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Enabling Performance for Businesses through Software

Earned Value Management - An Overview

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Introduction

- Earned Value Management (EVM) is a technique used to track Progress and Status of a Project & forecast the likely future performance of the Project
- EVM technique integrates the Scope, Schedule and Cost
- Good Planning coupled with effective use of the EVM Technique will reduce a large amount of issues arising out of Schedule and Cost Overruns
- EVM technique answers a lot of questions to the stakeholders in a project, related to the performance of the project
- EVM technique can be used to show past performance of the project, current Performance of the Project and predict the future performance of the project by use of Statistical techniques

Basic Elements of EVM

- Basic elements of the EVM Technique are the Planned Value (PV), Earned Value (EV) & Actual Cost (AC)
- They are also referred to as Budgeted Cost of Work Scheduled (BCWS), Budgeted Cost of Work Performed (BCWP), Actual Cost of Work Performed (ACWP)
- All the three elements are captured on a regular basis as of a reporting date
PV or BCWS is the Cost of the Work Scheduled/Planned as of a Date
EV or BCWP is the Cost of the Work Completed/Performed as of a Date
- AC or ACWP is the Actual Cost taken to Complete the Work as of a Date

Calculation of the Basic Elements

- All these three basic elements can be derived from the Work Break Down Structure by associating the costs to each of the tasks. These values can be easily extracted from Scheduling Software like Microsoft Project Plan
- It is too tedious to calculate these elements manually especially if the project has a lot of tasks. Our suggestion is to use the Scheduling Software to get these details
- For theory on how these elements are calculated, please refer the following publications for detailed explanation
- PMI Practice Standard for EVM – www.pmi.org
- NASA EVM Guidelines – www.evm.nasa.gov
- Wikipedia - http://en.wikipedia.org/wiki/Earned_value_management

Schedule Variance (SV)

- Schedule Variance can be calculated using the below formula
 - Schedule Variance (SV) = Earned Value (EV) – Planned Value (PV)OR
 - Schedule Variance (SV) = BCWP – BCWS
- Schedule Variance indicates how much ahead or behind schedule the project is
- The formula mentioned above gives the variance in terms of Cost which will indicate how much cost of work is yet to be completed as per schedule or how much cost of work has been completed over and above the scheduled cost
- Positive Variance indicates we are ahead of Schedule
- Negative Variance indicates we are behind Schedule

Schedule Variance % (SV %)

- Schedule Variance % can be calculated using the below formula
 - $SV \% = \text{Schedule Variance (SV)} / \text{Earned Value (EV)}$
OR
 - $SV \% = SV / BCWP$
- Schedule Variance % indicates how much ahead or behind schedule the project is in terms of percentage
- The formula mentioned above gives the variance in terms of percentage which will indicate how much percentage of work is yet to be completed as per schedule or how much percentage of work has been completed over and above the scheduled cost
- Positive Variance % indicates % ahead of Schedule
- Negative Variance % indicates % behind Schedule

Schedule Performance Indicator (SPI)

- Schedule Performance Indicator can be calculated using the below formula
 - $SPI = \text{Earned Value (EV)} / \text{Planned Value (PV)}$ Schedule Perform
- OR
- $SPI = BCWP / BCWS$
- Schedule Performance Indicator is an Index showing the efficiency of the Time utilized on the Project
- The formula mentioned above gives the efficiency of the project team in utilizing the time allocated for the project

Schedule Performance Indicator (SPI) - continued

- An SPI value above 1 indicates project team is very efficient in utilizing the time allocated to the project
- An SPI value below 1 indicates project team is less efficient in utilizing the time allocated to the project

To Complete Schedule Performance Indicator (TSPI)

- To Complete Schedule Performance Indicator can be calculated using the below formula
 - $TSPI = (Total\ Budget - EV) / (Total\ Budget - PV)$
 - OR
 - $TSPI = (Total\ Budget - BCWP) / (Total\ Budget - BCWS)$
- To Complete Schedule Performance Indicator is an Index showing the efficiency at which the remaining Time on the Project should be utilized
- The formula mentioned above gives the efficiency at which the project team should utilize the remaining time allocated for the project

To Complete Schedule Performance Indicator (TSPI) - continued

- A TSPI value below 1 indicates the project team can be lenient in utilizing the remaining time allocated to the project
- A TSPI value above 1 indicates project team needs to work harder in utilizing the remaining time allocated to the project

Cost Variance (CV)

- Cost Variance can be calculated using the below formula
 - Cost Variance (CV) = Earned Value (EV) – Actual Cost (AC)
OR
 - Cost Variance (CV) = BCWP – ACWP
- Cost Variance indicates how much over or under budget the project is
- The formula mentioned above gives the variance in terms of Cost which will indicate how much less or more cost has been spent to complete the work as of date
- Positive Variance indicates we are under budget
- Negative Variance indicates we are over budget

Cost Variance % (CV%)

- Cost Variance % can be calculated using the below formula
 - $CV \% = \text{Cost Variance (SV)} / \text{Earned Value (EV)}$
- OR
- $CV \% = CV / BCWP$
- Cost Variance % indicates how much over or under budget the project is in terms of percentage
- The formula mentioned above gives the variance in terms of percentage which will indicate how much less or more money has been used to complete the work as planned in terms of percentage
- Positive Variance % indicates % under Budget
- Negative Variance % indicates % over Budget

Cost Performance Indicator (CPI)

- Cost Performance Indicator can be calculated using the below formula
 - $CPI = \text{Earned Value (EV)} / \text{Actual Cost (AC)}$
 - OR
 - $CPI = \text{BCWP} / \text{ACWP}$
- Cost Performance Indicator is an Index showing the efficiency of the utilization of the resources on the Project
- The formula mentioned above gives the efficiency of the utilization of the project resources allocated to the project
- A CPI value above 1 indicates efficiency in utilizing the resources allocated to the project is good
- A CPI value below 1 indicates efficiency in utilizing the resources allocated to the project is not good

To Complete Cost Performance Indicator - TCPI

- To Complete Cost Performance Indicator can be calculated using the below formula
 - $TCPI = (Total\ Budget - EV) / (Total\ Budget - AC)$
 - OR
 - $TCPI = (Total\ Budget - BCWP) / (Total\ Budget - ACWP)$
- To Complete Cost Performance Indicator is an Index showing the efficiency at which the resources on the Project should be Utilized for the remainder of the Project
- The formula mentioned above gives the efficiency at which the project team should be utilized for the remainder of the project

To Complete Cost Performance Indicator (TCPI) - continued

- A TCPI value below 1 indicates utilization of the project team for the remainder of the project can be lenient
- A TCPI value above 1 indicates utilization of the resources for the remainder of the project should be stringent

Budget At Completion (BAC)

- Budget At Completion (BAC) is the Total Budget allocated to the Project
- Budget At Completion (BAC) is generally plotted over time. Say like periods of reporting (Weekly, Monthly, etc)
- BAC is used to compute the EAC (Estimate at Completion)
- BAC is also used to compute the TCPI and TSPI

Estimate To Complete (ETC)

- Estimate to Complete (ETC) is the Estimated Cost required to complete the remainder of the Project
- Estimate to Complete (ETC) is calculated and applied when the past estimating assumptions become invalid and a need for fresh estimates arises
- ETC is used to compute the EAC (Estimate at Completion)

Estimate At Completion (EAC)

- Estimate At Completion (EAC) is the Estimated Cost of the Project at the end of the Project
- There are three methods of calculation of the EAC
 - **Variations are typical** - This method is used when the variations at the current stage are typical and are not expected to occur in the future
 - **Past Estimating Assumptions are not valid** - This method is used when the past estimating assumptions are not valid and fresh estimates are applied to the project
 - **Variations will be present in the future** - This method is used when the assumption is that the current variations will be continue to be present in the future

Estimate At Completion (EAC)

- The formula for calculation of the three methods are as below
 1. $AC + (BAC - EV)$
 2. $AC + ETC$ (Estimate to Complete)
 3. $AC + (BAC - EV) / CPI$

Variance At Completion (VAC)

- Variance At Completion (VAC) is the Variance on the Total Budget at the end of the Project



Thank You