

Resource Planning of a Colony Project Using Primavera

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ABSTRACT: In construction project there are various activities needs to be planed and monitored properly to ensure the completion of the project. It involves collecting, reporting information recording information for analysis. This study deals with the project monitoring process of “Residence Colony” which is collection of 5 blocks of five stories (G+5) each building, whose construction is in progress at Bhopal Madhya Pradesh. Using project management software Primavera P6 a comparison between the planned progresses of construction work and actual progress is performed. Primavera software provides enterprise project portfolio management solutions that help customer to manage their project, programs and resource. Over the last decade the way in which project monitoring tasks such as organization, planning and decision-making are executed and supported has certainly developed. Whereas a decade or so ago scheduling methods including PERT, CPM or using spreadsheets were well-known and widely used, the current standard is software with integrated support for display of activity duration, resource analysis, risk analysis, communication between project participants etc. Apart from advanced network software solutions (EPM, PPM), their less sophisticated versions such as MS Project and Primavera are also well received by users.

KEYWORDS: Primavera P6, EPM, PPM, Resource Management.

I. INTRODUCTION

The construction industry today has been built on the need of the worlds inhabitants to provide shelter, harness energy, and create public access. The basic human need have not changed over time even though the process and environment in which designer or constructor operate have becoming increasingly more complicated. Rapidly escalating technology has made possible structure and processes unimaginable even from generation to generation.

By referring back to the flow of the global development industries it will see that developing country like Malaysia, Indonesia, Vietnam and India are still spending a lot of money in development of a new project like housing, building office, shopping mall etc. This phenomenon will influence the increasing of the job opportunity for the people at those countries especially the fresh graduate because with the development of the new industrial areas and business area it shows that a lot of new workers needed to involve in the development of the country. The different scenario for the development country because for them they more stress on the maintaining the existing buildings in order to prolong the life span of the building.

Case Study: Resource Management of a colony Project

It is one of the large projects undertaken by Elite Builder and Developer Pvt Ltd in Bhopal. It involves construction of Residence Colony” which is collection of 5 blocks of five stories (G+5) each building. Total built up area is 7076 sq ft, expected to complete in 27 months.

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Owner	Elite Builder and Developer
Project	Rosewood Enclave
Location	Hosangabad Road Bhopal
Nearest Airport	Raja Bhoj Airport Bhopal
Rain fall Details	Maximum 250 Minimum 53.9

Table: 1 Case Study Details

II. RELATED WORK

A thorough review of technical journals, books, white papers, and industry standards have been done for the purpose of understanding how to effectively monitor a construction project.

In [12], authors discussed about component of a nation infrastructure and industrial growth. About the component which they discussed is construction industry, growth of such industry is different across the nation because of various reason to achieve goal in timely effective planning is necessary. Observations show that proper skilful 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.

In [13], authors discussed about the scheduling and project monitoring process along with it also discuss main parameter's involves in the calculation of Earned Value Analysis in cost management of civil construction projects. Primavera P6 software is used for EVM calculations. It is concluded that use of primavera P6 software for earned value analysis calculation of projects.

In [14], authors discussed about the project monitoring process of "Standard Design Factory", a four storeyed (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.

III. METHODOLOGY AND SIMULATION RESULT ANALYSIS

Major Construction projects are so complex in the nature there are various things involved in the project to be managed in order to complete the project successfully. Now days there are various project management softwares available to manage the whole project i.e .Primavera P6, P3, Suretrack, Microsoft project. In this study involves monitoring and controlling the project using Primavera P6. Steps involve in the Primavera P6 are:

- Create Project
- Define WBS
- Creating Calender
- Define Activity
- Appoint Activity Durations
- Assign Logic Links
- Perform Scheduling
- Allocating Resources / budgeting
- Creating Baselines

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- Updating Schedule
- Earned value analysis
- Publishing Reports

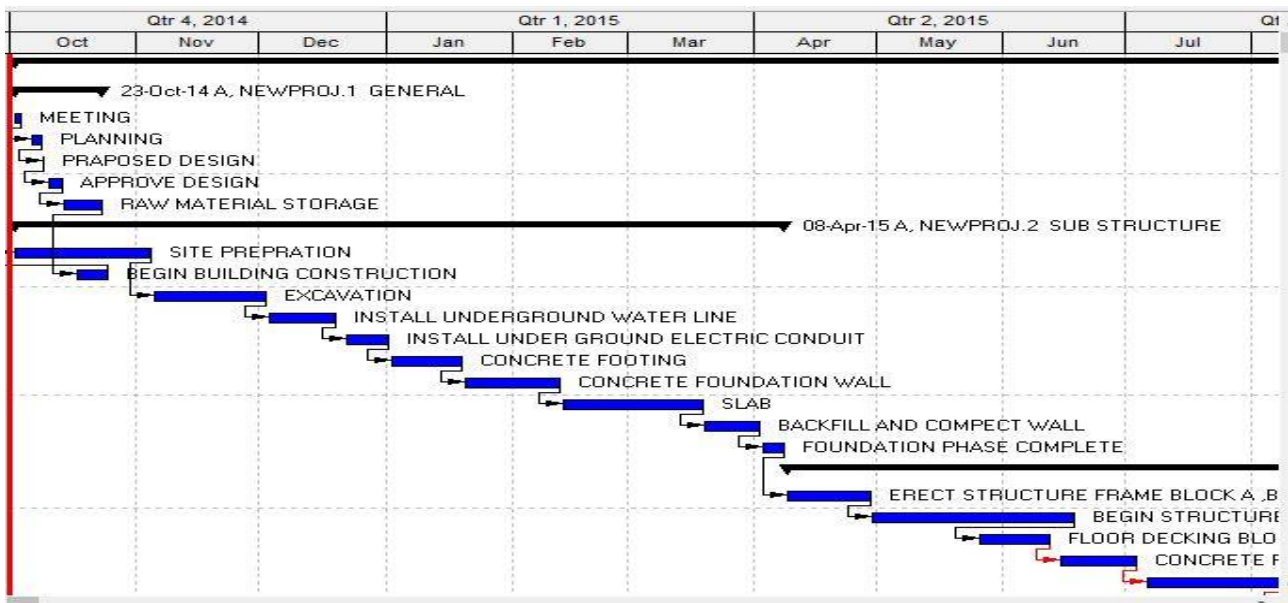


Fig1. Representation of Relationship between various phases

Schedule Analysis:

Proper allocation utilization of recourse improves project performance according to project cost and schedule. In fig.1 it is represent the relationship between various phases of project in the Gantt chart format.

- The time scale of the Gantt chart should be weekly basis.
- All relationships should be clearly given in the Gantt chart.

Calender:

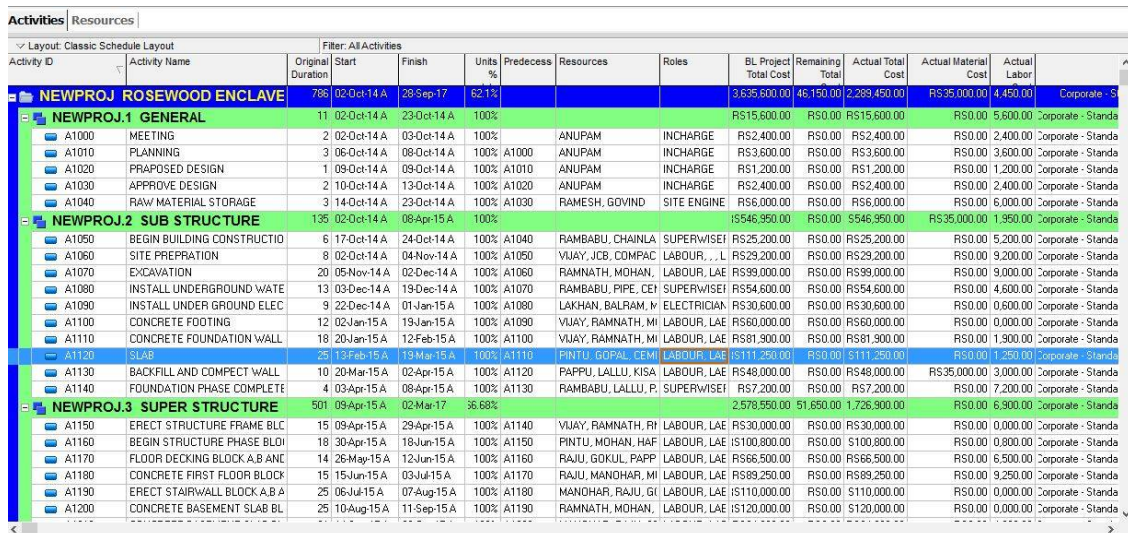
The work is carried out in 6 days per week. So the standard 6 day workweek calendar is made with necessary holidays in it. A break of one hour is given in the afternoon, activity usage spreadsheet and resource usage spreadsheet. These two spreadsheets reflect the usage of resources and progress of activities at any stage of the construction project. This is based on classic WBS layout.

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Activity ID	Activity Name	Original Duration	Start	Finish	Units %	Predecessor	Resources	Roles	BL Project Total Cost	Remaining Total	Actual Total Cost	Actual Material Cost	Actual Labor	Corporate - Standa
786	NEWPROJ. ROSEWOOD ENCLAVE	02-Oct-14 A	29-Sep-17	62.1%					3,635,600.00	46,150.00	2,289,450.00	RS35,000.00	4,450.00	Corporate - Standa
11	NEWPROJ.1 GENERAL	02-Oct-14 A	23-Oct-14 A	100%					RS15,600.00	RS0.00	RS15,600.00	RS0.00	5,600.00	Corporate - Standa
A1000	MEETING	02-Oct-14 A	03-Oct-14 A	100%	A1000	ANUPAM	INCHARGE		RS2,400.00	RS0.00	RS2,400.00	RS0.00	2,400.00	Corporate - Standa
A1010	PLANNING	06-Oct-14 A	09-Oct-14 A	100%	A1000	ANUPAM	INCHARGE		RS3,600.00	RS0.00	RS3,600.00	RS0.00	3,600.00	Corporate - Standa
A1020	PRAPPOSE DESIGN	09-Oct-14 A	09-Oct-14 A	100%	A1010	ANUPAM	INCHARGE		RS1,200.00	RS0.00	RS1,200.00	RS0.00	1,200.00	Corporate - Standa
A1030	APPROVE DESIGN	10-Oct-14 A	13-Oct-14 A	100%	A1020	ANUPAM	INCHARGE		RS2,400.00	RS0.00	RS2,400.00	RS0.00	2,400.00	Corporate - Standa
A1040	RAW MATERIAL STORAGE	14-Oct-14 A	23-Oct-14 A	100%	A1030	RAMESH, GOVIND	SITE ENGINE		RS6,000.00	RS0.00	RS6,000.00	RS0.00	6,000.00	Corporate - Standa
135	NEWPROJ.2 SUB STRUCTURE	02-Oct-14 A	08-Apr-15 A	100%					RS546,950.00	RS0.00	RS546,950.00	RS35,000.00	1,950.00	Corporate - Standa
A1050	BEGIN BUILDING CONSTRUCTIO	17-Oct-14 A	24-Oct-14 A	100%	A1040	RAMBABU, CHAINLA	SUPERWISEF		RS25,200.00	RS0.00	RS25,200.00	RS0.00	5,200.00	Corporate - Standa
A1060	SITE PREPRATION	02-Oct-14 A	04-Nov-14 A	100%	A1050	VJAY, JCB, COMPAC	LABOUR, LAE		RS29,200.00	RS0.00	RS29,200.00	RS0.00	9,200.00	Corporate - Standa
A1070	EXCAVATION	05-Nov-14 A	02-Dec-14 A	100%	A1060	RAMNATH, MOHAN,	LABOUR, LAE		RS99,000.00	RS0.00	RS99,000.00	RS0.00	9,000.00	Corporate - Standa
A1080	INSTALL UNDERGROUND WATE	03-Dec-14 A	19-Dec-14 A	100%	A1070	RAMBABU, PIPE, CEI	SUPERWISEF		RS54,600.00	RS0.00	RS54,600.00	RS0.00	4,600.00	Corporate - Standa
A1090	INSTALL UNDER GROUND ELEC	22-Dec-14 A	01-Jan-15 A	100%	A1080	LAKHAN, BALRAM, N	ELECTRICIAN		RS30,600.00	RS0.00	RS30,600.00	RS0.00	6,600.00	Corporate - Standa
A1100	CONCRETE FOOTING	02-Jan-15 A	19-Jan-15 A	100%	A1090	VJAY, RAMNATH, MI	LABOUR, LAE		RS60,000.00	RS0.00	RS60,000.00	RS0.00	6,000.00	Corporate - Standa
A1110	CONCRETE FOUNDATION WALL	20-Jan-15 A	12-Feb-15 A	100%	A1100	VJAY, RAMNATH, MI	LABOUR, LAE		RS81,900.00	RS0.00	RS81,900.00	RS0.00	1,900.00	Corporate - Standa
A1120	SLAB	25-Feb-15 A	19-Mar-15 A	100%	A1110	PINTU, GOPAL, CEM	LABOUR, LAE		RS111,250.00	RS0.00	RS111,250.00	RS0.00	1,250.00	Corporate - Standa
A1130	BACKFILL AND COMPECT WALL	20-Mar-15 A	02-Apr-15 A	100%	A1120	PAPPU, LALLU, KISA	LABOUR, LAE		RS48,000.00	RS0.00	RS48,000.00	RS35,000.00	3,000.00	Corporate - Standa
A1140	FOUNDATION PHASE COMPLETE	03-Apr-15 A	08-Apr-15 A	100%	A1130	RAMBABU, LALLU, P.	SUPERWISEF		RS7,200.00	RS0.00	RS7,200.00	RS0.00	7,200.00	Corporate - Standa
501	NEWPROJ.3 SUPER STRUCTURE	09-Apr-15 A	02-Mar-17	36.68%					2,578,950.00	51,650.00	1,735,900.00	RS0.00	6,800.00	Corporate - Standa
A1150	ERECT STRUCTURE FRAME BLC	09-Apr-15 A	29-Apr-15 A	100%	A1140	VJAY, RAMNATH, RI	LABOUR, LAE		RS30,000.00	RS0.00	RS30,000.00	RS0.00	0,000.00	Corporate - Standa
A1160	BEGIN STRUCTURE PHASE BLDI	30-Apr-15 A	18-Jun-15 A	100%	A1150	PINTU, MOHAN, HAF	LABOUR, LAE		RS100,800.00	RS0.00	RS100,800.00	RS0.00	8,800.00	Corporate - Standa
A1170	FLOOR DECKING BLOCK A,B ANC	26-May-15 A	12-Jun-15 A	100%	A1160	RAJU, GOKUL, PAPP	LABOUR, LAE		RS66,500.00	RS0.00	RS66,500.00	RS0.00	6,500.00	Corporate - Standa
A1180	CONCRETE FIRST FLOOR BLOCK	15-Jun-15 A	03-Jul-15 A	100%	A1170	RAJU, MANOHAR, MI	LABOUR, LAE		RS89,250.00	RS0.00	RS89,250.00	RS0.00	9,250.00	Corporate - Standa
A1190	ERECT STAIRWALL BLOCK A,B A	06-Jul-15 A	07-Aug-15 A	100%	A1180	MANOHAR, RAJU, GI	LABOUR, LAE		RS110,000.00	RS0.00	RS110,000.00	RS0.00	0,000.00	Corporate - Standa
A1200	CONCRETE BASEMENT SLAB BL	25-Aug-15 A	11-Sep-15 A	100%	A1190	RAMNATH, MOHAN,	LABOUR, LAE		RS120,000.00	RS0.00	RS120,000.00	RS0.00	0,000.00	Corporate - Standa

Fig.2 Activity usage spreadsheet window



Activity ID	Activity Name	Start	Original Duration	Finish	Units %	Predecessor	Cost	Qtr 4, 2014	Qtr 1, 2015	Qtr 2, 2015						
A1090	INSTALL UNDER GROUND ELEC	22-Dec-14	9	01-Jan-15 A	100%	A1080	Planned Total	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
A1100	CONCRETE FOOTING	02-Jan-15 A	12	19-Jan-15 A	100%	A1090	Planned Total			RS60,000.00						
A1110	CONCRETE FOUNDATION WALL	20-Jan-15 A	18	12-Feb-15 A	100%	A1100	Planned Total			RS40,950.00	RS40,950.00					
A1120	SLAB	13-Feb-15 A	25	19-Mar-15 A	100%	A1110	Planned Total				RS48,950.00	RS62,300.00				
A1130	BACKFILL AND COMPECT WALL	20-Mar-15 A	10	02-Apr-15 A	100%	A1120	Planned Total					RS38,400.00	RS9,600.00			
A1140	FOUNDATION PHASE COMPLETE	03-Apr-15 A	4	08-Apr-15 A	100%	A1130	Planned Total						RS7,200.00			
501	NEWPROJ.3 SUPER STRUCTURE	09-Apr-15 A	501	02-Mar-17	36.68%		Planned Total						RS35,600.00	RS114,200.00	RS118,900.00	RS105,850.00

Fig. 3 Resource usage spreadsheet window

Activity and Resource usage spreadsheet window:

These show graphical representation of cumulative values activity usage and resource usage at any stage of the construction project. This is based on classic WBS layout. Based on the guidelines from literature review and methodology described, it was possible to monitor the progress of SDF construction project. Till now we have gone through step by step procedure followed in monitoring the project using Primavera P6. The numerical results obtained after following the previously mentioned methodology is discussed in the following sections.

A schedule is being created using the key dates of the activities. The baseline project start date is on 15th March 2011 and baseline project finish date is on 20th August 2012. The actual start of project was on 15th March 2011. It shows that the actual start of project was as per baseline schedule. After knowing the dates of all key activities, all the constituent activities are arranged sequentially and logically to form a schedule. This schedule shows a slow and ever increasing gap between baseline schedule and actual work progress. The actual progress started shifting from planned schedule, from the second activity mobile station of resources itself, Resource assignments and usage. The resource assignment window shows all the resource assignments, grouped by resource for the project. An approximate rate analysis was done to arrive at rates of individual resource groups, considering the various component resources. Most

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of the resources are taken as material. Machines are taken as non-labour and human involvement is listed as labour. The resource usage profile obtained using Primavera P6 shows that there has been a slight variation in the quantity of each resource used during the project life cycle. Tracking of the Standard design factory project tracking a project is very important in mega projects. While updating the schedule time to time, it was reviewed and the revised allocation of resources and the budgeted cost is estimated. All the associated resources of a project are tracked and kept record. The following details were obtained from calculations using data obtained from Primavera P6.

Original Project Duration(Days)	786
Unite Complete (in %)	62.1
Actual Labour Unit	44484
Remaining Labour Unit	27152

Table 2 results obtained from primavera

Summary of the results obtained from the case study lead to following conclusions.

- Project progress is 62.1% of the total work after consuming 72.48% of the total estimated project duration.
- Total Project Duration is 786 days.
- Actual labour unit is 44484 and remaining labour unit is 27152.

IV. CONCLUSION

The main objective of this study was to understand the role of monitoring and control in the progress and timely completion of a construction project. This objective was achieved through revision of literatures and methodologies involved in monitoring and control. For efficient recourse management planning and controlling of a construction project it is very necessary to use project management software. This study represents the importance of resource management in a large construction project. Only because of efficient resource management by Primavera P6 overall cost of a construction which sometimes increases due to wastage of recourse is controlled delay in time also decrease. The case study proved to be a guideline in understanding the progress of a residential colony construction project. The companies which do not use primavera software tools efficiently have to increase their investments in training and educating their employed project teams. In large construction project efficient resource management reduce the unwanted wastage of resource also cost of overall project. The use of such software's helps to complete the project on schedule time and cost.

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