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Application of Primavera P6 for Monitoring and Updating Construction Project Performance

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Abstract: Proper planning and scheduling are critical components of construction projects for preventing and controlling project delays. Every year, the construction industry loses a significant amount of time, money, and resources as a result of poor construction activity management. As a result of globalisation, construction projects have grown in size and complexity. Such projects necessitate a significant amount of paperwork and effort, both of which can be reduced by using project management software. The primary goal of this study is to use the Primavera P6 software to plan, schedule, and optimise resources for construction projects, as well as to analyse the results. In addition, compare it to the traditional scheduling method to make recommendations for construction stakeholders who are directly and indirectly involved with the project. Here in this research investigation, a case study-based approach was used to describe how P6 software applications can help to control the overruns. The findings of this investigation show that the features of tracking and revised scheduled time to time save a significant amount of money and time for project completion.

Keywords: Planning; Scheduling; resource optimization; Primavera p6.

1. Introduction

Presently, the construction industry is extremely competitive globally and the future of many enterprises is dependent on their ability and economic decisions. Various global corporations deal with projects daily and they have become an especially large aspect of the business. Planning and scheduling and assign of resources is a very curial and important part of any project. Without proper planning and scheduling completion of the project is a very hard task. For this work, proper management of the project is an essential part of any construction work. The multi-directional interaction of dynamic forces is represented by the scope, time, resources, costs, and quality in the management of a construction project mission. From the planning stage until the successful completion of the project within the estimated cost and schedule, project management is a critical

component. To avoid or reduce the number of risks involved, very clear, planning and scheduling must be done to complete the project within the time frame and cost constraints with minimal or very few constraints during the project execution period to ensure smooth and continuous execution of the sequence of activities. From modest to large projects, it becomes increasingly necessary for a person, such as a manager, to oversee all operations from start to finish. However, it is impossible to do so while remaining focused on each and every task that must be completed and supervised manually. There are many types of project management software are available in the market to get an accurate result. (**Sarang et al.,2012**), Project management concepts, according to him, are no longer theoretical but have been transformed into technology-driven methods. Primavera has a number of other features, including Primavera architecture, calendars, scheduling, work breakdown structure, resource assignment, and analysis and leveling, and updating. But we've covered the primary factors that have a significant impact on the construction business. We believe the above-mentioned parameters are sufficient to distract the attention of non-participants of Primavera, to demonstrate its proper utilization and applicability, so that they can take initiative for their business or roles and responsibilities in their projects. **Subramani et al. (2014)** did a comparison between the conventional method for the construction of high-rise buildings and industrial building systems using scheduling simulation modelling. They used Primavera P6 software for planning and scheduling. They found that time and cost-saving can be more achieved by industrial building systems. Defects in the planning and scheduling procedure were discovered by **Polekar et al. (2015)**. They also discovered that contractors and subcontractors play an important role in keeping the project on track, as the main causes of delay were connected to contractor performance. Primavera P6 was discovered to be a very effective tool for tracking project progress and associated costs by **Shaikh et al. (2016)**. They also discovered that, unlike the traditional way of planning and scheduling, primavera avoids a lot of paper effort. **Mohammed et al. (2016)** conducted research of scheduling and planning utilizing Oracle Primavera P6 web logic and concluded that Oracle Primavera P6 web logic is far more advanced than Oracle Primavera alone P6 in terms of project planning, scheduling, and tracking. In the work by **Nagaraju et al.(2016)** the importance of resource allocation and scheduling in completing a construction project on schedule was emphasized. The findings revealed the shortcomings of the current project management system in station work projects, the need for effective planning, and the need for the use of project management software such as Primavera P6 in construction projects. **Saran et al. (2016)** stated that planning and Scheduling of a Two-Storey Building Using Primavera P6" was the subject of research. In this document, the author explains the step-by-step approach for using Primavera P6 software for proper planning and scheduling. The relevant processes have been discussed in this case study, starting with Enterprise Project Structure, OBS, Project Calendar, WBS, Activities, and Precedence with relationships, Schedule, Baseline, and Plan Update. **Nimbal et al. (2017)** used the PC-based Project Management programming/apparatus Primavera P6 to plan, schedule, and allocate assets for a (G+8) private building in the current investigation. It recognizes the similarity between the planned progress of development work and the actual advance of completed work. **Ranjithkumar et al. (2017)** explained that according to the company, Primavera software provides precise information on cost control, time management, working hour management, update and monitoring, and activity delay, all of which help to improve service delivery performance. In the work of **Jaswanth et al. (2018)** it is concluded that Primavera software can be used to schedule projects and reduce project duration in construction projects, based on the study approved the best characteristics of Primavera software in schedule controller

approaches. This study aids in identifying flaws in the organization's planning and scheduling processes.

1.1 Planning of the project

The backbone of project management is planning, which is one of the most critical stages in the project life cycle. By utilizing the information gathered and created, the planning should match the project's Scope criteria. In general, planning is breaking down a project's entire scope of work into tiny, measurable, identifiable, and quantifiable tasks, activities, or works, and then establishing logical interdependencies between them.

1.2 Scheduling of Project

The task of project scheduling is locating and fitting the final work plan into a time limit. It shows 'what to do' and 'when to do it' elements. A well-thought-out schedule ensures that all project components are finished on time and within budget. For the purpose of developing a project schedule, well-experienced individuals with extensive field execution expertise should be employed. Creating a well-defined timetable entails calculating how long each action will take to complete, as well as determining what and who will be accountable for completing them.

1.3 Primavera P6

There are many types of project management software are available in the market like Visual Studio 2008, SQL Server 2005, MS Project 2007, and Primavera P6. However, MSP and Primavera are the most often used software for construction project management nowadays. Primavera is an amazing software that can be used for both small and large projects. Primavera P6 is used for making project management smooth. It is used in civil engineering for developing plans, making schedules, reducing project delays, and determining the most effective utilization of resources. It refers to the application of skills, tools, and procedures to project operations in order to fulfil the owner's request. The Primavera p6 project management software is used to plan, manage, and estimate various types of projects.

2.Methodology

In this research, a case study-based study has been undertaken. The data for this study was gathered through detailed literature reviews, and then a case study was conducted to introduce one of the most effective methods for tracking and monitoring the project in order to complete the project successfully without delay. The data needed to achieve the study's goal were obtained by using applicable software (Primavera P6) to solve one of the major issues of project tracking and updating. The study is divided into two sections: the first is devoted to showing step by step guide for application and tracking of project progress, and the second is devoted to advising users on how it is advantageous over the conventional technique.

PCM and Primavera P6 are used for analysis. A case study was conducted using one of the construction projects to gain a better understanding of the method of using PCM in construction preparation as well as the procedure of applying the delay analysis. This project included 11 different changes that resulted in claims. The following points provide an overview of the project that was used in the case study.

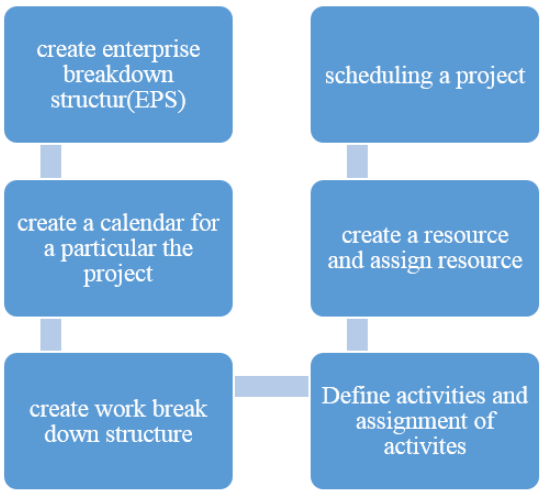
2.1 Project Description

The project under consideration is the construction of the Security cabin for the Commercial construction project of Sai Builders in Surat city of Gujarat, India. The structure is made up of a reinforced concrete skeleton that includes all ultramodern amenities under the Study with an original budget of the complete project is 2,75,45,250 and required duration of 18 months beginning on 1/6/2020.

2.2 Steps of Construction Activities on Project Site

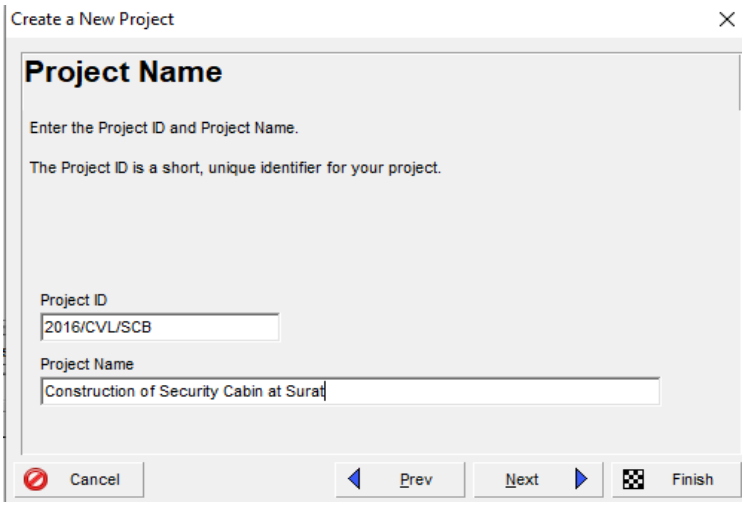
The following steps are to be considered for planning and scheduling a project in Primavera P6.

Figure.1 Steps of creation and scheduling project in Primavera P6



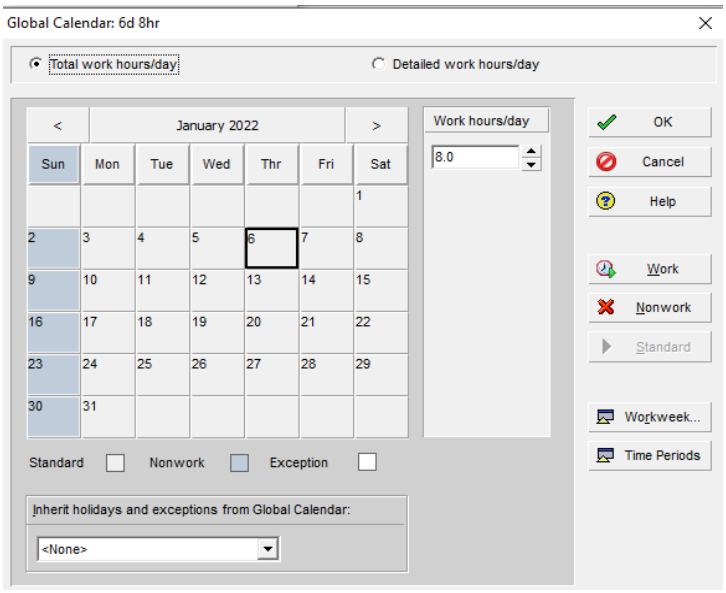
The enterprise project structure is a hierarchical representation that shows the structure and levels of organizations depending on the project scope and after having to create a new project below in figure 2.

Figure.2 Wizard of creating a project.



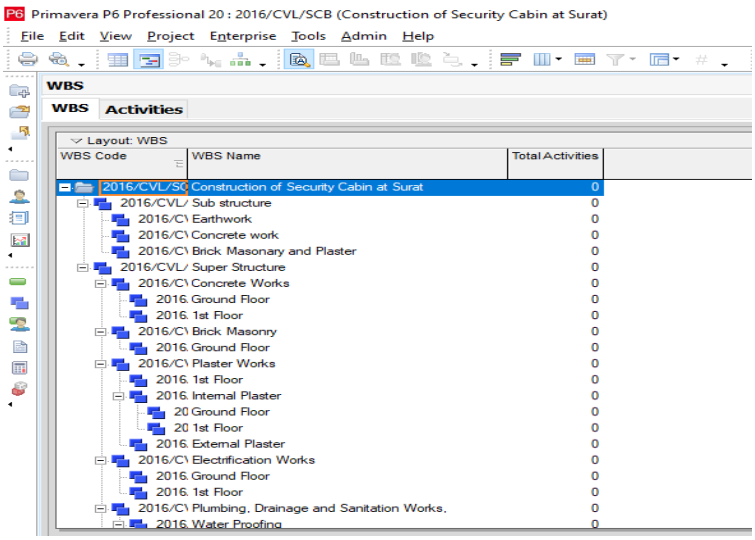
After the initial steps of EPS and creation of project then after having a create calendar. The calendar can be used from the standard global calendar or can be customized according to the requirement of the organization and project. Then the calendar is assigned to the project Figure.3. In this work calendar, 6 days x 8 hours was created.

Figure.3 Calendar



After the assigned calendar next step is to create a work breakdown structure (WBS) for the project which is shown in figure. 4.

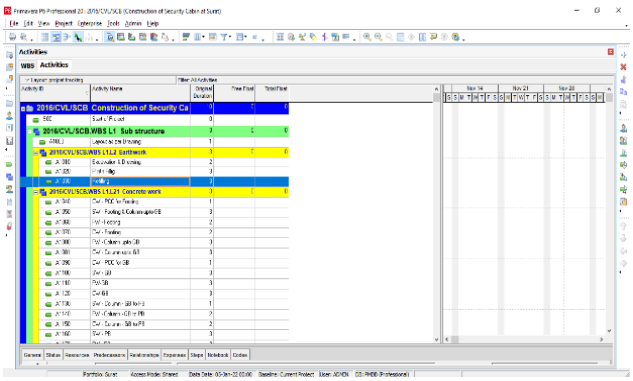
Figure.4 Work breakdown structure



The project elements have been defined and organized using WBS elements. It aids in clearly identifying deliverables, reporting and summarizing project schedule and cost data at various levels of detail. A work breakdown structure (WBS) is a hierarchy of all project work that must be completed in order to complete a construction project. Each project has its own project WBS

hierarchy structure, with the top-level WBS element equal to the project's EPS node. Each WBS element contains more detailed information in the form of WBS levels, activities, or resource constraints. The WBS, create activities and assigning of each activates concerning their predecessors which is shown in the figure. 5 and figure. 5.1 respectively.

Figure.5 Creation of activates



2.3 Relationship between activity

To create a network, the tasks should be linked together by allocating succeeding, preceding activities that have a significant relationship to the overall project activities.

- Finish to Start (FS) relationship
- Start to Start (SS) relationship
- Finish to Finish (FF) relationship
- Start to Finish (SF) relationship

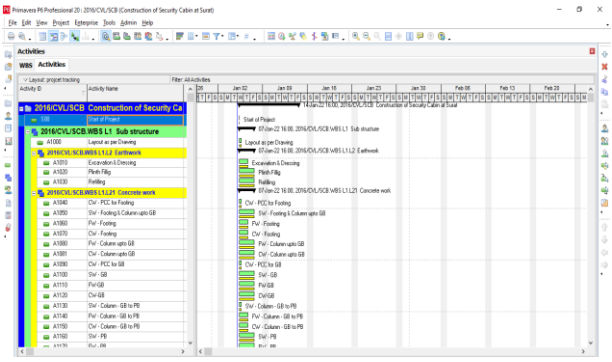
Activity Duration

The project duration is entered in the original duration field when planning the work. Only completed project activities can have their actual duration entered.

Activity Dates

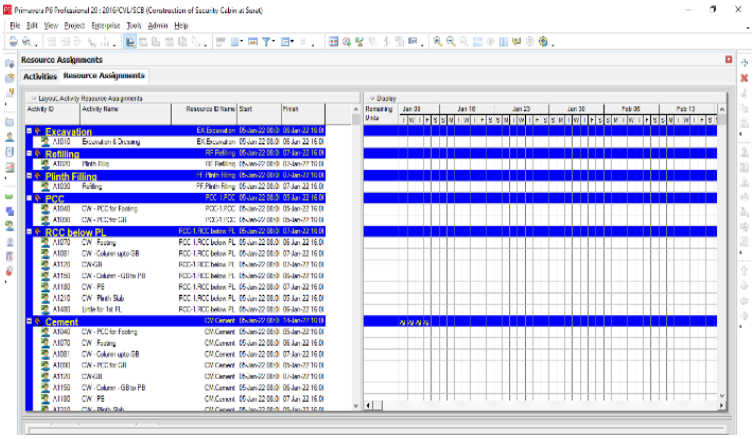
Primavera supports the following project activity dates: actual start, planned start, actual finish, and planned finish. Creating baseline,a straightforward resource management planning is a complete replica of the original schedule that serves as a benchmark against which the performance of a project is measured. Select a project. Keep the baseline. Then, as a new baseline B1, add and save a copy of the current project. Then select B1 as the project baseline and B1 as the primary baseline. There will be daily updates.

Figure.5.1 Activity and relationships



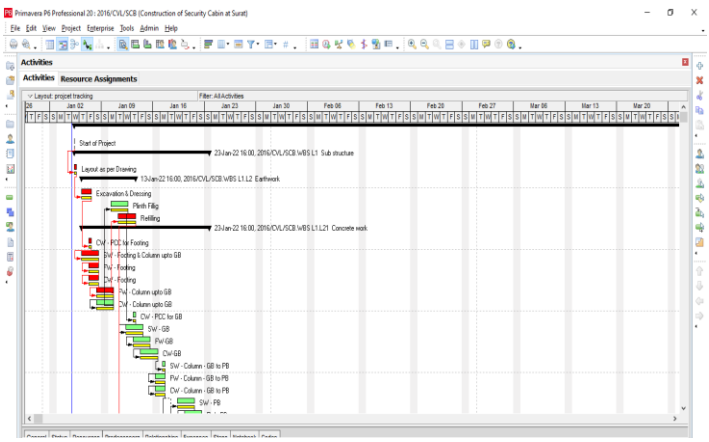
After the assignment of activities, create a resource and assign that resources to the particular activity were being done. This is shown in figure 6.

Figure.6 Assignment of resources



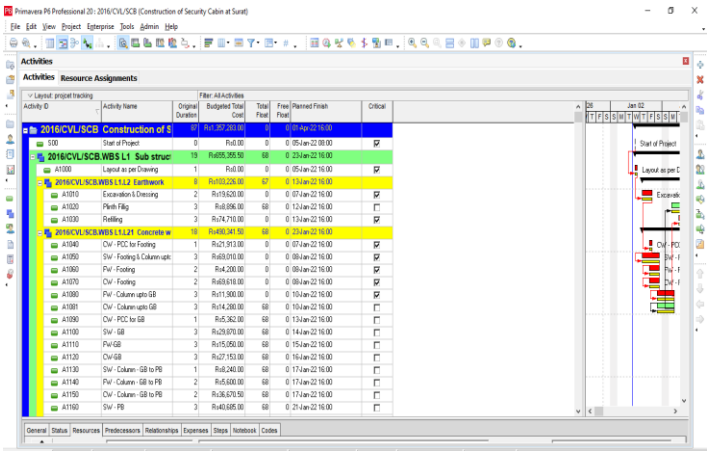
Graphical representation of assigned activity was done. In the next figure, Figure.7 is shown the Gantt chart.

Figure.7 Gantt chart of activities



After this whole process, the final scheduling was output in Figure.8.

Figure.8 Final Scheduling



3. Conclusion

The purpose of this study was to understand the role of monitoring and control in the progress and timely completion of a construction project, as well as the need for and effectiveness of project management software such as Primavera P6 in a construction project. This goal was met by revising the literature and methodologies used in monitoring and control. The study served as a guideline for understanding the progress of construction work as well as identifying specific problems that arose during the process. The findings of this study demonstrate the shortcomings of the current project management system in project management and the importance of efficiency. A new project management plan that is both efficient and cost-effective is completed.

Also, after completion, all progress in primavera resulted in the total budgeted cost of 13,57,283 Rs. and the total duration of the project is 83 days. while using the conventional method, the total cost and duration were 15,53,300 and 125 days, respectively. after comparison of conventional scheduling and cost with primavera-based calculation, results show that with the help of primavera p6 software is more accurate duration can identify due to proper tracking and time to time updating of schedule, while conventional takes a lot of time and effort so, for tracking, updating, and revision of assignments or activities with time constraints and used the software,

Future Scopes and recommendation

This project is limited to only planning, scheduling, and resource assignment part but we can more achieve like tracking and monitoring of live project with the help of earned Value analysis (EVM) tool and also we generate the S-curve in this software which is very helpful to forecast the project.

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