## Earned Value Management (EVM)

Earned Value Management (EVM) is a critical technique in project management used to monitor and control project performance and progress. It integrates project scope, time, and cost measures to help assess project performance and predict future outcomes. Here's an explanation of EVM and its key components.

1. **The Budget at Completion (BAC)** represents the total budget allocated for the entire project. In many cases, the BAC is given directly in the project documentation.

2. **Planned Value (PV)**: This represents the value of work that was planned to be accomplished within a given timeframe. It is essentially the budgeted cost for the scheduled work. In many cases, the PV is not given directly in the project documentation.

$$\text{PV for the given period} = \frac{\text{The project completion}}{\text{The project duration}} \times \text{BAC}$$

3. **Earned Value (EV)**: This represents the value of work actually completed to date, expressed in terms of the budget assigned to that work. It shows the monetary value of the work actually performed.

   EV=Percentage of Work Completed × Budget at Completion (BAC)

   Ex:
   Total Budget (BAC): 100,000
   Percentage of Work Completed: 40%

   EV=Percentage of Work Completed × BAC
   EV=0.40×100,000
   EV=40,000

4. **Actual Cost (AC)**: This represents the actual cost incurred for the work completed to date. It shows the real expenses spent on the project so far.

EVM uses the following formulas to compare planned progress and actual progress and to evaluate project performance:

1. **Cost Variance (CV)**:

CV = EV − AC

This measures the cost performance of the project by comparing earned value to actual cost. **A positive CV** indicates that the project is under budget.

2. **Schedule Variance (SV)**:

SV = EV − PV

This measures the schedule performance of the project by comparing earned value to planned value. **A positive SV** indicates that the project is ahead of schedule.

3. **Cost Performance Index (CPI)**:

CPI = EV / AC

This measures cost efficiency. A **CPI greater than 1 indicates** that the project is performing well in terms of cost efficiency.

4. **Schedule Performance Index (SPI)**:

SPI = EV / PV

This measures schedule efficiency. **An SPI greater than 1 indicates** that the project is performing well in terms of schedule efficiency.

EVM is a powerful project management tool that helps project managers and stakeholders understand project performance in a comprehensive manner. By using EVM, they can identify deviations from the plan early and take corrective actions to keep the project on track.

**Example 01 :**

You are managing a project with a total budget of $150,000, scheduled to be completed in 12 months. By the end of the 6th month, The project is estimated to be 50% complete. Actual Cost (AC): $70,000

Using this information, calculate the following:

1. Earned Value (EV)
2. Planned Value (PV)
3. Cost Variance (CV)
4. Schedule Variance (SV)

5. Cost Performance Index (CPI)
6. Schedule Performance Index (SPI)

**Example 02 :**

You are managing a project with a total budget of $200,000, scheduled to be completed in 10 months. By the end of the 4th month, you have the following data:

- The project is estimated to be 40% complete.
- Actual Cost (AC): $90,000

Calculate the following:

1. Earned Value (EV)
2. Planned Value (PV)
3. Cost Variance (CV)
4. Schedule Variance (SV)
5. Cost Performance Index (CPI)
6. Schedule Performance Index (SPI)