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TRACKING AND MANAGEMENT OF CONSTRUCTION PROJECTS USING PRIMAVERA

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Abstract: *Construction industry is an integral component of a nation's infrastructure and industrial growth. Eventhough construction industry is the second largest industry in India, the growth of this industry has been differential across the nation. Proper planning, scheduling, tracking and application are the major parameters in construction industry. This study involves tracking of the ongoing construction and management of a new building using primavera. The tracking of the project during construction is necessary to control the variance in the project and to know the forecasting cost of the project. Construction planning and scheduling is one of the important tool in construction. In the present study the tracking and forecasting was done by a method called Earned Value Management (EVM). The importance of construction management has been reviewed and the tracking of ongoing residential building as well as the management of new construction of an apartment building has been done.*

Key Words: Planning, Scheduling, Construction Management, Tracking, Primavera, EVM

1. INTRODUCTION

The construction industry has been developed rapidly from the early days. One of the development was planning and scheduling using software. In construction industry, mostly used software for the planning and scheduling are MS Project and Primavera. But in India the use of the Primavera is rare and most of the construction has been taken place without the use of software which leads to extension of the duration and the cost of the project. In this study, the use and need of the project management software has been explained considering residential building and apartment building. The tracking was done in residential building and the management of the apartment building up to planning process using the project management software Primavera P6.R8.2.

1.1. PROJECT MANAGEMENT

Planning is important for any work to reach its goal and Proper Planning leads to excellent result. The three basic things needed for the planning of construction projects are scope, time and cost. The efficient planning in a construction project involves project management plan, managing scope, collecting requirements, creating WBS, defining activities and their relationships, sequencing the activities, duration of the activities and estimation. If any risk arises then steps are taken to minimize or remove the risk.

1.2. EARNED VALUE MANAGEMENT

Earned Value Management is the most frequently used performance measurement method. EVA looks at schedule, cost and scope performance measurements of a project together. To perform the earned value calculations, it is needed to determine the following three parameters:

- Planned Value (PV)
- Earned Value (EV)
- Actual Cost (AC)

The planned value is the cost of the work that has been budgeted for an activity or for the project during a certain time period. The estimations and budgets are established during Planning Process. The Actual Cost is the cost of the work including direct and indirect costs. The Earned Value is the value of work that has been completed to date. The EVM is categorized as shown in Fig.1

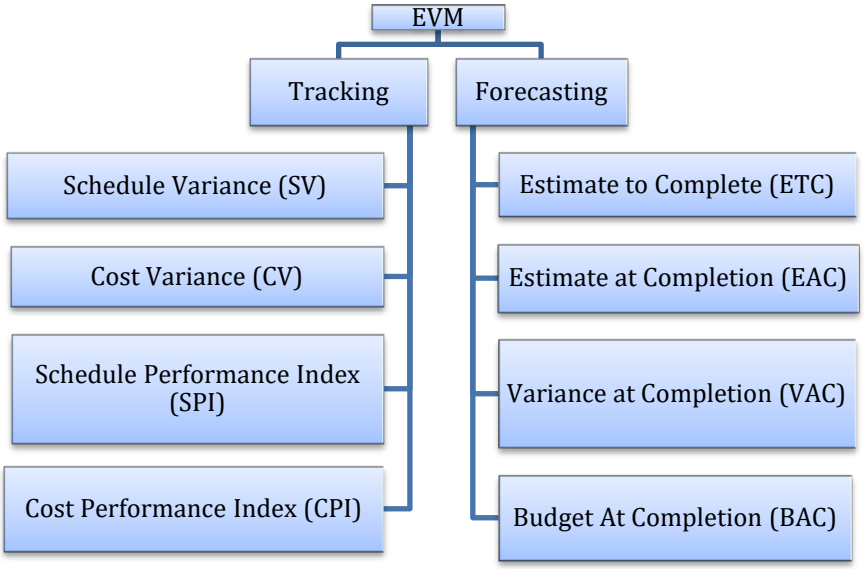

Fig-1: EVM Types

1.2.1. TRACKING:

Planning is important for the success of the project. To know the project has been executed according to the planning, tracking has been takes place. Tracking helps to stick to the plan during execution. The tracking is the process of analyses the updated schedule whether the cost and units of the project are beyond or ahead or equal of the planning. The tracking is done by EVM (Earned Value Management).

Tracking is comes under the process of monitoring and controlling of the construction project. Tracking of the project can be done after updating the project by monitoring. If the project is deviated from the schedule or cost it can easily be identified and controlling can be done.

- SV = EV - PV
- CV = EV – AC
- SPI = EV / PV
- CPI = EV / AC

a. Schedule Variance Cases

Case 1: if SV = 0 ; as per schedule, SPI =1
Case 2: if SV = -ve ; behind schedule, SPI <1
Case 3: if SV = +ve ; ahead schedule, SPI >1

b. Cost Variance Cases

Case 1: if CV = 0 ; as per budget, CPI =1
Case 2: if CV = -ve ; budget at over run, CPI <1
Case 3: if CV = +ve ; budget at under run, CPI >1

1.2.2. FORECASTING OF THE PROJECT

The forecasting is also done under EVM which helps us to know the forecasting end date of the project. It determines the estimation cost of the project during tracking and also the needed cost to complete the project till the end of the project. It helps to know the future performance of a construction project.

Case 1: if variance is not going to continue

ETC = BAC – EV
EAC = AC + ETC
EAC = AC + [BAC – EV]
VAC = BAC – EAC

Case 2: if variance is going to continue but affects only cost

ETC = [BAC – EV] / CPI
EAC = AC + ETC
VAC = BAC – EAC

Case 3: if variance is going to continue but affects the cost and schedule

ETC = [BAC - EV] / [CPI * SPI]
EAC = AC + ETC
VAC = BAC – EAC

where, PV is Planned Value
EV is Earned Value
AC is Actual Cost
SPI is Schedule Performance Index
CPI is Cost Performance Index
SV is Schedule Variance
CV is Cost Variance
ETC is Estimate to Complete
EAC is Estimate to Completion
VAC is Variance at Completion
BAC is Budget at Completion

2. APPLICATION OF PRIMAVERA SOFTWARE

The study involves tracking of ongoing construction project and management of new construction project of residential and apartment buildings respectively using the project management software Primavera.

2.1. TRACKING OF ONGOING CONSTRUCTION PROJECT

Tracking of the construction projects involves following steps:

- Getting Information of the Project from the Organisation
- Entering the Details of the Project in Primavera
- Monitoring the Execution of the Project
- Entering the Planned and the Actual Cost
- Tracking the Project
- Forecasting the Project
- Report and Conclusion

2.2. CONSTRUCTION MANAGEMENT OF NEW PROJECT

The management of the new construction project in Primavera software involves following steps:

- New Building Project
- Calendar Creation

- Work Breakdown Structure
- Define Activities
- Applying Durations
- Sequence of Activities
- Finding the Critical Path
- Creation of Resources
- Assigning the Resources into a task
- Analysing the Resources
- Levelling the Resources
- Creating Baseline
- Develop the Schedule
- Report Preparation

3. PROGRESS OF TRACKING OF A CONSTRUCTION PROJECT

The tracking of an ongoing project is located in Chennai. It is residential project. The plot area of the project is 2322 sq.ft and the built up area is 1357sq.ft. It is a G+1 building. After the drawing designs the project started with the preparation of documents on May 2nd 2016. The project contractor said the project would be finished in 9 months for the construction of the building which starts in Sep 2nd 2016 and the cost of the project is Rs.55 Lakhs. But during the scheduling of the project using management software Primavera the end date of the project was 24th Aug 2017 which is nearly to 1 year. The cost of the project is Rs.5842311.52 excludes the indirect cost of the building. The tracking has been done in four months.

The Table.1 shows the EVM parameters of tracking in four months

Table – 1: EVM of the tracking of the ongoing project

EVM Parameter	Tracking 1 Jan 31st 2017	Tracking 2 Feb 28th 2017	Tracking 3 Mar 31st 2017	Tracking 4 April 30th 2017
Budget at Completion	Rs.5842311.52	Rs.5842311.52	Rs.5842311.52	Rs.5842311.52
Planned value	Rs.1200890.29	Rs.1501963	Rs.2641957	Rs.3238450
Earned Value	Rs.1199770.29	Rs.1392929	Rs.1647009	Rs.2689678
Actual Cost	Rs. 1225770.29	Rs.1442429	Rs.1702143	Rs.27779012
Schedule Variance	Rs.1120	Rs. 109035	Rs.994948	Rs.548772
Cost Variance	Rs.26000	Rs. 49500	Rs.551341	Rs.89334
Schedule Performance Index	1	0.93	0.92	0.83
Cost Performance Index	0.98	0.97	0.97	0.97
Estimate at Complete	Rs.5869511.52	Rs. 5893012	Rs. 5893645	Rs.5932845
Estimate to Complete	Rs.4643741.24	Rs. 4450582	Rs.4196503	Rs.3153833
Planned schedule % complete	51.61%	54.97%	63.32%	68.48%
Actual Schedule % complete	20.55%	24.39%	45.21%	55.42%
Forecasting end date	Oct 14th 2017	Oct 19th 2017	Oct 25th 2017	Nov 7th 2017

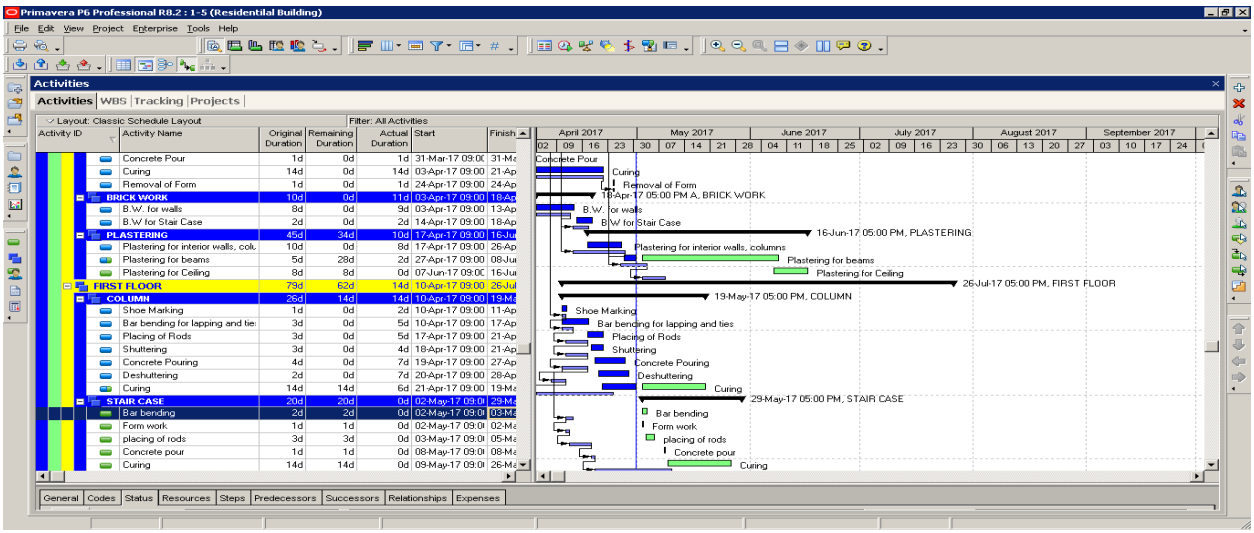

Fig-2: Updation of the Project

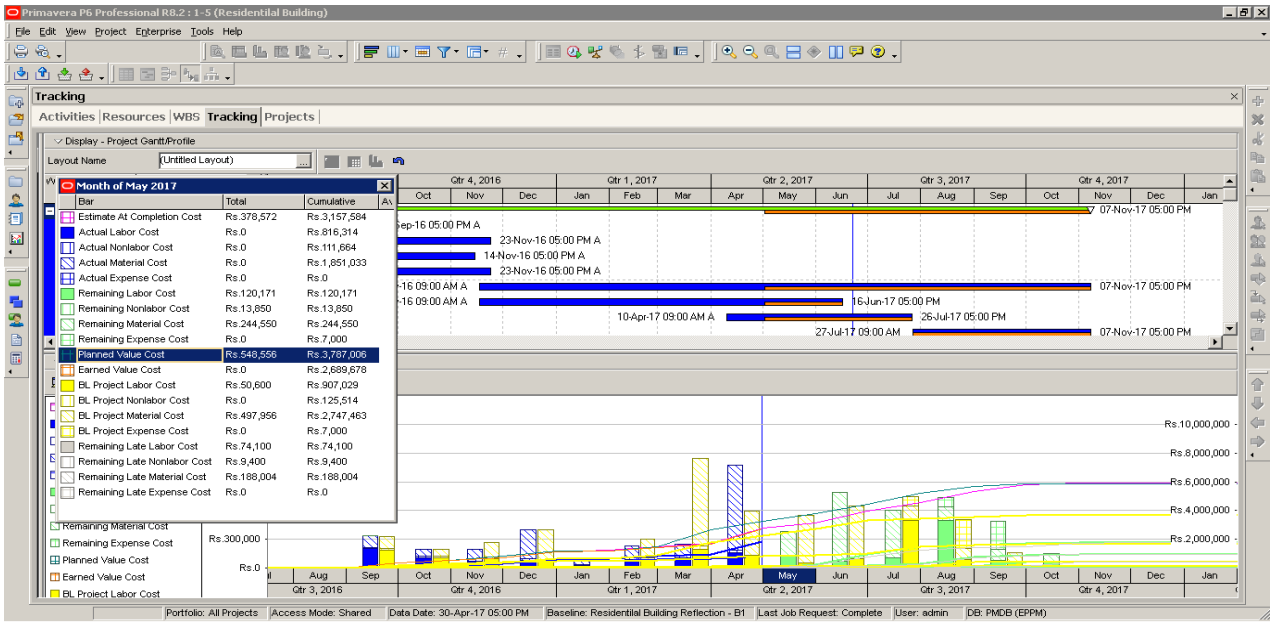

Fig-3: Tracking Cost of the Project

4. CONSTRUCTION MANAGEMENT OF NEW BUILDING

Managing the new construction project using the software of Primavera. The project has initiation and planning up to scheduling and estimation of the project. The project has the plot area of 2460 sq. ft. and building area of 2130 sq. ft. The project starts at August 7th 2017. The project has the Budgeted total cost of Rs.8072726. The projects finish date is Dec 5th 2019. It is G+2 building. It has car parking at ground floor and 3 flats in each floor. The building has been spacious and it is 2BHK apartment.

The planning and scheduling has been done in Primavera. The baselines also created to know the deviation in the project duration during execution. Then develop a schedule and report of the project.

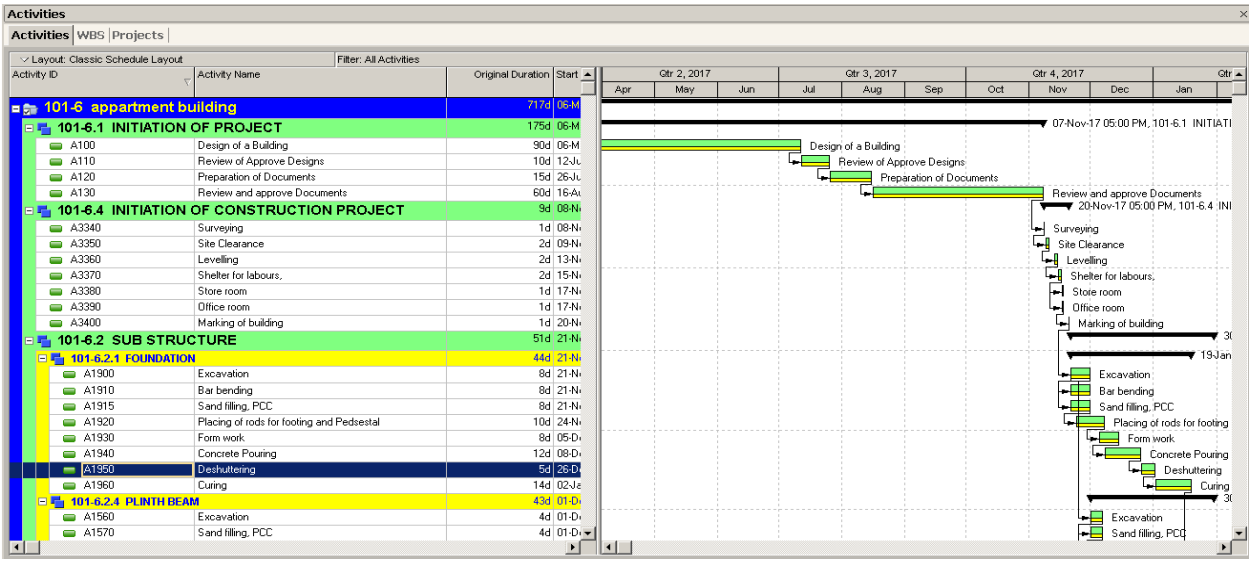

Fig-4: Scheduling of the apartment building

5. CONCLUSION

- Residential Project progress is 55.42% of the total work had been completed in the time period of 68.48% of the total project duration.
- Schedule variance index of a residential project is -0.17 therefore the residential building is 17% behind schedule.
- SPI is 0.83 says that the residential project is only 83% rate had been done as originally planned.
- CPI is 0.97 indicates that the project is only progressing at 97% of the originally planned rate.
- The original estimated completion of the project was 15 months but due to the natural calamities, shortage of labour and fund the duration had been extended to 3 months which has 18 months to complete the project.
- The project has a cost variance of Rs.89334 and cost variance index is -.03. A negative value of CV means that the project is over budget.
- Apartment building has a budgeted cost of Rs.8072726.
- The duration of the new management project is 22 months.

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