best software in construction management.

Keywords—Planning,Scheduling,CPM,PERT,Project Management Software,Primavera P6.

I. INTRODUCTION

Project is an activity to meet the creation of **unique product** or service and thus activities are undertaken to accomplish routine activities cannot be considered as project. The completion time for a unique endeavor can vary from a few hours to many years, and the cost can change from low to very high. Each project has a specified mission or a purpose to be achieved. It ceases after the mission is accomplished. A construction project mission is to create desired facilities like a housing complex or a fertilizer plant with predetermined performance objectives defined in terms of quality specification, completion time, budgeted costs and other specified constraints. Project management is the discipline of initiating, planning, executing, controlling, and closing the work of a team to achieve specific goals and meet specific success criteria. A project is a temporary endeavor designed to produce a unique product, service or result with a defined beginning and end undertaken to meet unique goals and objectives, typically to bring about beneficial change or added value. Construction planning is a fundamental and challenging activity in management and execution of construction projects. It includes the selection of technology, the definition of work task, the estimation of required duration and resources of individual task, and identify the interactions between different work tasks. A good construction plan is the base for developing the schedule and the budget for work. Primavera is the most effective tool for construction management.

Primavera is the industry leading project and program management solution for projects any size. Primavera enables to manage time, tasks, costs, resources, contracts, change and risks to consistently execute profitable projects

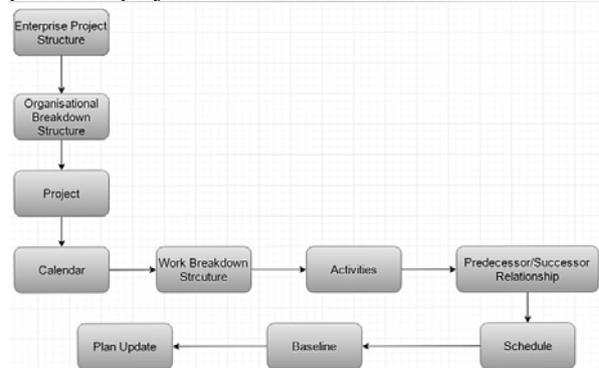


Fig 1 Execution Plan

II. OBJECTIVES

The objectives of this study are:

- To identify construction sequence for a residential building construction.
- To work out the practical durations required to carry out the activities.
- To identify scheduling technique used by the organization on developing plan and scheduling.
- To develop scheduling using primavera project planner's software.
- To track the project and analyses the reasons for delays, and increase in estimated budget etc.
- To investigate defects in the planning and scheduling procedure of the organization, and suggest suitable improvements in their methods.

III. EXPERIMENTAL WORK

A.LITERATURE REVIEW

Subramani.T and Chinnadurai.K(2015) has discussed that long-introduced Industrialized Building System (IBS) has promised to solve and improve the current construction method and scenario

in our country, but the IBS method has not gained enough popularity. One of the reasons is due to lack of research works done to quantifying the benefit of IBS especially in construction time saving. In lieu with such scenario, this study conducted to quantify evidence of time saving in IBS application. Primavera P6 is amazing software, which is used not just by planners, but also managers, engineers, schedulers, and anyone else involved in planning, management, reporting of a project.. Designed to make managing large or complex projects a piece of cake, Primavera is the ideal tool for anyone who is involved in planning, Monitoring and reporting on the progress of any big task, development or venture. Primavera allows for top level planning as well as being ideal for managing the intricate details. This enables project managers, planners, planning controllers and other associated professionals to have instant access to all the project information they require at the touch of a button. Also from this study shown not all IBS components can improved to the overall construction duration, however by adopting IBS components can improve and expedite the construction of 18 stories residential building from the point of departure of the project throughout of the whole of project's with a total 405 days or 42% the time saving.

Andrew Fernans Tom and Sachin Paul (2013) have proposed that project monitoring and control is the process of collecting, recording, and reporting information concerning project performance. Project controlling uses the data from monitor activity to bring actual performance to planned performance. The present study deals with the project monitoring process of "Standard Design Factory"; a four storied (G+3) factory building whose construction is in progress at Cochin, Kerala. A comparison between the planned progress of construction work and actual progress is performed in this study using project management software Primavera P6. Despite well-established principles and policies of project monitoring the process itself may not be efficiently accomplished in a project, because of those practical problems existing or arising in the project Such an attempt in realizing the practical problems in implementation of project monitoring and control will contribute to proper recognition of the problem areas and putting in place the control process to rectify the deviations.

Sandip Pawar and Attarde.P.M(2013) has described that planning and scheduling using tools and devices are helpful in comparing the project with stipulated cost, time and quality. Resequencing model proposed to overcome the delay factor from the critical area, to minimize that delay of the construction and to reduce the time, cost and it also helpful to concentrate on the major areas in the project. It has hands-on experience in an ongoing project, and evaluation of schedule of equipment, staff, labour and material. It helps to plan and evaluate the resources for the construction of the building project. It also compares the cost variation

due to the delay of the project and rescheduling the project by crashing process.

Boskee Sharma and Labh.K.N(2012) has illustrated that construction project shall employ the latest and the best available project planning and management package. Primavera project management, one of the most sought after software package employed by a large group of industries, world over. The project planning and management aims to ensure the project deliverables are completed and delivered in time, within the stipulated cost, and meets the stakeholder's requirements and expectations. It also adopts methods, control processes in monitoring and implementation to reduce as best as possible any changes of failure at some stage or another. The planning process for a building construction with some alternative schemes such as execution schedule, activities relationship, resource allocation etc. has been attempted to examine the consequence of overall implementation in terms of scope, time and cost to the project.

Dayakar.T and Udhayakumar.M(2012) has described that implementation of construction project needs a proper planning and scheduling is of vital importance for the project to be executed and run smoothly. A best schedule has to be prepared in such a way that meets the primary objectives of the total project. That primary objective is to create a quality project, completed on time, within budget, and in a safe work environment. Hence in this study an ongoing construction project is taken and the execution of the project is compared with the schedule with the help of Microsoft Project. An ongoing project in IIT Madras is selected and the activities pertaining to the Substructure is considered for comparison. From the study, it is found, how the project is planned, the sequence of work and linking relationships between activities for the whole project. In conclusion it is understood that, it is important to realize that there will be changes to the schedule logic as well as differences between the planned progress and actual progress. Based on the differences the schedule needs to be changed so as to complete the project smoothly.

B.RESEARCH WORK

Organizational Breakdown Structures is an hierarchical arrangement of an organizational management structures. OBS is defined at a global level and relates and relates with EPS to control user access to project information.OBS relates every single unit of the project.

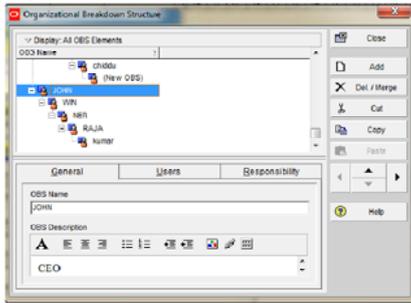


Fig 2 Organizational Breakdown Structures

Calendars are used to set the project and its resources working times to accurately reflect availability of resources.

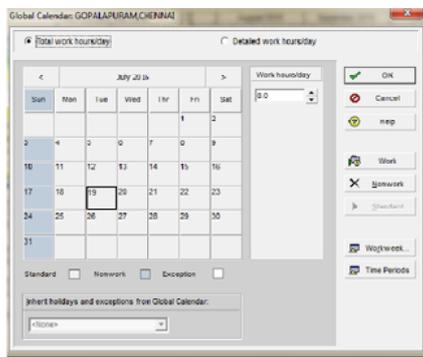


Fig 3 Calendar

Activities are fundamental work element of project.

Activity ID	Successors	Activity Name	Predecess	Original Duration
A45	A49, A48, A46	POURING CONCRETE FOR LINTEL&SUNSHADE	A44, A43	4
A46	A47	REMOAVL OF SHUTTERING FOR LINTEL&SUNSHADE	A45	3
A47	A48	CURING FOR LINTEL&SUNSHADE	A46	2
A48	A50	BRICK WORK UPTO ROOF	A45, A47	7
A49	A51	BAR BENDING FOR ROOF&STAIRCASE	A45	7
A50	A51	CENTRING FOR ROOF&STAIRCASE	A48	3
A51	A52, A53, A63	POURING CONCRETE FOR ROOF&STARCASE	A50, A49	6
+1FLOOR				
A52	A64	CURING FOR ROOF&STAIRCASE	A51	3
A53	A54, A94	REMOVAL OF CENTRING FOR ROOF&STAIRCSAE	A51	4
A54	A58, A57, A62	FITTRNG DOOR&WINDOWSG.F	A53	7
A55	A88, A87	PLASTERING INSIDE G.F	A58, A57	20
A57	A55	ELECTRICAL FITTING	A54	7
A58	A55	PLUMBING WORK G.L	A54	8
A63	A65	BAR BENDING FOR COLUMN&LIFT	A51	4
A64	A65	SHUTTERING FOR COLUMN&LIFT UPTO 1.5m	A52	3
A65	A66, A68	POURING CONCRETE FOR COUMN&LIFT 1.5m	A63, A64	4
A66	A67	REMOVAL OF SHUTTERING FOR COLUMN&LIFT 1.5m	A65	3
A67	A68	CURING FOR COLUMN&LIFT 1.5m	A66	3
A68	A69	SHUTTERING FOR COLUMN&LIFT UPTO ROOF	A67, A65	3
A69	A73, A72, A70	POURING CONCRETE FOR COLUMN&LIFT	A68	4
A70	A71	REMOVAL SHUTTERING FOR COLUMN&LIFT	A69	3
A71	A72	CURING FOR COLUMN&LIFT	A70	3
A72	A74	BRICK WORK UPTO LINTEL	A69, A71	7
A73	A75	BAR BENDING FORLINTEL&SUNSHADE	A69	4
A74	A75	SHUTTERING FOR LINTEL&SUNSHADE	A72	3
A75	A76, A79, A78	POURING CONCRETE FOR LINTEL&SUNSHADE	A73, A74	3
A76	A77	REMOVAL OF SHUTTERING FOR LINTEL&SUNSHADE	A75	3

Fig 4 Activity List upto 3rd Floor

Activity ID	Successors	Activity Name	Predecess	Original Duration
A139	A141	BAR BENDING FOR ROOF&STAIRCSAE		2
A140	A141	CENTRING FOR ROOF&STAIRCASE		4
A141	A153, A142	POURING CONCRETE FOR ROOF&STAIRCASE	A139, A141	2
A142	A154, A143	CURING FOR ROOF&STAIRCASE	A141	2
A153	A155	BAR BENDING FOR COLUMN&LIFT	A141	2
A154	A155	SHUTTERING FOR COLUMN&LIFT	A142	4
A155	A158, A156	POURING CONCRETE FOR COLUMN&LIFT	A153, A155	2
A156	A157	REMOVAL OF SHUTTERING FOR COLUMN&LIFT	A155	3
A157	A158	CURING FOR COLUMN&LIFT	A156	2
A158	A159	SHUTTERING FOR COLUMN&LIFT	A155, A157	4
A159	A160, A162	POURING CONCRETE FOR COLUMN&LIFT	A158	2
+5FLOOR				
A143	A144	REMOVAL CENTRING FOR ROOF&SUNSHADE	A39, A142	3
A144	A152	FITTING DOOR&WINDOW	A143	6
A145	A151	PLASTERING INSIDE 3FLOOR	A148, A147	10
A147	A145	ELECTRICAL FITTING 3FLOOR	A152	7
A148	A145	PLUMBING WORK 3FLOOR	A152	10
A152	A147, A148	BRICK WORK IN STAIRCASE 3FLOOR	A144	15
A160	A161	REMOVAL OF SHUTTERING FOR COLUMN&LIFT	A159	3
A161	A162	CURING FOR COLUMN&LIFT	A160	2
A162	A164	BRICK WORK UPTO LINTEL	A161, A157	10
A163	A165	BAR BENDING FOR COLUMN&LIFT		2
A164	A165	SHUTTERING FOR LINTEL&SUNSHADE	A162	4
A165	A166, A168	POURING CONCRETE FOR FOR LINTEL&SUN	A164, A163	2
A166	A167	REMOVAL OF SHUTTERING FOR LINTEL	A165	3
A167	A168	CURING FOR LINTEL&SUNSHADE	A166	2
A168	A170	BRICK WORK UPTO 4FLOOR	A167, A163	15
A169	A171	BAR BENDING FOR ROOF&STAIRCASE		2

Fig 5 Activities List above 3rd Floor

RESOURCE ALLOCATION is the process of assigning the machine, material and man power used in the project.



Fig 6 Resource Allocation

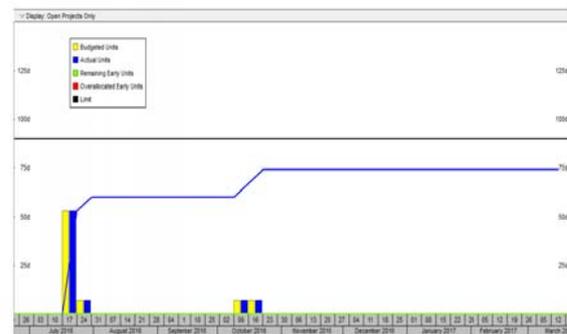


Fig 7 Machinery Allocation

Work Breakdown Structure is used to define and organize the project elements so as to clearly identify deliverables, reports, summarize schedule and cost data of the work. It is very essential in all the complicated problems.

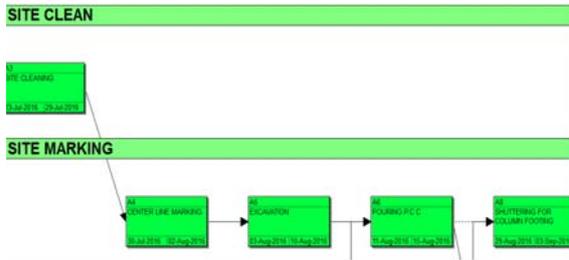


Fig 8 Work Break Down Structure

Scheduling is the process of organizing the activities and assigning its duration to complete the works in time.

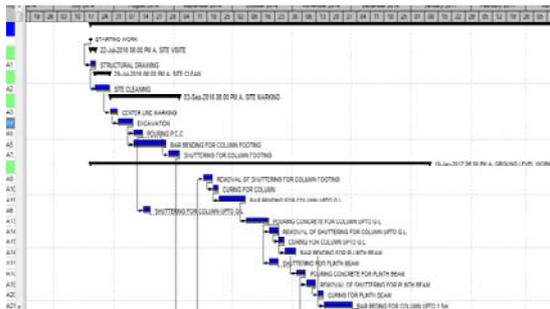


Fig 9 Scheduling of 1st Floor

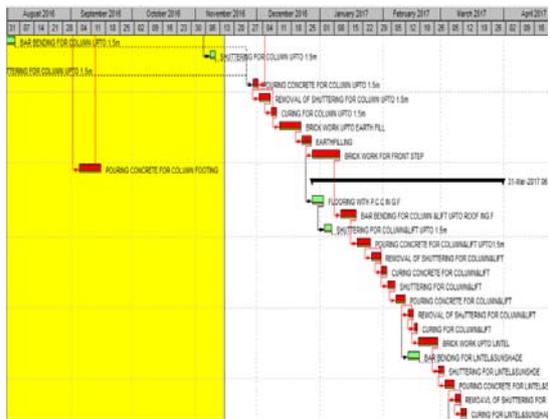


Fig 10 Scheduling upto 3rd Floor

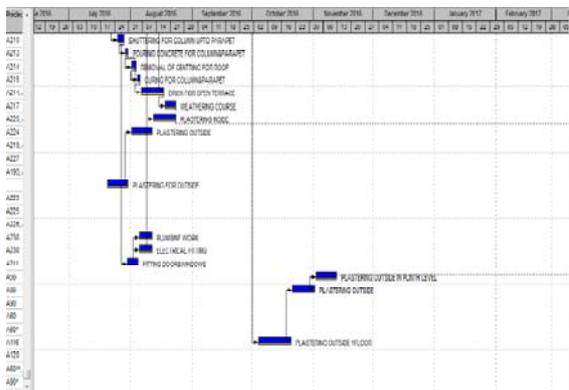


Fig 11 Scheduling upto 5th Floor

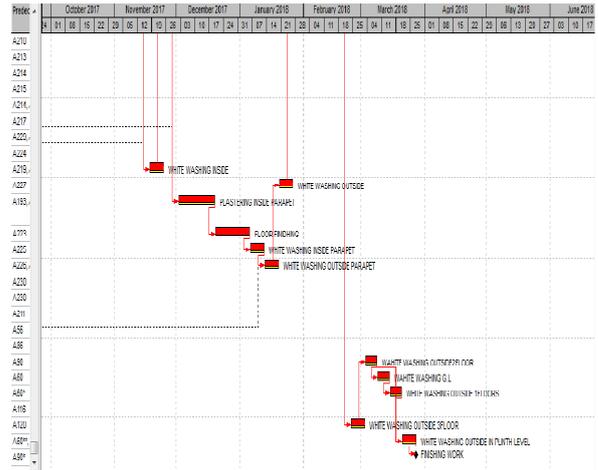


Fig 12 Scheduling upto 6th Floor

IV. RESULT AND DISCUSSION

TABLE 1 Scheduled Data

S.NO	DESCRIPTION	DAYS
1	Manual Scheduling	693
2	Primavera Scheduling	683

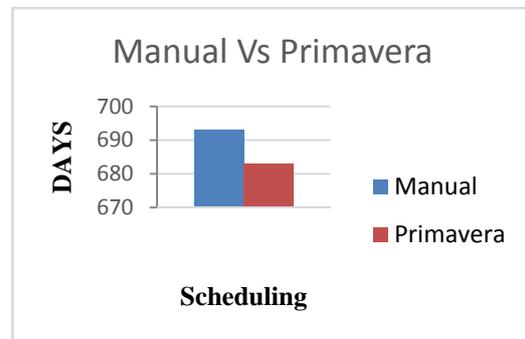


Fig 9 Result Comparison

Comparison

- In manual method more efforts should be taken while assigning resources, but in primavera fewer efforts are required.
- In manual method much confusion are arrived due to dependent activity but in primavera the dependent activity are identified easily.

V. CONCLUSION

Based on the comparison between the manual scheduling and primavera scheduling, Primavera is efficient for scheduling the project and also to optimize the days by using Primavera. The critical path scheduling is done by using Primavera. The standard norms of the building had referred from QUANTITY SURVEYING BOOKS & PUBLIC WORKS DEPARTMENT.

Primavera is efficient for the project because linking the project activities easily and also by using the four relationships can optimize the time of project. The shouldn't have any modification in critical path.

The delay of the construction project is due to improper planning and scheduling. Thus this project concludes that the delay can be rectified by proper scheduling and periodical tracking throughout the project.

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