

A Guideline for application of Earned Value Analysis in Project Management

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I . Introduction

One of the most important aspects of managing and controlling the costs and schedules is to manage change. In relation to this change, the necessity of EVA (Earned Value Analysis) is induced and resulted in the creation of the EVMS (Earned Value Measurement System) (Kerzner, 2006). So, more and more companies and organizations are adopting EVA

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techniques for measuring project performance. It provides an objective measurement of performance that can be consistently applied to multiple projects. It can be used for relative comparisons of project performance across many different projects and types of projects. The objective of this paper is to answer at the following questions:

First, describe the advantages of earned value to an organization that has not used it before.

Second, propose guidelines an organization new to the concept might follow to implement EVA

II . Description of EVA concept

EVA (Earned Value Analysis) is to integrate project scope, cost (or resource) and schedule measures to help the project management team assess project performance. That is, EVA is considered to be the most effective tool for project control since it integrates scope, cost, and schedule. This means that the EVA simultaneously includes scope, cost and schedule area of nine areas in project management. So, we agree that EVA equals the integrated project management. We think that this integration function is the strongest point in EVA concept.

If any organization has not used EVA before, we can describe the advantages as follows.

First, although EVA is a sort of integration method, schedule and cost variances are isolated and reported to the project manager for corrective action. So project manager can make an optimal decision during the process.

Second, although it appears to be complex and the terminologies of PV (Planned Value), AC (Actual Cost) and EV (Earned Value) are a little difficult, such software as Microsoft Project tool can easily estimate the numbers. Lately, many organizations use it as a tool for project control. So, we can tell the EVA an easy accessible concept through my experience.

Third, EVA has various measurement methods as % complete, Fixed formula, Weighted milestones, % complete with milestone gates, Earned standards, Equivalent units etc

(Milosevic, 2003). So project manager can select the optimal method by the project character.

Fourth, EVA can be used as a tool to forecast actual completion dates and total project costs.

III. A Guidelines for an organization new to implement EVA

If we introduce the EVA concept to new organization, we can propose the guideline through the following questions. Below guideline intends to provide approaches for understanding the Earned Value Management System.

2.1 What is an EVA?

EVA is an industry standard way to measure a project's progress, forecast its completion date and final cost, and provide schedule and budget variances along the way. By integrating three measurements, it provides consistent, numerical indicators with which you can evaluate and compare projects.

2.2 What is the background of Earned Value approach?

The earned value approach evolved from the earlier PERT/Cost approach that was described in the influential 1962 document, *DOD and NASA Guide, PERT Cost Systems Design*. The PERT/Cost system was based on the principal that costs should be measured and controlled on a project basis rather than according to the functional organization of the firm. So EV approach is an extension of PERT/Cost (*Klastorin, 2004*).

2.3 When is it used?

This should be implemented as early as possible and at the important milestone time in a project's life cycle.

2.4 What is the application process of EVA?

Definition of scope > Work plan and schedule > Resource allocation > Confirmation of baseline > Management of total actual record > Performance analysis of cost/schedule > Change Management

2.5 What are three measures?

Basically, three measures are needed to construct an earned value system of performance evaluation: (1) Planned Value (PV): PV is the dollar value planned and assigned to the work or the deliverable in the WBS. (2) Actual cost (AC): The actual cost is the cost of performance to accomplish the work or provide the deliverable on the WBS. (3) Earned value (EV): Earned value is a measure of the project value actually obtained by the work package effort (*Goodpasture, 2004*).

2.6 What is the Related Performance Index?

Cost Variance: $CV = BCWP - ACWP$ / Schedule Variance: $SV = BCWP - BCWS$ / Cost Performance Index: $CPI = BCWP \div ACWP$ / Schedule Performance Index: $SPI = BCWP \div BCWS$ / Estimate to completion: $ETC = (BAC - BCWP) \div CPI$ / Estimate at Completion: $EAC = ETC + ACWP$ / Variance At Completion: $VAC = EAC - BAC$ / $SPI = BCWP \div BCWS$

For example, EVA metrics (Such as SPI, CPI, CV, SV, and EAC) are reported weekly in

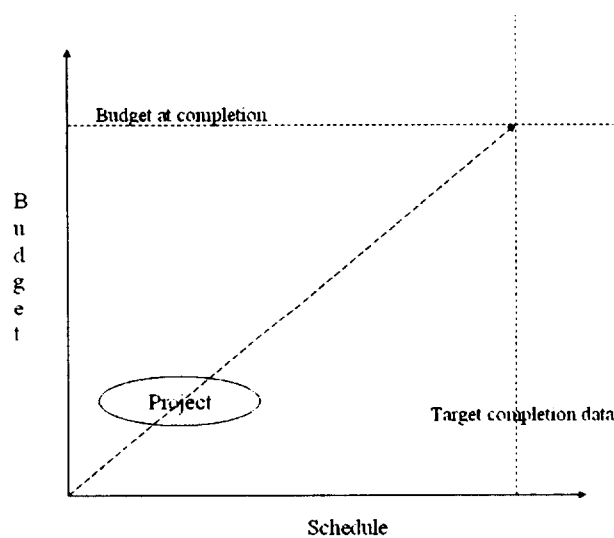
project status reports. The project manager provides additional status commentary for variances from target that exceed $\pm 10\%$ (Fleming, 2005).

2.7 How can the EVA be explained by graph?

The principal role of project manager is to monitor the budget and schedule (completion date) properly. The budget and schedule made through the project planning is managed by close date of project as the objective number of project.

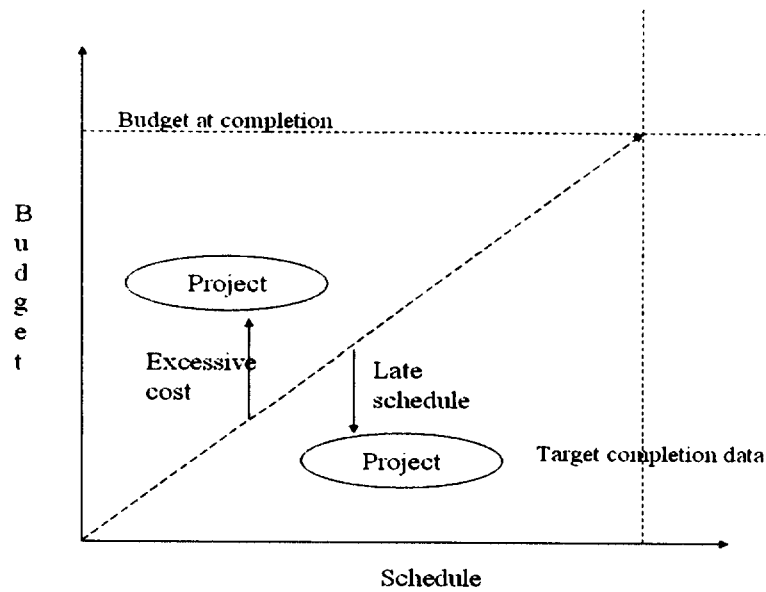
The following figure shows the proper level of budget and schedule as project date passes.

<Figure 1> Ideal project case in EVA



If EVA progress is ideal case as figure 1, the cost and schedule will be progressed by linear form from project execution to close date. However, in reality, project doesn't follow the anticipated linear equation. That is, late or early schedule and in budget or out of budget case are more realistic as follows.

<Figure 2> Realistic case in EVA



Based on above figure 2, we can show the example as the following table.

<Table 1> Example of EVA

CPI = EV / AC = 4 / 6 = 0.67 > 0.33 over cost	AC (6) - EV (4) - PV (6)		SPI = EV / PV = 4 / 6 = 0.67 > 0.33 behind schedule
	CV = EV - AV = (-) 2 > Excessive cost (Negative = Bad)	SV = EV - PV = (-) 2 > Late Schedule (Negative = Bad)	

In result, above example shows the over cost / over schedule. That is, If the difference is negative, we are over budget and behind schedule.

Actually, project manager always must check the cost and schedule and so, can complete

the project successfully.

2.8 What is the bottleneck of EVA?

The core of EVA is in budget and schedule. If we can estimate the two numbers, EVA can easily be calculated automatically. So it is difficult to estimate the exact budget and schedule. We think that this estimation of budget and schedule is a sort of bottleneck in EVA. If there is no similar benchmarking and historical data, it depends on expert's know how. So in order to approach with quantitative method, first of all, Lessons Learned needs to be cumulated.

2.9 What are the indicators for correction action and how we can report after EVA?¹⁾

There are many clues that indicate a possible need for corrective action as follows.

- Schedule slippage on critical path activity
- Negative schedule variance
- Cost overruns
- Negative cost variance
- Inability to resolve problems promptly
- Insufficient or inadequate resources
- Large number of changes
- Quality problems and excessive rework

After all of the EVA, How can we report?

- Focus on exceptions.

1) *We referred the various materials related to EV and listed it.*

- Emphasize the extraordinary and downplay the ordinary.
- Status reports should not be a regurgitation of the project plan
- Report details as explicitly and objectively as possible.
- Avoid terms such as “reasonably well”. Be specific
- Report as little as possible, as simply as possible.
- Take responsibility for issues and problems by providing proposed resolutions etc.

IV. Results

Earned Value Analysis (EVA) is to integrate project scope, cost (or resource) and schedule measures to help the project management team assess project performance. That is, EVA is considered to be the most effective tool for project control since it integrates scope, cost, and schedule. This means that the EVA simultaneously includes scope, cost and schedule area of nine areas in project management.

The objective of this paper is to describe the advantages of earned value to an organization that has not used it before and to propose guidelines an organization new to the concept might follow to implement EVA

If any organization has not used EVA before, we can describe the advantages. First, project manager can make an optimal decision during the process. Second, we can tell the EVA an easy accessible concept through the experience. Third, project manager can select the optimal method by the project character. Fourth, EVA can be used as a tool to forecast actual completion dates and total project costs.

REFERENCES

- Fleming W.(2005), Earned Value Project Management, *Project Management Institute*, 3rd Edition.
- Goodpasture John G.(2004), Quantitative Methods in Project Management, *J. Ross. publishing Inc.*
- Kerzner, H.(2006). Project Management Best Practices, *New Jersey: John Wiley and Sons.*
- Klastorin, T.(2004). Project Management: Tools and Trade offs. *New Jersey: John Wiley and Sons.*
- Milosevic D. Z.(2003), Project Management ToolBox Tools and Techniques for the Practicing
Project Manager, *John Wiley & Sons, Inc.*
- <http://www.stsc.hill.af.mil/crosstalk/>

