

1. Assume that operations on a work package were expected to cost \$1500 to complete the package. They were originally scheduled to have been finished today. At this point, however, we have actually expended \$1350 and we students estimate that we have completed two-thirds of the work. What are the cost and schedule variances? Calculate CPI, SPI, ETC & EAC. Interpret the results (what does it all mean).

Cost variance = Earned value - Actual Cost

Earned value = Actual completion(%) * Budgeted at completion cost

$$\text{Earned value} = \frac{2}{3} * 1500 = \$1000.$$

$$\text{Cost variance} = \$1000 - \$1350 = \underline{\underline{-\$350}}$$

Schedule Variance = Earned value - Planned Value

Planned Value = Planned completion(%) * Budget at completion cost

$$\text{Planned Value} = \cancel{\$1000 - \$1500} = \underline{\underline{\$500}} \quad 100\% * 1500 =$$

$$\text{Scheduled Variance} = \$1000 - \cancel{\$1500} \quad \frac{100}{100} \times 1500 = \$1500 \\ = \underline{\underline{-\$500}}$$

$$\text{Scheduled Variance} = \underline{\underline{-\$500}}$$

Interpretation - Since the project cost variance & project schedule variance both are negative this means that project is over-budget and is behind schedule.

$$\begin{aligned} \text{CPI} &= \text{Earned Value / Actual Cost} \\ &= \$1000 / \$1350. \end{aligned}$$

$$\underline{\underline{\text{CPI} = 0.74}}.$$

$$\text{SPI} = \text{Earned Value / Planned Value}$$

$$\text{SPI} = \$1000 / \$1500.$$

$$\underline{\underline{\text{SPI} = 0.67}}$$

- ② Find the schedule & cost variances for a project that has an actual cost at month 16 of \$540,000, a scheduled cost of \$523,000 and an earned value of \$35,000. What do the results tell you?

Schedule variance = earned value - scheduled cost

$$\Rightarrow \$535,000 - \$523,000 \Rightarrow \underline{\underline{\$12,000.}}$$

Cost variance = earned value - actual cost

$$\Rightarrow \$535,000 - \$40,000 \Rightarrow \underline{\underline{\$-5000.}}$$

Positive schedule variance means that the project is ahead of schedule.

Negative cost variance means the project actual cost exceeded its budget (the project is over budget).

③ A sales project at month 5 had an actual cost of \$34,000 a planned cost of \$42,000, and a value completed of \$39,000. Calculate the CPI and SPI and explain the message they give the program manager.

$$CV = \$39,000 - 34,000 = \$5,000.$$

$$SV = \$39,000 - 42,000 = \$-3,000.$$

$$SPI = 39,000 / 42,000 = 0.93.$$

$$CPI = 39,000 / 34,000 = \underline{\underline{1.15}}$$

The CPI gives us how efficient we are spending our money against the budget, numbers above 1 is good and we are 1.15.

The SPI gives us comparison to how well we are doing with work completed to what should be done. We are running you could say only 93% efficient schedule wise.

④ A construction project at day 70 has actual costs of \$78,000 and a scheduled cost of \$84,000. The work package Manager estimates a value completed of \$81,000. Calculate SV, CV, CPI and SPI. What does this tell you?

$$AC = \$78,000.$$

$$PV = \$84,000.$$

$$EV = EV - AC$$

$$EV = \$81,000 - \$78,000$$

$$EV = \underline{\underline{\$3,000}}$$

$$SV = EV - PV.$$

$$SV = \$81,000 - \$84,000.$$

$$\underline{SV = \$3,000}$$

$$CPI = EV/AC.$$

$$CPI = \$81,000 / \$78,000.$$

$$\underline{CPI = 1.04}$$

$$SPI = EV/PV.$$

$$SPI = \$81,000 / \$84,000.$$

$$\underline{SPI = 0.96}$$

The project is little under budget ($CPI = 1.04$) and the project is little behind schedule ($SPI = 0.96$).

- ⑤ Given a project planned to cost \$12,000 but actual cost to date is \$10,000 so far and the project is only 70% complete. Calculate the variances. Should the customer be happy?

$$EV = \$12,000 \times 0.70 = \$8400.$$

$$PV = \$12,000.$$

$$\text{Cost variance} = EV - AC = \$8400 - \$10,000.$$

$$\underline{\underline{= -\$1600}}$$

$$\text{Schedule variance} = EV - PV = \$8400 - \$12,000.$$

$$\underline{\underline{= -\$3,600}}$$

$$\text{Schedule variance} = EV - PV = \$8400 - 12,000 \\ = \underline{\underline{-\$3600}}$$

The project is far behind schedule and over-budget for the amount of progress to date. The client will not be happy.

- ⑥ A project to build a new taxiway at Culpeper Airport is 5 days behind at day 65. It had a planned cost of \$735000 for this point in time, but the actual cost is only \$55,000. Estimate the variances and what do they say about the health of the project?

Planned value for 65 day time = \$7,35,000.

Actual Cost incurred = \$550000.

Earned value = Budgeted cost for day * Work days completed.

Earned value = $\frac{735000}{65} * 60 = \678461 (rounded off to nearest dollar)

Cost variance = Earned value - Actual cost

Cost variance = $\underline{\underline{\$678461 - \$550000 = \$128461}}$

Schedule Variance = Earned value - Planned value

Schedule Variance = $\underline{\underline{\$678461 - \$735000 = -\$56539}}$

Since the cost variance of the project is positive, this means the project is within the budget & since the schedule variance is negative, this means the project is behind schedule.

If the actual cost incurred is \$750000 then,

No change in schedule variance. But cost variance will change.

which are as follows.

$$\text{Cost variance} = \$678461 - \$750000 = \underline{\underline{-\$71539}}$$

Now negative cost variance shows the project is over budget.