Summary

PERT was developed in the context where many activities associated with the project had never been attempted previously. PERT was developed to handle projects where the time duration for each activity is no longer just a single time estimate, (that is decision makers best guess) but is a random variable that is characterized by some probability distribution – usually a beta distribution. To estimate the parameters of the beta distribution (the mean and variance), the PERT model requires three time estimates for each activity. From these times a single value is estimated for future consideration . the three time estimates that are required are as under.

Optimistic time (t0 or a): the shortest possible time (duration) in which an activity, can be performed assuming that everything goes well.

Pessimistic time (tp or b): the longest possible time required to perform an activity under extremely bad conditions. However, such conditions do not include natural calamities like earthquakes, flood, etc.

Most likely time (tm or m): the time that would occur most often to complete an activity, if the activity was repeated under exactly the same conditions many times. Obviously, it is the completion time that would occur most frequently (that is model value)

The beta distribution is not necessary symmetric, the degree of skewness depends on the location of tm to t0 and tp. thus, the range specified by the optimistic time (t0) and pessimistic time (tp) estimates is assumed to enclose every possible estimate of the duration of the activity.

With uncertain activity time, variance can be used to describe the dispersion (variation) of the activity time values. The calculations are based on an analogy to the normal distribution where 99 percent of the area under normal curve is within plus or minus 3 standard deviation from the mean or fall within the range approximately 6 standard deviation in length. Therefore the interval (t0, tp) or range (tp to t0) is assumed to enclose about 6 standard deviations of a symmetric distributions.

Estimation of project completion time:

Since we expect variation in the activity duration, therefore the chance of completing the project in a desired time and the duration necessary for obtaining any desired probability of actually meeting the scheduled time can be calculated.

Project Time-Cost trade off:

The cost of resources consumed by activities were not taken into consideration. The project completion time can be reduced by reducing (crashing) the normal completion time of critical activities. The reduction in normal time of completion will increase the total budget of the project. However, the decision-maker will always look for trade-off between the total cost of project and the total time required to complete it.

Project crashing:

Crashing the project means crashing a number of activities to reduce the duration of the project, below its normal time.

Crashing is employed to reduce the project completion time by spending extra resources (cost). However, as shown in the figure, beyond point A cot increases more quickly when time is reduced. Similarly, beyond point B, the time increases while the cost decreases. Since for technical reasons, time may not be reduced indefinitely, therefore we call this limit crash point. There is also a cost efficient duration called normal point. Thus extending the activity duration beyond normal point may increase costs.

For simplicity, the relationship between normal-time and cost as well as crash-time and cost, for an activity is assumed to be linear instead of being concave and/or discrete. Thus, the crash cost per unit of time can be estimated by computing the relative change in cost (cost slope), per unit change in time. From the above figure it is clear that one must be interested in the central region of the curve contained between points A and B. this helps in establishing a trade-off between time and cost, the direct cost of completing an activity per unit of time.

Remark: crashing an activity means performing it in the shortest possible time by allocating to its necessary resources.

Updating of the project progress

When a project is actually executed it may not exactly follow the time schedule developed for it. There are bound to be unexpected delays and difficulties in terms of delay in supply of materials, non-availability of some machine and/or breakdown of machines, non-availability of skilled man power, natural calamity, etc. in such cases it may be necessary to review the progress of network planning and scheduling. Such review of the progress helps in taking stock of the progress that has been made. It also helps in making the necessary change in the initial schedule in terms of time and resources required by the uncompleted activities in the project.

There is no rule about the specific time that is required to update the project progress. The frequency of updating may be more when project duration is small because few slippages in detecting the progress will affect the project as a whole. This as a whole would help in absorbing such slippages to be less. But in case of large projects the frequency of updating may be less at the initial stages because a few initial slippages may be absorbed later in the project. However, to add dynamism to the nature and progress of work, updating may be carried out as frequently and as economically possible.

Resources such as men, material, money, machinery, etc. are limited and conflicting demands are made for the same ype of resources as a project progresses. A systematic method for the allocation of resources therefore becomes essential. The aim is to prevent the day-to-day fluctuation in the level of the required resources and obtain a uniform resource requirement during the project duration.