

The Three Chances:

There are three estimation times involved in PERT; Optimistic Time Estimate (TOPT), Most Likely Time Estimate (TLIKELY), and Pessimistic Time Estimate (TPESS).

In PERT, these three estimate times are derived for each activity. This way, a range of time is given for each activity with the most probable value, TLIKELY.

Following are further details on each estimate:

1. TOPT

This is the fastest time an activity can be completed. For this, the assumption is made that all the necessary resources are available and all predecessor activities are completed as planned.

2. TLIKELY

Most of the times, project managers are asked only to submit one estimate. In that case, this is the estimate that goes to the upper management.

3. TPESS

This is the maximum time required to complete an activity. In this case, it is assumed that many things go wrong related to the activity. A lot of rework and resource unavailability are assumed when this estimation is derived.

The PERT Mathematics

BETA probability distribution is what works behind PERT. The expected completion time (E) is calculated as below:

$$E = (TOPT + 4 \times TLIKELY + TPESS) / 6$$

At the same time, the possible variance (V) of the estimate is calculated as below:

$$V = (TPESS - TOPT)^2 / 6^2$$

Now, following is the process we follow with the two values:

- For every activity in the critical path, E and V are calculated.
- Then, the total of all Es are taken. This is the overall expected completion time for the project.
- Now, the corresponding V is added to each activity of the critical path. This is the variance for the entire project. This is done only for the activities in the critical path as only the critical path activities can accelerate or delay the project duration.
- Then, standard deviation of the project is calculated. This equals to the square root of the variance (V).
- Now, the normal probability distribution is used for calculating the project completion time with the desired probability.

Conclusion:

The best thing about PERT is its ability to integrate the uncertainty in project times estimations into its methodology.

It also makes use of many assumption that can accelerate or delay the project progress. Using PERT, project managers can have an idea of the possible time variation for the deliveries and offer delivery dates to the client in a safer manner.

Advantages of Operations Research

Better Systems: Often, an O.R. approach is initiated to analyze a particular problem of decision making such as best location for factories, whether to open a new warehouse, etc. It also helps in selecting economical means of transportation, jobs sequencing, production scheduling, replacement of old machinery, etc.

Better Control: The management of large organizations recognize that it is a difficult and costly affair to provide continuous executive supervision to every routine work. An O.R. approach may provide the executive with an analytical and quantitative basis to identify the problem area. The most frequently adopted applications in this category deal with production scheduling and inventory replenishment.

Better Decisions: O.R. models help in improved decision making and reduce the risk of making erroneous decisions. O.R. approach gives the executive an improved insight into how he makes his decisions.

Limitations of Operations Research

Dependence on an Electronic Computer: O.R. techniques try to find out an optimal solution taking into account all the factors. In the modern society, these factors are enormous and expressing them in quantity and establishing relationships among these require voluminous calculations that can only be handled by computers.

Non-Quantifiable Factors: O.R. techniques provide a solution only when all the elements related to a problem can be quantified. All relevant variables do not lend themselves to quantification. Factors that cannot be quantified find no place in O.R. models.

Distance between Manager and Operations Researcher: O.R. being specialist's job requires a mathematician or a statistician, who might not be aware of the business problems. Similarly, a manager fails to understand the complex working of O.R. Thus, there is a gap between the two.

Money and Time Costs: When the basic data are subjected to frequent changes, incorporating them into the O.R. models is a costly affair. Moreover, a fairly good solution at present may be more desirable than a perfect O.R. solution available after sometime.

Implementation: Implementation of decisions is a delicate task. It must take into account the complexities of human relations and behaviour.

