# PERT and CPM: Techniques of Project Management (Advantages and Disadvantages)

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**PERT and CPM: Techniques of Project Management (Advantages and Disadvantages)!**

PERT and CPM are techniques of project management useful in the basic managerial functions of planning, scheduling and control. PERT stands for “Programme Evaluation & Review Technique” and CPM are the abbreviation for “Critical Path Method”. These days the projects undertaken by business houses are very large and take a number of years before commercial production can start.

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The techniques of PERT and CPM help greatly in completing the various jobs on schedule. They minimise production delays, interruptions and conflicts. These techniques are very helpful in coordinating various jobs of the total project and thereby expedite and achieve completion of project on time.

PERT is a sophisticated tool used in planning, schedu ling and controlling large projects consisting of a number of activities independent of one another and with uncertain completion times. It is commonly used in research and

development projects.

**The following steps are required for using CPM and PERT for planning and scheduling:**

(i) Each project consists of several independent jobs or activities. All these jobs or activities must be separately listed. It is important to identify and distinguish the various activities required for the completion of the project and list them separately.

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(ii) Once the list of various activities is ready the order of precedence for these jobs has to be determined. We must see which jobs have to be completed before others can be started. Obviously, certain jobs will have to be done first.

Many jobs may be done simultaneously and certain jobs will be dependent upon the successful completion of the earlier jobs. All these relationships between the various jobs have to be clearly laid down.

(iii) The next step is to draw a picture or a graph which portrays each of these jobs and shows the predecessor and successor relations among them. It shows which job comes first and which next. It also shows the time required for completion of various jobs. This is known as the project graph or the arrow diagram.

The three steps given above can be understood with the help of an example. Suppose, we want to construct a project graph of the simple project of preparing a budget for a large manufacturing firm. The managing director of this company wants his operating budget for the next year prepared as soon as possible.

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To accomplish this project, the company salesmen must provide sales estimates in units for the period to the sales manager. The sales manager would consolidate this data and give it to the production manager.

He would also estimate market prices of the sales and give the total value of sales schedules of the units to be produced and assign machines for their manufacture. He would also plan the requirements of labour and other inputs and give all these schedules together with the number of units to be produced to the accounts manager who would provide cost of production data to the budget officer.

Using the information provided by the sales, production and accounting departments, and the budget officer would make the necessary arrangements for internal financing and prepare the budget. We have seen that the project of preparing the budget involves a number of activities.

**These activities listed in the order of precedence are given below:**

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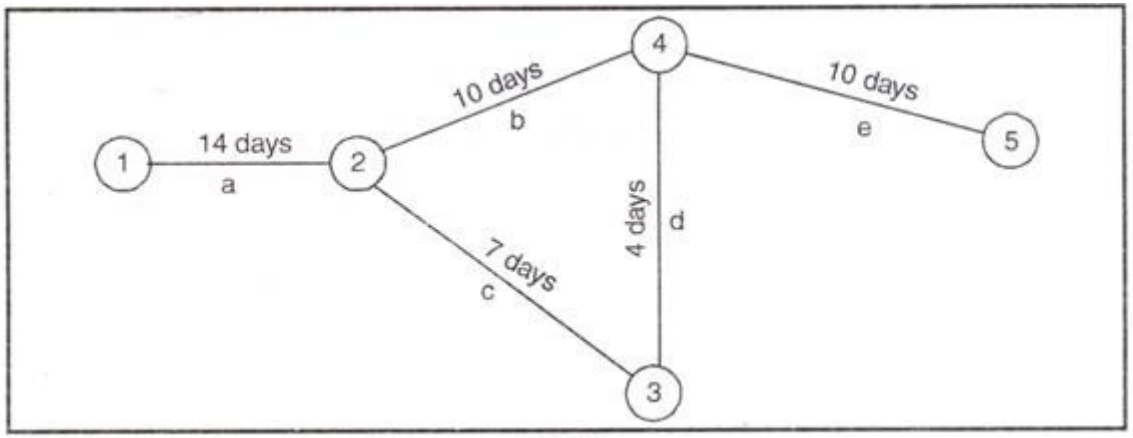
**TABLE 1. The project of budgeting for company A**

| Job identification | Alternate | description | Deptt. | Time of performing the Job |
|---|---|---|---|---|
| a | (1,2) | Forecasting units of sale | Sales | 14 days |
| b | (2,4) | Pricing sales | Sales | 10 days |
| c | (2,3) | Preparing production schedules | Production | 7 days |
| d | (3,4) | Costing the production | Accounting | 4 days |
| e | (4,5) | Preparing the budget | Budget | 10 days |
| | | | | 45 days |

In this graph jobs are shown as arrows leading from one circle on the graph to another. Thus, the arrow connecting the two circles represents a job. Circle one and two represent job a i.e. forecasting of units sale which would take 14 days.




Graph 1

Circles 2 and 4 represent job b which will take ten days and so on. It would be seen that job c is not dependent upon job b and therefore, the two jobs can be done simultaneously. Once we reduce the project to network of activities and events and we estimate activity durations, we are in a position to determine the minimum time required for completion of the whole project.

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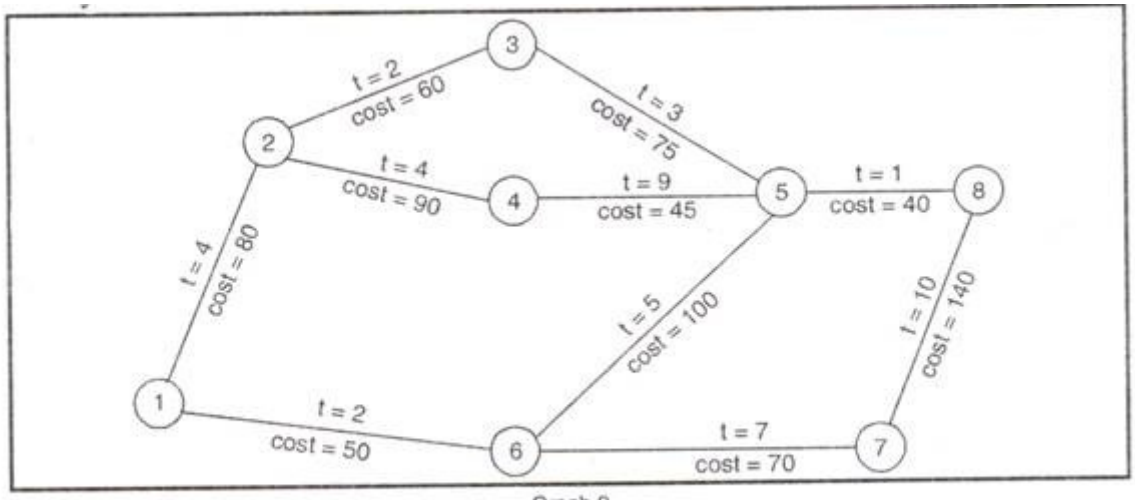
To do so, we must find the longest path or sequence connecting the activities through the network. This is called the ‘critical path’ of the project. The longest path is the critical path. In our example, there are two paths. One is connecting circle numbers 1, 2, 4 and 5. This path will take 14+10 + 10 = 34 days.

The other path, is connecting circles 1,2,3,4 and 5, this path will takes 14 + 7 + 4+ 10 = 35 days. Obviously the 2nd path is the critical path and the project of budget presentation will take this much of time. The students will however notice that this time is shorter than the total time listed under Table 1 which will be 45 days. This is because jobs b and c can be done simultaneously.

What we have basically described above is the very careful technique of CPM and PERT which consists of decomposing project into activities and then ordering activities according to their relationships to find out the shortest time required to carry on an activity.

This technique is very useful in case of projects which involve a large number of activities. It makes the project manager list out all the possible activities, their relationships, find out which activities can be performed first, which next and which can be performed simultaneously so as to find out the best possible manner of completing the project.

A good project network goes a long way in reducing costs. Many companies work out the cost estimate of each activity and show




Graph 2
t = time
Cost = In thousands of Rs.

## Advantages of Pert:

**The following advantages are derived from the pert:**

1. It compels managers to plan their projects critically and analyse all factors affecting the progress of the plan. The process of the network analysis requires that the project planning be conducted on considerable detail from the start to the finish.

2. It provides the management a tool for forecasting the impact of schedule changes and be prepared to correct such situations. The likely trouble spots are located early enough so as to apply some preventive measures or corrective actions.

3. a lot of data can be presented in a highly ordered fashion. The task relationships are graphically represented for easier evaluation and individuals in different locations can easily determine their role in the total task requirements.

4. The PERT time (Te) is based upon 3-way estimate and hence is the most objective time in the light of uncertainties and results in greater degree of accuracy in time forecasting.

5. It results in improved communication; the network provides a common ground for various parties such as designers, contractors, project managers etc. and they must all understand each other's role and contributions.

The network will highlight areas that require attention of higher priority so that concentration can be applied to the key jobs without ignoring the lower priority tasks. This gives the management an opportunity to shift attention to any critical task so that the entire project is completed in time.

## Limitations of Pert:

**Some of the limitations and problems that arise are:**

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1. Uncertainly about the estimate of time and resources. These must be assumed and the results can only be as good as the assumptions.

2. The costs may be higher than the conventional methods of planning and control. Because of the nature of net working and net work analysis, it needs a high degree of planning skill and greater amount of details which would increase the cost in time and manpower resources,

3. It is not suitable for relatively simple and repetitive processes such as assembly line work which are fixed-sequence jobs.

Hence PERT is not very effective in manufacturing operations, since it deals in the time domain only and does not deal with the quality information which is necessary in manufacturing processes.

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