

Performance Managment

Lecture: 5

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Project Management Performance Metrics

- ***Performance Metric #1: Schedule and Effort/Cost Variance***
- ***Performance Metric #2 – Productivity: Resource Utilization***
- ***Performance Metric #3: Change requests to Scope of work***
- ***Performance Metric #4: Quality and Customer Satisfaction***
- ***Performance Metric #5: Gross Margin***

Performance Metric #1: Schedule and Effort/Cost Variance

Earned Value Management (EVM)

- **EVM** is a project performance measurement technique that integrates scope, time, and cost data

Planned value (PV)

- The **planned value (PV)**, is the approved value of the work to be completed in a given time period; i.e. *it is the money that you should have spent as per the schedule.*
- $PV = (\text{Planned \% Complete}) \times (\text{BAC})$
- Budget at Completion (BAC)
- You have a project to be completed in 12 months and the total cost of the project is \$100,000. Six months have passed and the schedule says that 50% of the work should be completed.

What is the Planned Value?

Planned value: Answer

Project duration – 12 months

Project Cost (BAC) – \$100,000

Time elapsed – 6 months

Percent complete – 50% (as per the schedule)

The definition of Planned Value says that Planned Value is the value of the work that should have been completed so far (as per the schedule).

Therefore, in this case we should have completed 50% of the total work.

Planned Value = 50% of value of the total work

= 50% of BAC

= 50% of \$100,000

= $(50/100) \times \$100,000$

= \$50,000

Therefore, Planned Value (PV) is \$50,000

Earned value (EV)

- The **Earned value (EV)**, is the value of the work actually completed to date; i.e. it is the value of the project that you have earned so far.
- Earned Value is also known as the Budgeted Cost of Work Performed (BCWP).
- **Rate of performance (RP)** is the ratio of actual work completed to the percentage of work planned to have been completed at any given time during the life of the project or activity
- Example: You have a project to be completed in 12 months and the total cost of the project is \$100,000. Six months have passed and \$60,000 is spent, but on closer review you find that only 40% of the work is completed so far.

What is the Earned Value (EV)?

Earned value: Answer

From the above question you can clearly see that only 40% of the work is actually completed.

The definition of Earned Value says that it is the value of the project that has been earned.

In this case only 40% of the work has been completed.

Earned Value is = 40% of value of total work
= 40 % of BAC
= 40% of \$100,000
= $0.4 \times \$100,000$
= \$40,000

Or $RP = (40/50) * 100 = 0.8 * 100 = 80\%$

$PV = 50,000$ then $EV = PV * RP = 50,000 * 0.80 = 40,000$

Actual Cost (AC)

- The **Actual Cost** is the total cost incurred for the actual work completed to date; i.e. *it is the amount of money you have spent till now.*
- Actual Cost is also known as the Actual Cost of Work Performed (ACWP).
- Example:

You have a project to be completed in 12 months and the total cost of the project is \$100,000. Six months have passed and \$60,000 is spent, but on closer review you find that only 40% of the work is completed so far.

What is the Actual Cost (AC)?

Actual Cost : Answer

Finding the Actual Cost (AC) is simplest of all.

As per the definition of Actual Cost, it is the amount of money that you have been spent so far.

And in our question, you have spent \$60,000 on the project so far.

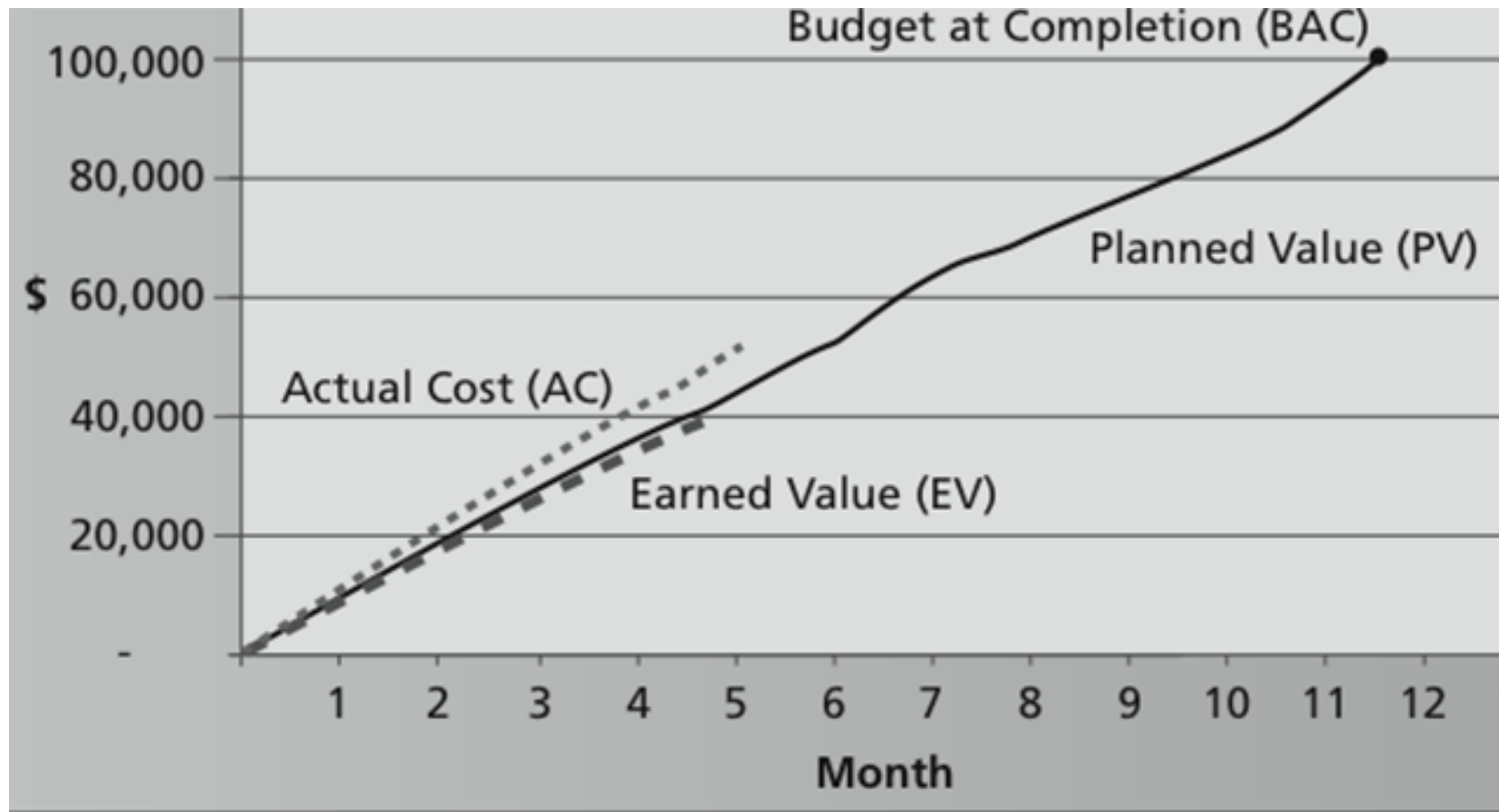
Actual Cost is \$60,000

Earned Value Formulas

TERM	FORMULA
Earned Value	$EV = PV \text{ to date} \times RP$
Cost Variance	$CV = EV - AC$
Schedule Variance	$SV = EV - PV$
Cost Performance Index	$CPI = EV/AC$
Schedule Performance Index	$SPI = EV/PV$

- Example:
 - $CPI = 40.000 / 60.000 = 66\%$
 - $SPI = 40.000 / 50.000 = 80\%$

Earned Value Chart for Project after Five Months



.... Actual Cost (AC) — Planned value (PV) - - - Earned Value (EV)

Earned Value example

Consider a project where the work has to be completed in two months in Rs 20,000. Cost breakdown is Rs.10,000 for each month. The work scheduled in each month is half of the total work to be completed.

By the end of the first month, the project has completed only 25% of the total work to be completed, but the cost utilised is that of 50% of the total work.

Also given that, for completion of 25% work, the actual cost(AC) incurred =50% of total budgeted cost
=10,000

Now from given data :-

The planned value(PV) for the work to be completed by the end of the first month

=50% of total

=50% of 20,000

=10,000

Earned Value example

The rate of performance(RP)= Percentage of ratio of work actually completed to the work scheduled to be completed
$$=(25/50) \times 100$$

=50%

This implies that only half of the work scheduled to be completed by the end of the first month has been completed.

Now, the earned value(EV) or the value of the work actually completed in monetary terms

=Rate of performance X Planned Value of work to be completed till the first month (EV = PV X RP)

=50% of 10,000

=5,000

This implies that we have utilised Rs.10,000(AC) for the work which should have utilised Rs. 5,000(EV) according to our budget.

Earned Value example

Cost variance(CV)=EV - AC

=5,000-10,000

=-5,000

Cost performance index(CPI)=EV / AC

=5,000/10,000

=1/2

Schedule variance(SV)=EV - PV

=5,000-10,000

=-5,000

Schedule performance index(SPI)=EV / PV

=5,000/10,000

=1/2

Rules of Thumb for Earned Value Numbers

- Negative numbers for cost and schedule variance indicate problems in those areas
- CPI and SPI less than 100% (or value=1) indicate problems
- Problems mean the project is costing more than planned (over budget) or taking longer than planned (behind schedule)

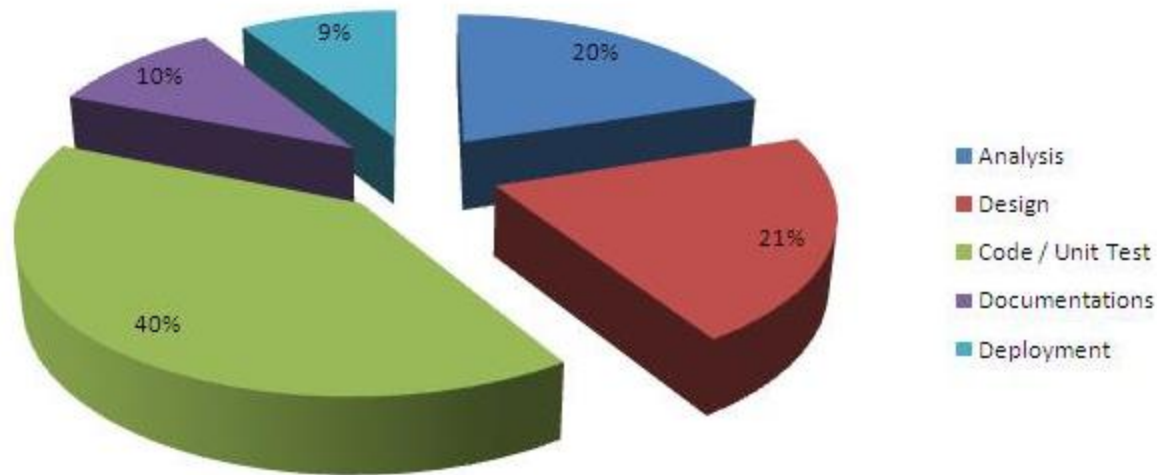
Performance Metric #2 – Productivity: Resource Utilization

- The objective of this metric is to measure productivity of resources involved in project and let PM assess over or under-utilization cases.
- $\text{Utilization\%} = \frac{\text{Total Effort spent by resource}}{\text{Total Budgeted Effort for the resource}}$
- Budgeted effort is the planned billable work of resource.
- Any over-utilization and under-utilization indicated by this metric has an impact on the project's profitability.
- For e.g. Effort distribution can tell PM that how much effort is being spent on defect resolution, customer support or design activities.

Performance Metric #2 – Productivity: Resource Utilization

- Example: Development effort distribution

Development Effort Distribution



Performance Metric #3: Change requests to Scope of work

- Signed Scope baseline with customer forms the baseline for the entire project planning and development. Any change to signed scope should happen in controlled manner.
- So here comes another important metric for PM to track i.e. the number of change requests coming from customer for the already signed scope of work.

Performance Metric #3: Change requests to Scope of work

- Each and every change request, once approved by internal change control board (**CCB**), requires update to Scope baseline which in turn has a cascade impact on cost baselines and schedule baselines and resource plans.
- PM should never allow such scope creep.
- In case of acceptance of change request, the impact on project cost and schedule should be clearly communicated in written form to customer and a written agreement from customer secured on those from customer before proceeding.

Performance Metric #4: Quality and Customer Satisfaction

- Throughout the execution of project, Quality Assurance should always be on the radar of project manager.
- **Quality** here is defined as the number of severe, medium or low defects delivered through the lifetime of the project.
- It indicates the health of the deliverable to the end user and drives the Customer Satisfaction.
- Quality should be reported throughout the life of the project
- **Defect density = Total number of defects found/ Measure of size.**

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Performance Metric #4: Quality and Customer Satisfaction

- **Defect age**
 - Number of days since the defect is open and not fixed. It can also be inferred as the time customer has been waiting for their issues to get resolved.
- **Defect resolution rate = Total number of defects resolved/ Total effort spent**
 - Rate of closing the open defects over a period of time.

Performance Metric #4: Quality and Customer Satisfaction



Performance Metric #5: Gross Margin

- **Gross margin (GM)** is basically the difference of total revenue and the total cost spent on project i.e. profit.
- When a project is started, certain GM levels for the project are approved by project sponsor.
- Project **PNL** (Profit and Loss) statement gives a way to PM for tracking his/her projects GM metric at any point of time.
- All the above four project management performance metrics impact this metric, if not handled in controlled manner.
- A good organizational level PNL tool rather than manual excel sheets reduces the overhead on PM