

Project Management Approach by Applying EVA to Construction Activities

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Abstract- Nowadays management of technical project is becoming a challenge to professional engineers. In the increasingly competitive marketplace and in the construction industry effective project planning and control approach is required. In spite of all the challenges it is very crucial to improve performance of a project with respect to its schedule and cost. Earned value analysis is an 'early warning' project management tool that will help managers to identify and control problems before they become unconquerable. Successful project managers demand EVA so that their project meets the technical objectives of the project as well as it is completed on schedule. EVA is an important tool in analyzing the performance of any construction projects. It measures the project progress and helps in identifying the critical activities thereby bringing the activities on schedule. So with the help of these one can easily be on time.

Keywords:- Project management, EVA

I. INTRODUCTION

Construction industry is one of the important sectors in India and is met with challenges every day. The industry contributes to the growth of our economy to a large extent. But in recent years an increasing number of government contracts are demanding earned value analysis report as many government contracts are project oriented. We all have heard the problem or the delays with completing the projects due to various reasons like deviation from initial plan, scarcity of resources, poor planning, poor execution, natural calamities, etc. which results in over budget and for government contractor there is more publicity when something goes wrong.

Earned value analysis is a management tool that integrates the scope, schedule and budget to project. EVA is a method of performance measurement. EVA is a project management technique that uses "work in progress" to indicate what is the status of the project and also helps to predict the future. EVA is enhancement over traditional accounting. It is "early warning" project management tool that enables managers to identify and control problems before they become unsolvable.

EV Indicators-

- 1) ACWP (AC) – Actual cost of work performed (ACWP) or Actual cost (AC) is the actual cost incurred for the activities that are performed in a given period.
- 2) BCWP (EV) – Budgeted cost of work performed (BCWP) or Earned value (EV) is the approximation sum of budget for actually completed work.
- 3) BCWS (PV)- Budgeted cost of work schedule (BCWS) or Planned value (PV) is the sum of the

approved cost of budget for all activities to be completed in a given time period .

- 4) Schedule Variance (SV) -the difference between the work actually performed (BCWS) and work schedule (BCWS).

$$SV = EV - PV$$

A negative schedule variance indicates that the project is behind schedule .

A positive schedule variance indicates that the project is ahead of schedule

- 5) Cost Variance (CV) -the difference between the planned cost of work performed (BCWP) and actual cost incurred for that performed work (ACWP).

$$CV = EV - AC$$

A Negative cost variance means the project is over budget

A positive cost variance means the project is under budget

- 6) Schedule Performance Index (SPI) – the ratio of work accomplished (BCWP) versus work planned (BCWS) for a specific time period
 $SPI = EV/PV$

SPI = 1 means that the project is on schedule

SPI less than 1 means the project is behind schedule

SPI greater than 1 means the project is ahead of schedule

- 7) Cost Performed Index (CPI) – the ratio of work performed (BCWP) to an actual cost (ACWP) .

$$CPI = EV/AC$$

CPI =1 means that the planned and actual cost are same

CPI less than 1 means that the project is under budget

CPI greater than 1 means that the project is over budget.

- 8) Budget AT Completion- is the baseline cost that shows the planned cost for a task to be performed by a resource.

- 9) Estimate at completion-the estimate at completion is the sum of actual cost in current till date.

Following fig shows EV indicators used for analyzing a project costwise and schedule wise

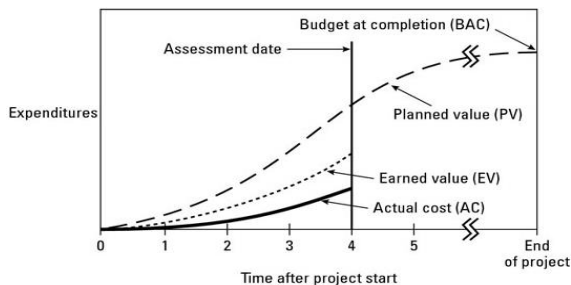


Fig No 01- EV Indicators

II. LITERATURE REVIEW-

EVM can provide a warning system to the project managers and thus helps in efficient project management. It can be sensitive to change scheduling in MSP proves to ease the scheduling of project. It is an important tool in analyzing that performance of construction project. It measures the progress of project and thereby bringing schedule of project. The analysis helped in critical areas. It assured that project is on time and within the budget. (Ganapathy Ramasamy N, Sandhya Suresh 2015)

Earned value analysis is better method of project management because it integrates cost, schedule and scope and can be used to forecast future performance and project completion dates. It is an “early Warning” project management tool. It allows project to be managed better on time and budget. It provides accurate forecast of project performance problems which are important project management. It is not a specific system or tool set, but rather a set of guidelines that guide a company’s management control system. (Gupta Radhika 2014)

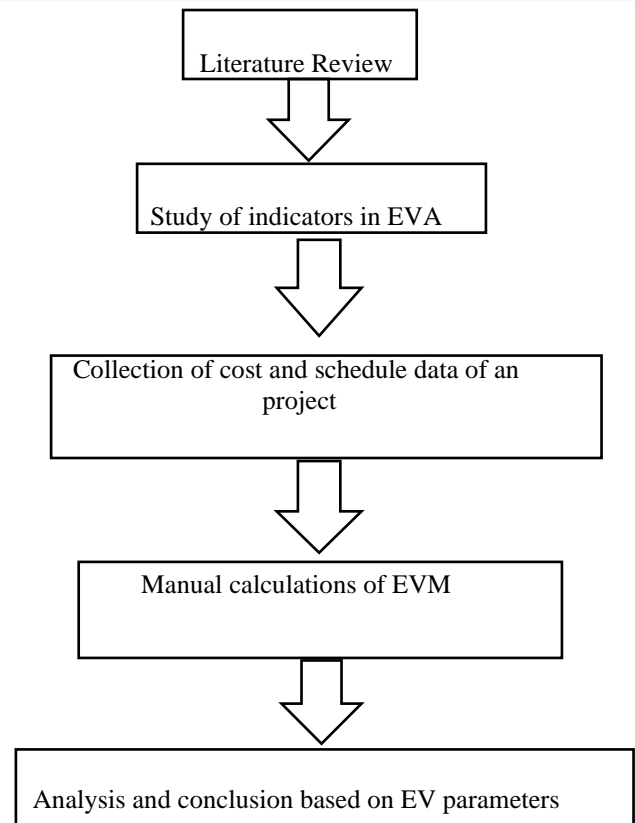
The infrastructure project has different complexities and uncertainties; hence the continuous project performance evaluation becomes necessary. Earned value analysis integrates cost, schedule and work performance to estimate the status of project. In earned value analysis comparison between planned baseline and actual progress of work is conducted. By studying the actual progress they have calculated EVM indicators and have resulted in telling if the project is overbudget or underbudget, and ahead or behind of schedule (Rajhans S .Mathpati, Dr A.S Wayal 2016)

III OBJECTIVES

- 1) To study Earned value analysis indicators used for PM
- 2) Selecting activities of residential construction and implementing EVA to selected activities
- 3) To identify benefits of EVA for project management

IV APPLICATION-

- This project is expected to be completed in 8 months. The EV analysis is done at 5th month. Based on the results and conclusion we will come to know actual cost and duration of the project.



- The first approach is to collect existing research and analysis that have been done on Earned value analysis
- The second approach is to study all the indicators of Earned value analysis and their formulas too
- The third approach is to collect schedule and cost data of an average project which is in progress so that EV analysis can be done and conclusion can be made regarding the future of project
- The fourth approach is to manually calculate all the terms of EVM using data collected
- The final approach is to make suitable conclusion based on schedule and cost indices obtained after Earned value analysis.

Table no 1-Calculations of EVM On A Residential Construction Site:

Activity ID	Activity	Start Month	Duration (months)	Cost in thousand (per month)
A	Excavation	1	1	400
B	Structural work	2	5	600
C	Walls	4	2	450
D	Windows and doors	5	1	1000
E	Miscellaneous expenses	5	1	400
F	Finishes	6	2	500

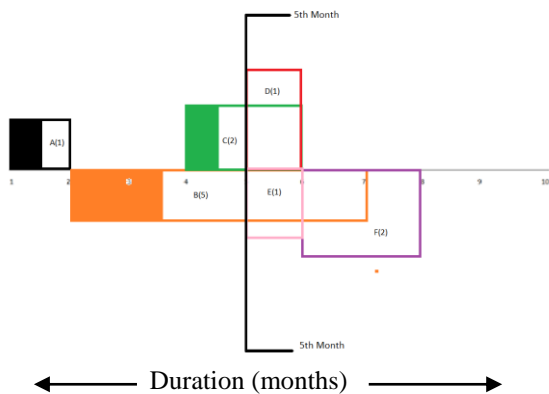


Fig No (1) Progress Status of Activity on Updating in 5th Month

Above Fig no 01 shows the logical and sequential order in which activities will be performed and accordingly duration required for performing the activities is given. Based on that it is estimated that 8 months are required to perform the project. Out of which assessment is carried on 5th month when the actual execution was going on

Table No 2% Completion Status Of Activity In 5th Month Of Project

Activity	% Complete	Actual Cost
A	50	250
B	50	1100
C	50	350
D,E,F	0	0

Table no 3 Activity wise Data after project in 5th month

Act	PV	AC	EV	CV	CPI	SV	SPI
A	400	250	200	-50	0.8	-400	0.5
B	1800	1100	900	-200	0.8	-900	0.5
C	450	350	225	-125	0.64	-225	0.5

Table no 3 indicates activity wise updating on 5th month. If we consider Activity A the CV value is negative and the CPI is less than 1 which indicates that particular activity is Overbudget. The value of SV is negative and the SPI is less than 1 which indicates that project is behind schedule

Table no 4 Data after updating project in 5th month

	PV	AC	EV	CV	CPI	SV	SPI
Project	2650	1700	1325	-375	0.77	-1325	0.5

Table no 4 indicates Project updating on 5th month. The value of CV is negative and the value of CPI is less than 1 which indicates that project is overbudget. The value of SV is negative and the value of SPI which indicates that project is behind schedule.

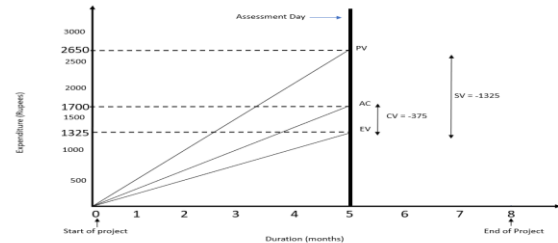


Fig No 2 Graph Showing Analysis of EV Indicator for selected project

- Fig No 2 is Graph. It is a graph of Cost and Time of project. The difference between the curve PV and curve EV shows schedule variance (behind). And the difference between curve AC and curve EV shows cost variance (over).

V CONCLUSION

- EVA is a effective project management tool which we have implemented for a small residential construction project .For this project the total project duration estimated was 8 months and status of project (assessment month) was work out on 5th month by comparing planned baseline and actual progress. Table no 3 & 4 gives values of earned value indicators which helps for performance measurement of project. For e.g. - Take activity B,CPI value is 0.81 which means for every 1 rupees that they have spent of activity B they have earned only 0.81 rupees till completion. For same activity CPI value is 0.5 which means it is progressing at 50% of what was actually planned .Thus it is warning system for a project manager and helps in effective project management that is it inspire management team to pay more attention towards cost, schedule & progress for effective management.

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