

## CONSTRUCTION PLANNING AND MANAGEMENT OF RESIDENTIAL BUILDING USING PRIMAVERA

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**Abstract:** *Proper planning and scheduling is very important in construction projects for reducing and controlling delays of the project. Substantial amounts of time, money, resources are wasted each year in a construction industry due to improper planning and scheduling. With globalization the construction projects have become vast and complex. Planning of such projects requires huge amount of paperwork, which can be reduced with the help of project planning software. Providing good planning, proper organization, sufficient flow of resources to a project cannot automatically achieve desired result. A warning mechanism must be present which can alert the organization about its possible success and failures throughout the project. The main objectives of this study are to plan, schedule, and track a residential project with help of primavera software, study the results generated, it is possible to suggest which method is suitable for the selected residential project. Also, to recommend measures to the organization for enhancing their project planning skills for similar projects in future.*

**Keywords:** *Planning, Scheduling, Project Management, Primavera*

### I. INTRODUCTION

Construction industry is an integral component of a nation's infrastructure and industrial growth. Even though construction industry is the second largest

industry in India, the growth of this industry has been differential across the nation. The rural regions need tools for economic development, land use and environment planning to cope with the

status of development in urban areas. The time available to achieve this goal is shrinking. Here arises the need for effective project management. Many issues are being faced by construction industry that must be taken care of. They include time and cost overruns due to inadequate project formulation, poor planning for implementation, lack of proper contract planning and management and lack of proper management during execution. It has been estimated by analysts that average cost of a project goes up by 30 percentage compared to the budgeted cost. Observations show that proper skillful management is imperative for the timely completion of the project within estimated budget and with allocated resources. Projects with good planning, adequate organizational machinery and sufficient flow of resources cannot Automatically achieve the desired result. There must be some warning mechanism, which can alert the organization about its possible success and failures, off and on. Project monitoring is the process of collecting, recording, and reporting information concerning project performance that project manager and others wish to know. Monitoring involves watching the progress of the project

against time, resources and performance schedule during execution of the project and identifying lagging areas requiring timely attention and action whereas project controlling uses data from monitor activity to bring actual performance to planned performance. The objective of this study is to plan, schedule and to budget a Residential project with help of primavera software, study the results generated, it is possible to suggest which method is suitable for the selected G+4.Commercial Building project and also to recommend measures to the organization for enhancing their project planning skills for similar projects in future. The traditional project management system cannot meet the demands of today's projects, as tremendous amount of information and data on a project are always changing. Project managers from construction industry state that their 70-80% time is spent on communication and 70% of project documentation is paper based. The main objectives of this study are to plan, schedule, and track a residential project with help of primavera software, study the results generated, it is possible to suggest which method is suitable for the selected residential project. Also to recommend measures to the organization for enhancing

their project planning for similar projects in future. The contract scheduling specifications mandate the use of critical path method (CPM) schedules for the management of many of the construction projects. An understanding of the underlying mathematics that form the basis of critical path methodology is a necessary prerequisite to use of Oracle Primavera® P6™ Project Management software (P6) for creation or review of schedules. Elements of project planning, including the nature and use of work breakdown structures. This chapter additionally discusses standard schedule requirements, so an understanding of what the contract requires can be gained. The different types of scheduling methods, and then teaches the basic terminology associated with CPM scheduling.

CPM provides an effective time line to complete the project within the desired budget. It also offers techniques to identify any delay in projects to avoid the time conflicts. It provides a proper communication system to keep all the stakeholders and team members informed throughout the project. This outcome will reduce conflicts of different parties present in the project. These parties include labor vendors, material vendors, designer team,

accounting personnel, clients, etc. These are all the reasons that strengthen the significance of project management techniques in construction projects.

### **Objectives of Project Management**

The objectives of project management are:

- To complete the work within estimated budget and specified time using Primavera.
- To compute the practical durations required to carry out the activities and to identify the construction sequence.
- To identify the scheduling techniques used by the organization in developing plan and scheduling.

## **II. LITERATURE SURVEY**

A systematic process was used to classify the literature along salient conceptual and research methodological dimensions as part of a doctoral study. The historical analysis of mainstream academic journals' content can show patterns of evolution within a discipline, thus enabling assessment of the impact of contributions, setting more rigorous research efforts, mapping existing areas of research and changes in a discipline, detecting emerging research topics and patterns of collaboration, and controlling research policies at a national and institutional level

(Pietroforte and Stefani 2004; Betts and Lansley 1993).

Within all fields of study there is a need for knowledge of the ways in which an academic discipline develops and for strategic overview of main dimensions representing the subject matter and classifications of relevant research methods and tools. In many disciplines, studies that address these concerns are termed meta-analysis (Betts and Lansley 1993).

In each academic discipline, there are major journals that have high impact scores resulting in them receiving the largest number of submissions and which therefore can be selective in choosing their content. An established refereed academic journal is a repository of good and novel insights gained from data-based research, scholarly enquiry, rigorous analysis of experience and careful logical debate about an issue or phenomenon (Betts and Lansley 1993).

As Betts and Lansley (1993) indicated, the analysis of large numbers of papers can reflect important patterns and biases in a discipline. Also, studies of research patterns can be important indicators for understanding researchers' preferences and

mainstream themes related with the subject. Performance related research is looming large in the field of construction management discipline, yet there have been few traditional literature reviews only partially addressing performance related issues and which do not address aspects and features of performance studied in different contexts.

Lin and Shen (2007) analyzed construction management journals between 1998 and 2004 with a specific focus on performance measurement. This investigation considered patterns of published output from peer-reviewed articles in mainstream construction management journals. In this regard, this paper addresses the following three objectives; a) To assess recent performance research in construction management journals. b) To map patterns in the articles that concerned performance against proposed meta-analysis framework constructs

Subramani and Chinnadurai (2015) Discusses although the 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. Primavera P6 has benefited every industry from aerospace to manufacturing, electronics to IT, Telecom to Civil, any more. Primavera is an amazing project management software tool which is not just used by project managers. 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.

- Prabhat Kumar Sinha et.al. (2013) Aims in providing time and schedule management by using primavera is a useful technique for modelling and analysing project management. This paper is a conceptual paper that Projects are expected to be completion in schedule and help to project manager to control schedule while achieving performance, quality and cost goals by proper planning and

execution. The benefits of primavera are using quantified data, allowing project managers to justify and communicate their arguments when senior management is pushing for unrealistic project expectations. Proper risk management education, training, and advancements in computing technology combined allow project managers to implement the method easily.

Regina Mary and Rathinakumar (2015) Study deals with the methods that reduce time and cost constraints and resource 16 management. A construction of residential apartment is taken for this study which is undergoing a time and cost overrun. The constraints are reduced by using techniques interconnecting activities properly an increasing the resources, schedules are prepared by means of Primavera software. The cost constraints can also be reduced by managing labour resources of different categories. The actual schedule of the project is considered as base schedule. The base schedule is compared with the modified schedule using techniques which helps to reduce constraints. Schedule made by the technique interconnecting activities properly gives a time difference for the completion of the project of about 5 months from the baseschedule of the

project. Schedule made by the combination of the both techniques show the result of 7 months prior completion from the base schedule of the project.

### III. METHODOLOGY

The scope of work was divided into the following steps:

- Collection of data and Specifications of activities.
- Study area characteristics.
- Identifying the Constraints
- Preparing Actual Schedule for the Project in Primavera
- Tracking the schedule of the project by using Primavera (P6)

#### Collection of data and Specification of activities

The data which is required for the schedule of the project was collected from site. The total numbers of activities that are required for the schedule are listed out. Specifications required for each item or activity is collected from site to prepare schedule.

**Study area characteristics** A real time residential building which is to be started has taken as a case study for the project. The construction is for a residential purpose having G+4 and the carpet area of

the construction is 18275 sq. ft. The number of flats at each floor is two with typical floor plan of an area of 3735 sq. ft. for each flat.

#### Identifying the Constraints

The project was started on the month of September-2022 and will be finished on the month of May-2023. This actual construction of the residential building takes a long duration of one year for the completion of the project. The long duration of a single project will lead to a considerable increase in the cost of the project. Therefore, reducing the project completion time is necessary for completing the project within the budgeted cost and budgeted time. This on time project completion and on budget completion of project is the two factors which state the project is a successfully completed. Reason for taking a long duration of this project is identified by means of the primavera schedule report.

#### Preparing Actual Schedule for the Project in Primavera

Actual schedule preparation process starts with the collection of data like project start date, activities involved in the construction of a G+4 building with activities sequences, duration taken for each and

every activities, resources needed for each and every activities and its amount, cost spent for each and every activities. The collected data are entered in the software and the relations between the activities are given as per its sequence of activities collected. The process of scheduling in primavera for the actual progress of work and the report obtained for the actual schedule from the primavera software are prepared. This actual schedule and report is considered as a schedule for this project.

#### **Tracking the schedule of the project by using Primavera (P6)**

The schedule that was prepared was tracked and updated from September 6th to May 8th and actual costs are calculated based on the updated schedule. Record actual start date for those activities which started. Record activity % complete for on-going or completed activities to 24 determine how much of the work has been completed. This should be based on work-in-place relative to the total amount of work planned for the activity. Enter Remaining Duration for in progress activities. Remaining duration will be the amount of time required to complete the activity as determined from the status date. Enter actual finish date for those activities

which have finished. Cost variance was calculated by the difference between the earned value cost and the actual cost.

#### **Planning, Controlling, and Managing Projects**

Before implementing Primavera to schedule projects, team members and other project participants should understand the processes involved in project management and the associated recommendations that help smooth the Primavera implementation that supports your corporate mission. If you were driving to a place you had never seen, would you get in the car without directions or a map? Probably not. More than likely you'd take the time to plan your trip, consider alternate routes, and estimate your time of arrival. Planning the drive before you even left would help your trip be more successful. And, along the way, should you encounter road blocks or traffic delays, you would have already identified alternate ways to reach your destination. Project management follows the same methodology and purpose—to achieve each project's goals, you need to plan them in advance. Good project management is no longer an option in today's corporate world. It is a critical tool to help your company stay on target and accomplish its

goals. Simply stated, project management is the process of achieving set goals within

the constraints of time, budget, and staffing restrictions.

## ENTERPRISE PROJECT STRUCTURE

It is a hierarchical structure that identifies the company wide projects and enables organization and management of those projects and enables organization and management of those projects by means of subdivisions or levels.

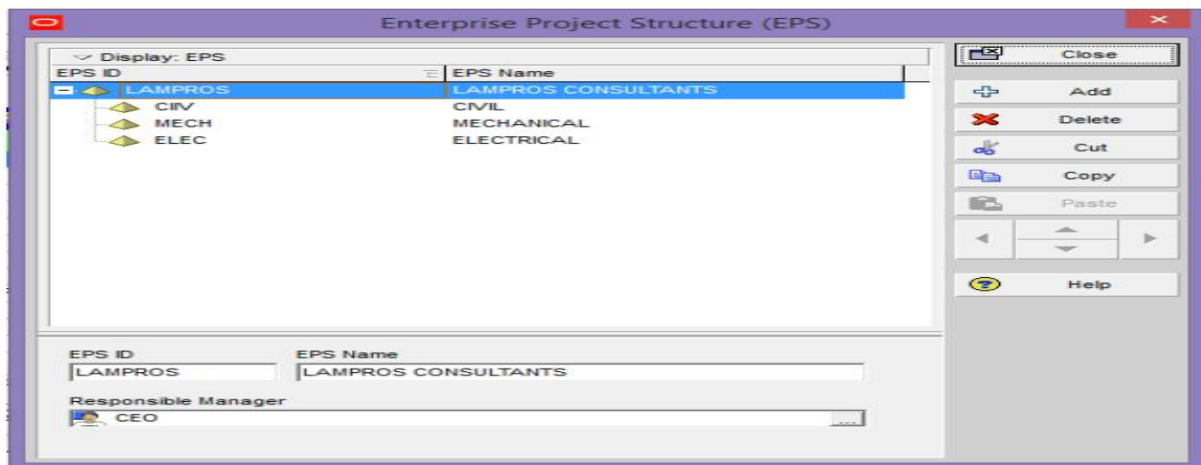


Fig.1 EPS

## ORGANIZATIONAL BREAKDOWN STRUCTURE

It is a hierarchical arrangement of an organization's management structure. OBS is defined at a global level and relates and relates with the EPS to control user access to project information.

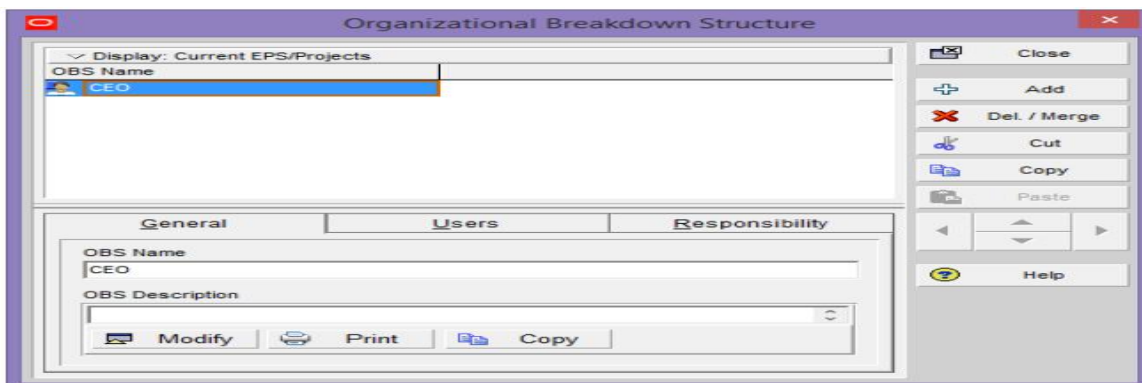




Fig.2 Breakdown structure

## PROJECT

It is a temporary endeavour undertaken to create a unique product, service or result. A project contains a set of activities performed in a coordinated arrangement in order to create a product, service, or measurable business result. Projects must have a definite beginning and end dates; else it is not a project. A project is concluded when its objectives have been reached or when the project is terminated.

There are three Access Modes: Shared Mode: Anyone who has access January also open the project, calculate and display with their user preferences, and report different data from the same project at the same time. Exclusive Mode: In order to open the projects exclusively, that means the respective users alone can edit the projects information's, other users cannot be editable. Read-only Mode: In read-only mode the project information is displayed for all users but the information is not edit by any of the user. It is just for viewing purpose only. In this project we have made a project with the following specifications:

- 1) An EPS node, OBS node to assign a responsible manager.
- 2) Project ID: CB Project Name: Residential Building G+4 Malakpet
- 3) The Project Start date: 6th September 2022. 4) Access Mode: Shared Mode

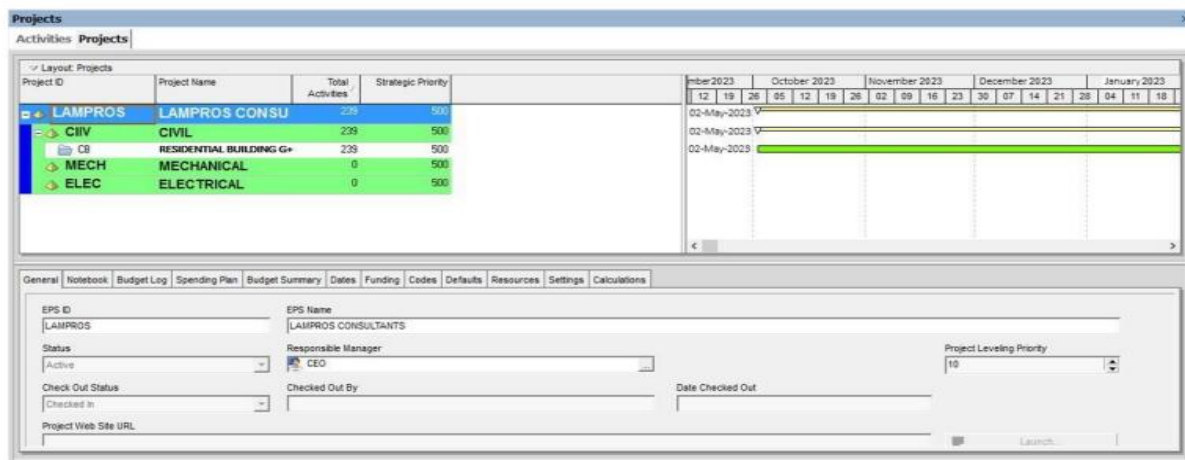


Fig.3 Access modes

## CALENDARS

They are used to set in a project and its resources' working times to accurately reflect resource availability information. The application uses your calendar assignments for levelling resources, scheduling, and tracking activities. Calendar will display the working and non-working time of an organization. Calendar will also represent the working days and working hours in a day. Besides, national holidays, specified days, and project-specific work/non workdays can also be declared

There are three types of calendars: - Global Calendar: It contains calendars that apply to all projects. - Project Calendar: It is a separate pool of calendars for each project. - Resource Calendar: It can be defined and applied to each individual resource. In this project we have used 6X8 Global Calendar and given holidays for: December 24TH , September 26TH, September 8ND, October 13TH , November 24TH , January 26TH , February 18TH , March 8TH , April 14TH,22ND and May 1 ST.

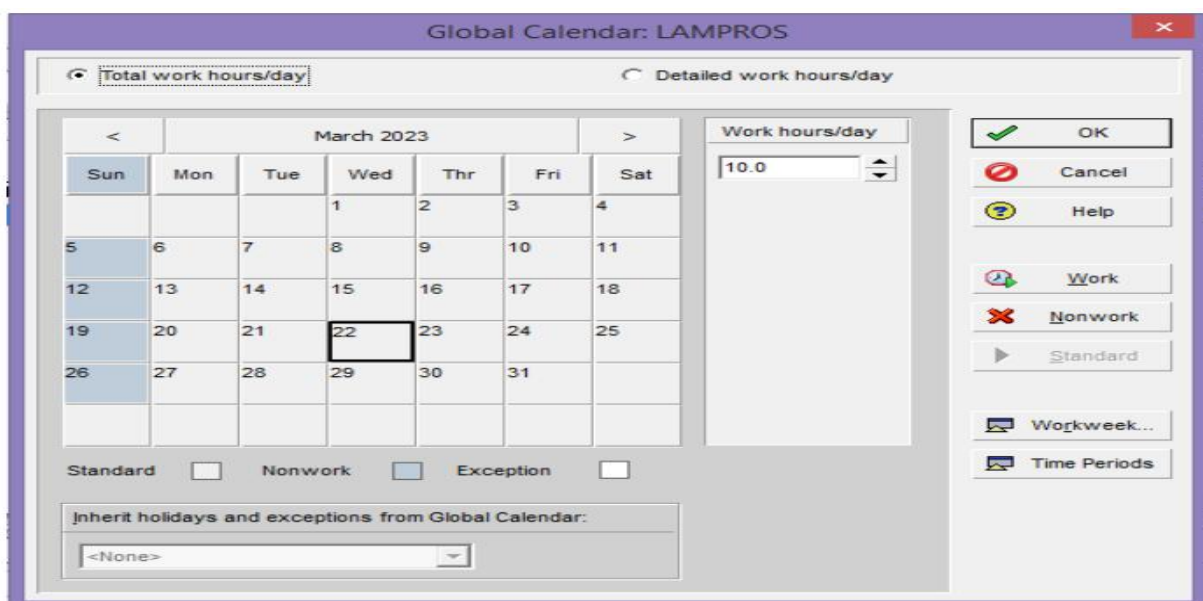


Fig.4 Global calendar

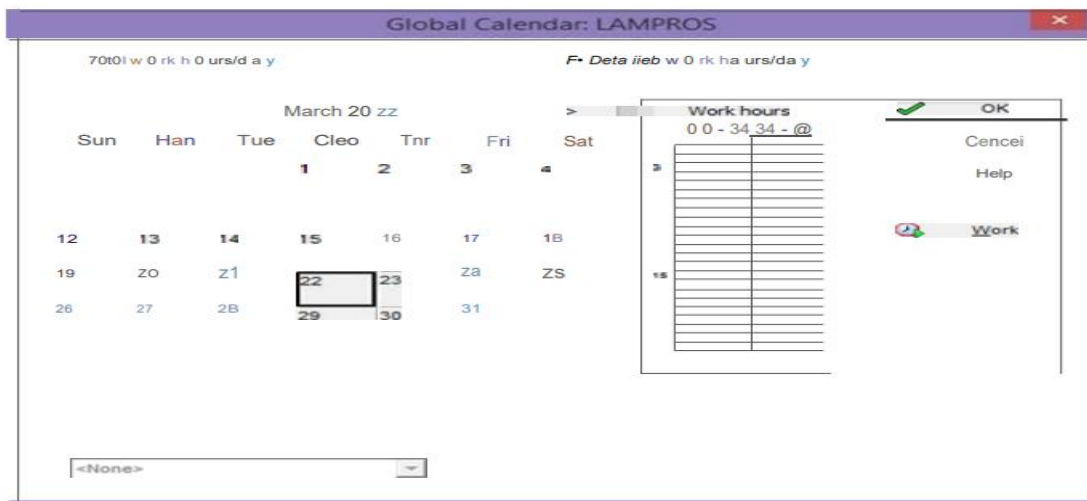


Fig.5 Global calender with Lampros



Fig.6 Total works hours



Fig.7 Calendar weekly hours

#### IV. RESULTS AND DISCUSSIONS

Based on the present case study the following results are determined. The various factors are

tabulated as follows which indicates the data representation to achieve the following result, The contractor had supplied us with the information that the actual duration of the project is 270 days and the total cost of the project was summed up to Rs.1.02 crs (approx.). But the same project when efficiently planned using Primavera software could be completed in only 230 days as shown in planned schedule with the total project cost assuming up to Rs.0.97 crs (approx.) as obtained from estimation of costs. Therefore, it is concluded that a project could be completed 40 days earlier and would save Rs.534011. Hence our objectives of project which were to complete the project in stipulated period of time using minimum resources and to maximize the resource material and equipment have been achieved.

#### V. CONCLUSION

The project Work Breakdown Structure (WBS) consist of 4 main divisions, project

includes 236 activities. The project is scheduled to complete within 230 days at a total cost of Rs.9665989. we used quality materials best to our construction during project. We completed the project within minimum duration and minimum budget when compared to contractors quote with help of primevera.

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