

## Summary

- Complex projects require a series of activities, some of which must be performed sequentially and others that can be performed parallel with other activities. The collection of series and parallel task can be modelled as a network. The program evaluation and review technique is a network model that allows randomness in activity completion time
- The Program (or Project) Evaluation and Review Technique, commonly abbreviated PERT, is a statistical tool, used in project management, that is designed to analyse and represent the tasks involved in completing a given project. First developed by the United States Navy in the 1950s, it is commonly used in conjunction with the critical path method (CPM)
- This Program Evaluation and Review Technique (code-named PERT) is applied as a decision-making tool designed to save time in achieving end-objectives, and is of particular interest to those engaged in research and development programs for which time is a critical factor
- The new technique takes recognition of three factors that influence successful achievement of research and development program objectives:
  - Time
  - Resources
  - Technical performance specifications
- PERT employs time as the variable that reflects planned resource-applications and performance specifications. With units of time as a common denominator, PERT quantifies knowledge about the uncertainties involved in developmental programs requiring effort at the edge of, or beyond, current knowledge of the subject - effort for which little or no previous experience exists
- Through an electronic computer, the PERT technique processes data representing the major, finite accomplishments (events) essential to achieve end-objectives; the inter-dependence of those events; and estimates of time and range of time necessary to complete each activity between two successive events. Such time expectations include estimates of "most likely time", "optimistic time", and "pessimistic time" for each activity. The technique is a management control tool that sizes up the outlook for meeting objectives on time; highlights danger signals requiring management decisions; reveals and defines both criticalness and slack in the flow plan or the network of sequential activities that must be performed to meet objectives; compares current expectations with scheduled completion dates and computes the probability for meeting scheduled dates; and simulates the effects of options for decision - before decision
- PERT is a method to analyse the involved tasks in completing a given project, especially the time needed to complete each task, and to identify the minimum time needed to complete the total project
- It is more of an event-oriented technique rather than start- and completion-oriented, and is used more in projects where time is the major factor rather than cost. It is applied to very large-scale, one-time, complex, non-routine infrastructure and Research and Development projects. This project model was the first of its kind, a revival for scientific management, founded by Frederick Taylor (Taylorism) and later

refined by Henry Ford (Fordism). DuPont's critical path method was invented at roughly the same time as PERT

- **Implementation**

The first step to scheduling the project is to determine the tasks that the project requires and the order in which they must be completed. The order may be easy to record for some tasks (e.g. When building a house, the land must be graded before the foundation can be laid) while difficult for others (There are two areas that need to be graded, but there are only enough bulldozers to do one). Additionally, the time estimates usually reflect the normal, non-rushed time. Many times, the time required to execute the task can be reduced for an additional cost or a reduction in the quality

- **Steps in the PERT planning process:**

PERT planning involves the following steps:

1. Identify the specific activities and milestones
2. Determine the proper sequence of the activities
3. Construct a network diagram
4. Estimate the time required for each activity
5. Determine the critical path
6. Update the Pert chart as the project progresses.

- **Advantages:**

- PERT chart explicitly defines and makes visible dependencies (precedence relationships) between the work breakdown structure (commonly WBS) elements
- PERT facilitates identification of the critical path and makes this visible
- PERT facilitates identification of early start, late start, and slack for each activity
- PERT provides for potentially reduced project duration due to better understanding of dependencies leading to improved overlapping of activities and tasks where feasible
- The large amount of project data can be organized & presented in diagram for use in decision making

- **Disadvantages**

- There can be potentially hundreds or thousands of activities and individual dependency relationships
- PERT is not easily scalable for smaller projects
- The network charts tend to be large and unwieldy requiring several pages to print and requiring special size paper
- The lack of a timeframe on most PERT/CPM charts makes it harder to show status although colours can help (e.g., specific colour for completed nodes)
- When the PERT/CPM charts become unwieldy, they are no longer used to manage the project

- **PERT CHART**

A PERT chart is a graphic representation of a project's schedule, showing the sequence of tasks, which tasks can be performed simultaneously, and the critical path of tasks that must be completed on time in order for the project to meet its completion deadline. The chart can be constructed with a variety of attributes, such as earliest and latest start dates for each task, earliest and latest finish dates for each task, and slack time between tasks. A PERT chart can document an entire project or

a key phase of a project. The chart allows a team to avoid unrealistic timetables and schedule expectations, to help identify and shorten tasks that are bottlenecks, and to focus attention on most critical tasks