<u>Summary</u>

- The critical path method (CPM) is an algorithm for scheduling a set of project activities. It is an important tool for effective project management
- The critical path method (CPM) is a widely used technique for analysing and managing task sequences in large projects. Based on calculating how long it takes to complete essential steps of a process and analysing how those steps interrelate, CPM is a visual and mathematical technique that gives managers the ability to effectively plan, schedule, and evaluate their projects. CPM-associated techniques are probably most often used in large manufacturing and construction projects, but they are also applied to tasks like new product development cycles, marketing campaigns, software process modelling, and research programs
- Any time a manager is trying to determine the date by which a project will be completed, he or she needs to have a basic understanding of the time required to complete each task that makes up the overall project. For small projects, managers are often able to memorize and to coordinate all of the various tasks necessary for their completion. For larger projects, however, with numerous activities occurring simultaneously, remembering and coordinating these activities can prove much more difficult
- CPM and related tools allow managers to determine which particular tasks most affect the total time of the project and enable managers to better schedule each task so that deadlines are met at the least possible cost
- CPM is commonly used with all forms of projects, including construction, aerospace and defence, software development, research projects, product development, engineering, and plant maintenance, among others. Any project with interdependent activities can apply this method of mathematical analysis. Although the original CPM program and approach is no longer used, the term is generally applied to any approach used to analyse a project network logic diagram

• Basic technique

The essential technique for using CPM is to construct a model of the project that includes the following:

- A list of all activities required to complete the project (typically categorized within a work breakdown structure),
- > The time (duration) that each activity will take to completion, and
- > The dependencies between the activities.
- Using these values, CPM calculates the longest path of planned activities to the end of the project, and the earliest and latest that each activity can start and finish without making the project longer. This process determines which activities are "critical" (i.e., on the longest path) and which have "total float" (i.e., can be delayed without making the project longer)

• CPM provides the following benefits:

- Provides a graphical view of the project
- > Predicts the time required to complete the project
- Shows which activities are critical to maintaining the schedule and which are not

- Steps in CPM project planning:
 - Specify the individual activities
 - Determine the sequences of the activities
 - Draw a network diagram
 - Estimate the completion time for each activity
 - Identify the critical path (longest path through the network)
 - Update the CPM diagram as the project progresses
- For CPM to be used appropriately, a project should have three attributes.
 - First, it must consist of tasks that are independent of each other, which managers can stop and start within the duration of the project
 - Second, the distinct tasks, upon completion, must result in the end of the project
 - Third, while some tasks can be performed simultaneously, others must be performed in a particular sequence
- In real life, one project's schedule often impacts other schedules, and thus CPM software and analysis is also applied to a multiple-project environment. In this case, individual steps within projects or the entire outcome of a project can be linked with phases of other projects, providing managers a means through which they can optimize scheduling across projects to maximize efficiency and serve other strategic functions
- When integrated with cost tracking, CPM is sometimes known as "least cost scheduling." By linking time variations with anticipated costs, the CPM model can be used to calculate the optimal project schedule to minimize costs. This can indicate, for example, that it is cheaper to take longer at some things, but not others. At the very least, it can indicate what the financial consequences will be if the project falls behind schedule at any particular stage. CPM has also been used in conjunction with statistical process control, a set of mathematical methods aimed at monitoring and improving efficiency and quality, to maximize these benefits in the course of completing a project
- 1. **PERT** was developed by the US Navy for the planning and control of the Polaris missile program and the emphasis was on completing the program in the shortest possible time
- 2. **CPM** was developed by Du Pont and the emphasis was on the trade-off between the cost of the project and its overall completion time
- 3. **PERT** considers optimistic, likely and pessimistic time, thereby adding an element of probability to the final figure one obtains
- 4. **CPM** takes only a single time for any task. This time typically would be the 'likely' time for the task
- 5. **PERT** is a probabilistic tool using 3 estimates of duration for completion of activities of a project and is basically a tool for planning and control of time Whereas,
- 6. **CPM** is a deterministic tool, with only single estimate of duration. CPM also allows an explicit estimate of costs in addition to time; thereby CPM can control both time and costs
- 7. **PERT** is more suitable for R&D related projects where the project is performed for the first time and the estimate of duration is uncertain
- 8. **CPM** is best suited for routine and those projects where time and cost estimates can be accurately calculated
- 9. **PERT** is event oriented
- 10. **CPM** is activity oriented i.e. CPM network is built on the basis of activities Also result Of Carious calculation are considered in terms of activities of the project

- 11. **PERT** is used in Project management for non-repetitive jobs (research and development work), where the time and cost estimates tend to be quite uncertain. This technique uses probabilistic time estimates
- 12. **CPM** is used in Production management for the jobs of repetitive in nature where the activity time estimates can be predicted with considerable certainty due to the existence of past experience