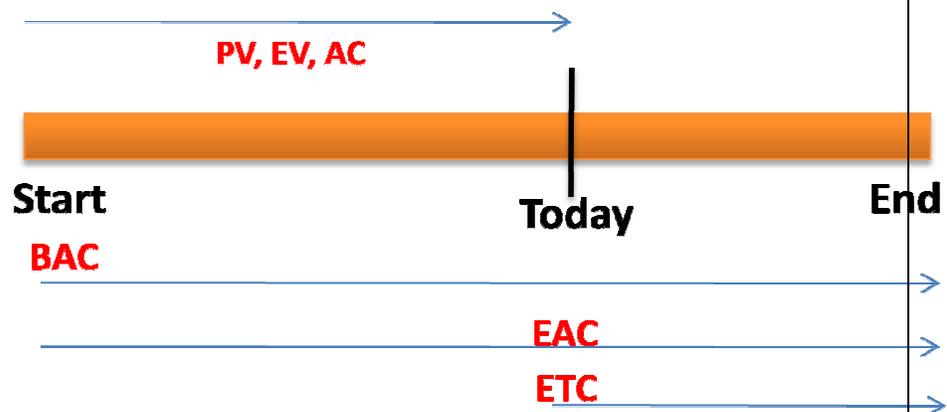


## Project Selection Methods

- NPV (Net Present Value) =  $FV/(1+r)^n$   
 FV= Future Value, r= interest rate in decimal form, n= no. of time periods  
 Select the project that has highest NPV. Do not calculate NPV/Number of years for decision making.
- IRR (Internal Rate of Return) = It is the equivalent interest of future cash flows. Solve the NPV equation for "r". Also called Hurdle Rate. Choose a project which has highest IRR.
- BCR (Benefit/Cost Ratio) = PV of Revenue/ PV of Costs, BCR > 1 indicates a positive profit project  
 Higher BCR is better when selection projects. Note that CBR is reciprocal of BCR and the opposite will apply in that case.
- ROI (Return on Investment) = Earnings/Investment  
 Higher ROI is better is a better project
- Payback Period = Time to recover the cost of the project  
 Lower payback period is better
- EVA = Revenue-Cost-Value of profits from other opportunities (Like Interest etc).  
 Positive EVA is a good project. Choose the project that has highest EVA.
- Opportunity Cost = Value of the opportunities lost. Choose the project with lowest opportunity cost.
- Cash Flow = Cash In - Cash Out

## Earned Value Formulas

- PV (Planned Value) = BCWS (Budgeted Cost of Work Scheduled)
- EV (Earned Value) = BCWP (Budgeted Cost of Work Performed)
- AC (Actual Cost) = ACWP (Actual Cost of Work Performed)
- SV = EV - PV (Negative indicates behind schedule and the financial impact of delay)
- CV = EV - AC (Negative indicates over budget)
- SPI = EV/PV (Less than 1 indicates behind schedule, SPI is rate of progress)



7.  $CPI = EV/AC$  (Less than 1 is over budget and CPI indicates cost efficiency)
8.  $EAC = AC + (BAC - EV)$  Use when variances are atypical when future efficiencies will be different from past
9.  $EAC = AC + [(BAC - EV)/CPI]$  Use when variances are typical and future is going to be similar to past
10.  $VAC = BAC - EAC$  (Negative indicates that project is going to be over the budget)
11.  $ETC = BAC - EV$  Use when variances are atypical when future efficiencies will be different from past
12.  $ETC = (BAC - EV)/CPI$  Use when variances are typical and future is going to be similar to past
13.  $ETC = EAC - AC$  Use when original estimates were incorrect and you have new estimates available
14.  $TCPI = (BAC - EV) \div (EAC - AC)$ . TCPI allows you to calculate the amount of cost performance improvement that must be made on the remaining work to reach a set goal. If TCPI is one (1.0), then the remaining project work must be executed at the same cost performance level as the completed project work. If TCPI is less than one (<1.0), then the remaining project work can be executed at a lower cost performance level than the project completed work. If TCPI is greater than one (> 1.0), then the remaining project work must be executed at a better cost performance level than the project completed work till date.

## **Network Diagram Formulas**

### Precedence Diagramming Method (PDM)

- Also called Activity on Node (AON): Activities are in boxes
- Most commonly used today
- Has 4 relationships: F-S, S-S, F-F, S-F
- No "dummies" (zero duration dependencies) allowed
- Can analyze using either Three-Point Estimates or CPM

### Arrow Diagramming Method (ADM)

- Also called Activity on Arrow (AOA)
- Only 1 relationship: F-S
- Can have "dummies"

- Can analyze using either Three-Point Estimates or CPM

#### Graphical Evaluation and Review Technique (GERT)

- Allows loops and repetitive activities (Normally used for R&D where trial and error is a popular technique)

Total Float (also called Slack, Float, or Project Float) is the total amount of time an activity can be delayed without delaying the project finish date or intermediary mile stones.

Free Float/Slack is the amount of time an activity can be delayed without delaying its successor (following activity). It is calculated using the following formulas (Both give the same answer).

- LS – ES: Calculates slack with forward pass
- LF – EF: Calculates slack with backwards pass

Lag Time: Inserted wait time between activities (Time an activity can be delayed)

Lead Time: Overlapping activities, also called paralleling or fast tracking (Time an activity can be pre-posed).

“Lead In; Lag Out”

Note that lead and lag are at discretion of Project Manager but Float is dependent on the problem at hand.

### **PERT (Program Evaluation and Reporting Technique) Estimates**

1. Holds schedule and lets the cost float. A very realistic estimate where most weightage in calculating the project times is given to the most likely time estimates of team members. Much better than one point estimate.
2. 3 estimates for each task: Optimistic, Pessimistic, and Most Likely
3. Mean Estimate =  $(O + 4*ML + P)/6$
4. Standard Deviation (s) =  $(P - O)/6$
5. Variance =  $s^2$  , or  $[(P - O)/6]^2$
6. All the PERT estimates are estimated for each task. For the project, Project duration and Standard deviation of tasks on CP = Sum of expected durations, variances of tasks on critical path

### **Ranges of Accuracy**

1. Order of Magnitude (At time of Initiation):-25% to +75%
2. Budget Estimate (Early stages of planning):-10% to +25%
3. Definitive Estimate (Last stage of planning and before actual execution):-5% to +10%

### Sigma Limits (Indicative of Quality Standards)

1. High value of Sigma indicates higher standards and lesser mistakes
2. +/- 1 Sigma is 68.26% correct
3. +/- 2 Sigma is 95.46% correct
4. +/- 3 Sigma is 99.73% correct
5. +/- 6 Sigma is 99.99985% correct

Industry neutral technique to compare

- Different industries
- Different functions
- Different departments

### Miscellaneous

1. Number of Communications channels are communicated by the formula  $N*(N-1)/2$ , Where N = Number of people
2. Expected monetary value of a Risk (EMV) =  $P \times I$ , Useful for decision tree based questions in PMP Exam  
P = Probability, I = Expected Monetary Impact
3. Point of Total Assumption =  $[(\text{Ceiling price}-\text{Target price})/\text{Buyers share ratio}] + \text{Target Cost}$