# Project Management Formulas

# Activity & Project Duration Formulas

In order to calculate Estimated Activity Duration (EAD) of an activity, Optimistic (O), Most Likely (M) and Pessimistic (P) estimates for an activity are determined first.

**PERT Triangular Distribution**

$$\text{EAD} = \frac{O + M + P}{3}$$

**PERT Beta Distribution**

$$\text{EAD} = \frac{O + 4M + P}{6}$$

**Standard Deviation (SD) of an Activity**

$$\text{SD} = \frac{P - O}{6}$$

**Variance of an Activity**

$$\text{Variance} = \left(\frac{P - O}{6}\right)^2$$

**Range of an Activity Duration**

$$\text{Range of an Activity Duration} = \text{EAD} \pm SD$$

# Float (Slack) Formulas

Float (Slack) of an activity determines how long an activity can be delayed without affecting the project end date. If an activity is on critical path, float (slack) of that activity will be zero.

In order to calculate Float (Slack) of an activity, Late Start (LS) and Early Start (ES) or Late Finish (LF) and Early Finish (EF) values of the activity are determined first.

$$\text{Total Float} = \text{Late Start (LS)} - \text{Early Start (ES)}$$

$$\text{Total Float} = \text{Late Finish (LF)} - \text{Early Finish (EF)}$$

# Earned Value Management Formulas

Abbreviations of Earned Value Terms:

- Earned Value = EV
- Planned Value = PV
- Actual Cost = AC
- Cost Variance = CV
- Schedule Variance = SV
- Cost Performance Index = CPI
- Schedule Performance Index = SPI
- Budget at Completion = BAC
- Estimate to Complete = ETC
- Estimate at Completion = EAC
- Variance at Completion = VAC
- To-Complete Performance Index = TCPI

## Cost Variance (CV)

$$CV = EV - AC$$

## Schedule Variance (SV)

$$SV = EV - PV$$

## Cost Performance Index (CPI)

$$CPI = \frac{EV}{AC}$$

## Schedule Performance Index (SPI)

$$SPI = \frac{EV}{PV}$$

## Budget at Completion (BAC)

BAC is determined during cost management activities, in Determine Budget Process, in a project. BAC includes contingency reserves for activities and defines how much money will be spent during project in total.

## Estimate to Complete (ETC)

ETC can be determined by re-estimation of the remaining works in a project or earned value (EV) of the accomplished activities can be subtracted from EAC to find ETC value.

$$ETC = \text{Re-estimation of Remaining Works}$$
$$ETC = EAC - AC$$

## Estimate at Completion (EAC)

EAC value can be found by 3 different approaches using EV, SPI and CPI values.

**Approach #1:** assumes that all future ETC work will be accomplished at the budgeted rate.

$$EAC = AC + (BAC - EV)$$

**Approach #2:** assumes that cost performance achieved till now is expected to continue in the future.

$$EAC = \frac{BAC}{CPI}$$

**Approach #3:** assumes that ETC work will be performed at an efficiency rate that considers both the cost and schedule performance indices.

$$EAC = AC + \frac{BAC - EV}{CPI \times SPI}$$

## Variance at Completion (VAC)

$$VAC = BAC - EAC$$

## To-Complete Performance Index (TCPI)

TCPI can be calculated by two approaches. If there is not a new EAC value, 1st approach is used. If there is an EAC value, then 2nd approach is used.

**Approach #1:**

$$TCPI = \frac{BAC - EV}{BAC - AC}$$

**Approach #2:**

$$TCPI = \frac{BAC - EV}{EAC - AC}$$

# Present Value Formula

There is time value of money and value of a future cash flow is less today than its amount in future. This is calculated by Present Value (PV) formula. Abbreviations of terms:

- Present Value = PV
- Future Value = FV
- Interest rate = r
- Number of periods = n

$$PV = \frac{FV}{(1+r)^n}$$

# Number of Communication Channels

If there are N stakeholders in an environment, following formula will give total number of communication channels between stakeholders in this environment.

$$\text{Number of Communication Channels} = \frac{N(N-1)}{2}$$

# Expected Monetary Value

Expected Monetary Value (EMV) of an opportunity or threat is calculated by following formula:

$$EMV = \text{Probability x Impact}$$

# Point of Total Assumption

Point of Total Assumption (PTA) is applicable only in Fixed Price Incentive Fee (FPIF) Contracts. Costs above PTA level are considered to be due to mismanagement. PTA is calculated by following formula.

$$\text{PTA} = \frac{\text{Ceiling Price} - \text{Target Price}}{\text{Buyer's Sharing Ratio}} + Target\ Cost$$