PM-7 Presentation

PERT – program evaluation and review technique

- Based on statistical principles
- Uses beta or triangular distributions for task duration
- Developed by the United States Navy in the 1950s
- Used together with CPM

Optimistic time (T_o) – The minimum possible time to complete a task, assuming everything proceeds better than normally expected.

Pessimistic time (T_p) – The maximum possible time to complete a task, assuming everything goes wrong (but excluding major catastrophes)

Most likely time (T_M) – The most probable estimate of the time to complete a task, assuming everything proceeds as normal

Expected time (T_E) – The best estimate of the time to finish a task

For beta distributions:

$$T_E = \frac{T_o + 4(T_m) + T_p}{6}$$

For triangular distributions (not really used):

$$T_E = \frac{T_o + T_m + T_p}{3}$$

Variance:

$$var = \left(\frac{T_p - T_o}{6}\right)^2$$

- The mean duration for each path si the sum of the mean duration for each activity along the path
- The critical path is the one with the maximum duration
- The variance of the project duration is the sum of the variance for each activity along the critical path
- The mean value provides a 50% confidence that the project will be completed by that date or earlier

Duration of a path

$$(A + B + C) + var_B$$

Limitations of PERT

- Assumes all activities are independent (might not be true)
- More effort to obtain three values
- Path with the longest mean duration is the critical path, but a path with a lower mean and larger variance could be problematic.

PM-8 Presentation

Cost estimation
- Bidding
- Payments
- Project control

Time schedule
- CPM and bar chart
- Resource allocation
- Project control

Expenses
- Can be shown as regular costs (weekly) or cumulative

EVA (earned value analysis) – objective method to measure project progress
- Developed in the 1960s and used by the United States government
- Integrates cost, time, and scope to assess the performance of a project
- Widely used in construction
- More objective than estimate percent complete

Four main measures for EVA
- Budget at completion (BAC)
- Planned value (PV)
- Earned value (EV)
- Actual cost (AC)

Budget at Completion (BAC)
- Cost estimation of an activity
- CPM (critical path method) of the project

Planed value (PV) – also called budgeted cost of work scheduled (BCWS)
- The budget of the task that is planned to be carried out
- This is based on the baseline of the project

$$PV = scheduled\ progress\ (SP)\ x\ BAC$$

$$SP = \frac{(time\ to\ date)}{(total\ required\ time)}$$

Earned value (EV) – also called budgeted cost of work performed (BCWP)
- Budgeted cost of work that has actually been performed in carrying out a scheduled task during a specific time period

$$EV = \left(\frac{work\ performed}{total\ work}\right) \cdot BAC$$

Actual cost (AC) – also called actual cost of work performed (ACWP)

- Total costs actually incurred and recorded in accomplishing work performed during a given time period for a scheduled activity or work breakdown structure component

Equations:

$$Cost\ Variance\ (CV) = EV - AC$$

$$Schedule\ Variance\ (SV) = EV - PV$$

$$Cost\ Performance\ Index\ (CPI) = \frac{EV}{AC}$$

$$Schedule\ Performance\ Index\ (SPI) = \frac{EV}{PV}$$

EVA shortcomings

- Problem in some iterative projects
- Sometimes difficult to obtain information
- Information could be available too late
- Could be better ways to obtain information
- Assuming that everything behaves in linear manner, which is obviously not correct