PERFORMANCE ANALYSIS OF A FLYOVER PROJECT

Ms.S.Preethi[1], Mr.K.Chandra Sekar[2]

[1]Student,M.E-Construction Engineering & Management, Builders Engineering College
[2]Assistant Professor, Department of Civil Engineering, Builders Engineering College
--***---

Abstract - *Every Project Manager and Owner wants the project to meet its technical requirement, complete it within the contract value i.e., Budget and on-time. It becomes necessary that the Project Manager has to use a tool to monitor the project in terms of scope, cost and schedule. Earned Value Management (EVM) is such a tool which helps Project Manager to measure the project's performance by comparing planned and actual results. It also helps to forecast the performance of the project and act as a 'early-warning' tool. EVM is a process which helps to measure, forecast and ultimately improve performance of the project.*

EVM integrates project's scope, schedule and resources and report Project's performance from the initiation phase to closing phase.

Key Words: EVM, Budget, Schedule, Performance, Forecasting.

1. INTRODUCTION

Earned Value is a project management technique that uses current progress to indicate what will happen to work in the future in terms of cost and time. In construction Industry, the term 'Management' is considered as a project based job where clients and contractors are always keen to observe performance indicators. These indicators represent financial and non-financial efficiency of project activities. Among these, the monitoring of financial indicators such as cost monitoring is an ongoing process and its importance cannot be undermined during the project lifecycle. It can be monitored by using traditional approach of direct reporting of actual cost against budget.

2. CASE STUDY

EVM provides early indications of expected project results based on project performance and forecasting of the project which creates an opportunity to take better decisions and highlights the possible need for corrective action. This study can be applied to various levels of a project WBS and to various cost components, such as labour, material and subcontractors. This study enables a contractor and his customer to monitor the progress of a project objectively and if desire in terms of cost schedule and technical performance values and helps them to be aware of the status of the project. EVM provides project managers and the organization with triggers or early warning signals that allow them to take timely actions in response to indicators of poor performance and enhance the opportunities for project success. Better planning and resource allocation associated with the early periods of a project might be the cause of this reliability.

This study deals with evaluating the performance of a Infrastructure Project. The study will be conducted on "Construction of Grade Separator at Km.1/8 of Erode-Perundurai-Kangeyam Road near Government Hospital" project undertaken by M/s.Renaatus Projects Pvt. Limited. The study includes developing a Work Breakdown Structure for the project activities in the contract period and monitoring the activities, in order to arrive the actual value of the work performed. The result of this study delivers the performance of the project based on Earned Value Management/Analysis. In addition to that, the reasons for the delay or early completion and cost over-run or on-budget schedule shall be analyzed.

3. OBJECTIVE

The primary objectives of performance analysis and forecasting are:

- To identify the budget overruns and potential schedule slippage

- To predict the future of the project based on present progress

- To determine if enough time remains to meet scheduled deliverable dates, complete the remaining work, and meet project objectives within the constraints of the project baseline schedule

- To determine if adequate resources are available to meet scheduled deliverable dates, complete the remaining work, and meet project budget objectives

- To provide insight so that the project management team can recommend or make decisions or take actions that favourably affect the performance of the remaining work.

4. SCOPE

EVM provides early indications of expected project results based on project performance and forecasting of the project which creates an opportunity to take better decisions and highlights the possible need for corrective action. e his study can be applied to various levels of a project WBS and to various cost components, such as labour, material and subcontractors. This study enables a contractor and his customer to monitor the progress of a project objectively and

in terms of cost schedule and technical performance values and helps them to be aware of the status of the project.

5. METHODOLOGY AND ANALYSIS OF EVM

Methodology is a systematic way to find out the result on the research problem.

- Field Data Collection

- Analysis of Data

- Forming Work Breakdown Structure

- Scheduling based on WBS

- Monitoring the Project and arriving S-Curve

- Analysis by EVM

- Forecast using EVM

- Delay/Cost Over-run analysis

- Recommendation (Corrective Action and Preventive Action)

In EVM Technique ,Cost Variance, Schedule Variance, Schedule Performance Index and Cost Performance Index shall be calculated to analyze the performance of the project.

6. DATA COLLECTION

Name of the Project	Construction of Grade Separator at Km. 1/8 of Erode-Perundurai-Kangeyam Road near Government Hospital
Site Location	Government Hospital Junction, Erode
Client	Government of Tamilnadu
Contractor	M/S. Renaatus Projects Pvt. Limited
Total Duration	24 months

6.1 STRUCTURAL COMPONENTS DETAILS

COMPONENTS	DETAILS
Main Arm	
Roadway	12m / 6.5m
Superstructure	RCC T-beam cum slab
Bearing	Pot cum PTFE bearing
Substructure	Pier-1800mm dia
Foundation	Isolated footing
Abutment Piers	Single column Pier - 1800mm dia
Government Hospital Arm	
Roadway	6.5m
Superstructure	RCC T-beam cum slab
Bearing	Pot cum PTFE bearing
Substructure	Pier-1800mm dia
Foundation	Isolated footing
Abutment Piers	Single column Pier - 1800mm dia
Perundurai road Side	
Roadway	6.5m
Superstructure	RCC T-beam cum slab
Bearing	Pot cum PTFE bearing
Substructure	Pier-1800mm dia
Foundation	Isolated footing
Abutment Piers	Single column Pier - 1800mm dia

There are three arms design for this flyover Main arm, GH arm, Perundurai road arm in Brough Road, GH Road and Perundurai Road respectively.

7.LITERATURE REVIEW

I] Project Performance Evaluation by Earned Value Analysis by Raveesh L R, Sundip Shenoy

This journal discusses about various parameters involved in the earned value analysis which influence the project performance and control. The study is conducted on Residential apartment of 2B+G+24 in Bengaluru. Project cost and schedule data's are collected and following steps were followed to analyze project performance,

- Cost vs Duration curve (S-Curve) is plotted for the planned value.
- For EVA analysis, parameters like PV,AV,EV,SV,SPI,CPI,EAC are calculated and compared.
- SPI and SV graph is plotted for cost and duration.

The parameters are used to do Earned value analysis and for the evaluation of project performance. This study also listed the reasons for the delay and cost over-run of the project

II] Monitoring system for Project Cost control in Construction Industry, by Pramod M, K.Phaniraj, V.Srinivasa

This study states that Earned Value analysis and Earned schedule concept are the two monitoring systems that can be used to monitor the construction project. In this journal two residential apartment block of similar plan are compared using Earned Value Analysis, one is already completed and another is an on-going project. The data collected are analysed using Primavera. The results obtained from Primavera are used for Earned value and Earned schedule analysis in Spreadsheet. The author states that 'it is sometimes confusing to say that a project is behind schedule in terms of money. And hence we have used Earned Schedule Analysis to find the actual delay of the project'. The author concluded that Earned schedule parameters gives the

appropriate data regarding the actual delay of the project .He also concludes that Earned value analysis

- is a great monitoring system for project cost control when the required information are cost oriented.
- parameters seem to deviate from actuals in later stages of the project.
- gives us more accurate results in terms of time.

III] Forecasting Project Performance using Earned Value Analysis, by Tania Deena Alex and Sahimol Eldhose

The author states that Earned value management is the process of measuring project performance against the baseline schedule. The paper deals with the planning, scheduling and cost management of a multi-storied building. Primavera P6 is used for the calculation of earned value, schedule variance, cost variance, schedule performance Index and Cost performance Index. The WBS, resource required to perform each task, expected cost to perform each task and duration are fed in P6 and EVM parameters are analyzed. The author concludes that project monitoring and control is made easier by earned value method using Primavera.

IV] Analysis of cost and schedule performance of residential building projects by EVM technique, by Antony Prasanth and K.Thirumalai Raja

In this paper, the author stated that Earned value is a program management technique that uses 'Work-in-progress' to indicate what will happen to work in future. This thesis used a case study conducted in a Residential building, Thirussur using EVA as a cost monitoring tool. The study reaffirms the benefits of using EVA for project cash flow analysis and forecasting. It states that EVA is a 'Early warning' program/project management tool that enables managers to identify and control problems before they become insoluble.

The study is carried over by collecting the data from field, evaluating the project performance by using variances and performance indices and forecasting the future with the data's analyzed. He concludes that based on project performance evaluation by earned value method the project team can activate a project control process to reorganize any issues and return the project more in line as possible to its scheduled course.

V] An Analysis on Resource planning, Cost Estimation and Tracking of Project by Earned Value Management, by Shaik Mohammad Masood, Devanand.R, Harsa H.N Sizing of Graphics

This paper deals with the scheduling and project monitoring process of a duplex apartment. The paper also discusses main parameters involved in the calculation of earned value analysis in cost and time management. Primavera P6 is used for project planning and EVM Calculations. This study concludes that EVM provides information for project work

package decision making. The author also states that Earned value analysis enables PM to spot the potential problem early in the project and provides time to correct the situation. He quotes EVM as 'remarkable' as it integrates cost, schedule and scope and can be used to forecast future performances and project completion dates. He recommends that future research should consider risk analysis , Quality and technical performance for efficient project control.

VI] WHY SHOULD CPI=1? by Walt Lipke Resolution

The expectation when applying EVM is to control performance such that Cost Performance Index (CPI) = 1.00. This paper examines that premise. Two influences are identified: Schedule and risk. Each is shown to have negative impact on CPI. Recognizing how the influence is exhibited, an alternative management approach is proposed.

I) CPI& Schedule

The focus in this discussion, the cost performance efficiency(CPIs) derived from the resource loaded schedule could be used as a measure of scheduling effectiveness. The skills gaps could be evaluated and minimized to create a more efficient and cost effective schedule indicated by a value of CPIs closer to 1.00 The value of CPIs, when the schedule is finalized and the project commences, planned cost performance efficiency. This cost performance expectation has a maximum value of 1.00. The inefficiency from the schedule gaps affects the Management Reserve (MR) needed. The amount of MR to compensate for the gaps is calculable using the following equation:

$$MR = BAC \times (CPI\text{-}1 - 1)$$

II) CPI& Risk

An observation from the presentation is that the potential risks are categorized in to two areas, known and unknown. For the known category the method recommends that plans be created and put into action on occurrence of the specific risk to mitigate impact.

For the unknown risks are to be handled using the same process with the exception that before action takes place the mitigation is planned. For this instance, some amount of the MR budget is allocated and made available for planning. Depending on the size of the action, may choose to not integrate the mitigation plan with the management. performance measurement baseline (PMB) but instead perform the necessary work using a portion of the available MR.

VII] Project duration forecasting .. A comparison of earned value management methods to earned schedule by Wait Lipke Vector Art

Five methods of project duration forecasting were examined in this study, four from EVM and the ES technique

Performance data from sixteen projects were used to assess the capabilities of the various forecasting methods. The analysis strategy segregated the project data into seven ranges of percent complete to isolate possible forecasting characteristics or tendencies among the methods.

Each of the methods was used to create forecasts from the project data. The standard deviation of the forecasts from the actual final duration was computed for each project and each percent complete range studied. The forecasting methods were then ranked from best to worst using the standard deviations. The tabulation of best forecasts, one of the four EVM methods or ES, for each range was used to calculate the test statistic for the Sign Test. The null hypothesis, EVM provides the better forecast, was rejected for every percent complete range examined. Conclusively, from among the methods and data set studied, ES is shown to be the best method of forecasting project duration.

3. CONCLUSIONS

This research shall provide early indication of the performance of the project at present , so that any delay or cost over-run in future shall be avoided. Using EVM tool in on-going flyover project is beneficial to both Client and Contractor to keep a track on the project and shall provide a buffer time to take any corrective and preventive actions.

REFERENCES

[1] Project Performance Evaluation by Earned Value Analysis by Raveesh L R, Sundip Shenoy, published in Journal of Emerging Technologies and Innovative Research, Volume 2,Issue 5,May 2015.

[2] Monitoring system for Project Cost control in Construction Industry, by   Pramod M, K.Phaniraj, V.Srinivasan, published in International Journal of Engineering Research & Technology, Volume 3, Issue 7, July 2014.

[3] Forecasting Project Performance using Earned Value Analysis, by Tania Deena Alex and Sahimol Eldhose, published in International Journal of Innovations in Engineering and Technology, Volume 5,Issue 1, February 2015.

[4] Analysis of cost and schedule performance of residential building projects by EVM technique, by Antony Prasanth and K.Thirumalai Raja, published in Journal of Construction Engineering, Technology and Management, Volume 4, Issue 1, May 2014.

[5] An Analysis on Resource planning, Cost Estimation and Tracking of Project by Earned Value Management, by Shaik Mohammad Masood, Devanand.R, Harsa H.N, published in International Journal of Engineering and Innovative Technology, Volume 4, Issue 4, October 2014.

[6] WHY SHOULD CPI=1? by Walt Lipke published in The Measurable News, 2011, Issue 2

[7] Project duration forecasting .. A comparison of Earned Value Management methods to earned schedule by Wait Lipke published in The Measurable News 2009, Issue 2.

[8] www.pmi.org