

# Project Management

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This reference book can be useful for  
BBA, MBA, B.Com, BMS, M.Com, BCA, MCA  
and many more courses for Various Universities



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# **Sample Preview of The Chapter**

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# PROJECT MANAGEMENT

## PROJECT FORMULATION AND APPRAISAL



### Project Management: An Overview

#### INTRODUCTION

This chapter brings out the meaning and significance of Project Management and various concepts linked with project management such as Project Life Cycle (PLC). Various tools and technologies applied in project management have also been briefly explained.

#### CHAPTER AT A GLANCE

#### WHAT IS PROJECT MANAGEMENT?

'Project Management' as the term implies is management of projects.

Project can be described as a set of well-planned activities, which are required to be carried out for achieving a specific objective within specified limits of time. Examples of project can be ship-building, airplane building, generally all infrastructure related works, book writing etc. Projects differ from other production processes in the following ways:

	Project	Production
Nature of task	Project comprises of interlinked activities. Each project has its own set of activities.	Production process comprises of repeated tasks.
Nature of manpower	Skilled and diverse.	Lesser skilled.
Nature of machineries and equipments	Specific and according to the project.	For continuous use.
Output characteristics	Single and massive.	Volume and variety combination.
External involvement	Generally requires greater involvement of external organizations.	External organizations involved are generally suppliers.
Nature of technology	Varied technology.	Lesser variation in technology
Cash flow	High cash flow as project investment. Cash inflows occur only after completion of project.	Continuous cash inflows and outflows.
Duration	Time bound.	On-going.

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Issues and challenges involved in project management generally pertain to planning the activities and sequencing them and adhering to time limits and resource constraints.

### HISTORY OF PERT/CPM

Like all management subjects, project management has also evolved to become a separate discipline in management. Project management has used several concepts applicable in other management disciplines and mainly operations, such as Gantt charts. Over the years it has been realized that though project management may borrow from other disciplines yet there exists substantial differences and complexities specific only to project management, and hence a need was felt to make it a separate discipline. The development of PERT and CPM techniques proved to be a breakthrough in project management and the application of these techniques lead to better planning, implementation and control of projects.

Programme Evaluation or Review Technique or PERT and Critical Path Method or CPM were developed in the USA by NASA and Dupont respectively, around mid 1950. Both the methods are similar to each other in almost all aspects, the only difference being that PERT takes into consideration the uncertainties involved whereas CPM is based on deterministic calculations. Both these techniques are used for sequencing of activities keeping in mind the time and resource constraints. In CPM the activity times are mentioned with certainty whereas in PERT three estimates of time are used which are namely optimistic time, most likely time and pessimistic time. CPM is applied in situations where the timings of the activities are known due to past experiences or accumulated knowledge. For example, Dupont had available time estimates for activities involved in constructing large scale chemical plants, due to its past experience in construction of such plants hence it found suitable the application of CPM. When activity times are unknown PERT can be applied. For example, NASA did not have any available time estimates on developing ballistic missiles, hence it had to base its project planning taking into account the probabilities.

### NEED FOR PROJECT MANAGEMENT

The need for project management started being increasingly felt with the rising need for undertaking large scale and complex projects for increasing the pace of development. In the last forty years the public sector of India has invested around rupees hundred thousand

crores in development-oriented projects. Realizing the significance of projects and their successful implementation, the government of India has setup an institute of Project Management and also created a separate ministry for programme implementation.

### SOME MAJOR PROJECT MANAGEMENT CONCEPTS

**(a) Project Life Cycle:** Just as the life cycle concept has been found to be applicable in case of products, projects too can be thought of having life cycles. In case of products the pattern of revenue generated over the entire life of the product resembles a life cycle. Revenues show a positive growth in the introductory phase and by the time product reaches maturity the growth in revenue stabilizes and is nearly nil. During the decline phase of the product life cycle the growth in revenue is negative.

In the case of projects, intensity of activities (IA) varies with time and depicts a life cycle pattern. IA implies the number of activities and the variation in the nature of activities. A high intensity implies more varied and more number of activities. The various kinds of activities involved over the entire life span of a project can be categorized into technological, commercial, financial, socioeconomic, environmental and managerial activities.

Stage one (Feasibility Stage) and two (Design Stage) of the project life cycle is depict a positive growth in the IA. During stage three (Execution Stage) growth in IA is almost nil. Stage IV (Termination Stage) depicts a negative growth in IA.

In the feasibility stage the activities are mainly concentrated on techno commercial aspects. Financial and market related aspects need to be considered more in detail during the design stage. Social aspects become very important during the execution stage. The termination stage comprises mainly of environment and management related aspects.

**(i) Feasibility:** The feasibility stage includes generation of ideas, overall feasibility analysis, search for alternatives, evaluation of alternatives and investment related decisions.

**(a) Idea Generation:** Source of project ideas can be various secondary data such as reports, organizations can also obtain project ideas from primary sources such as from company personnel. Ideas are generally solutions to unmet needs.

**(b) Overall Feasibility Analysis:** The ideas are then assessed with respect to all the aspects

involved in a project such as technological, commercial, financial, socio economic and environmental. Ideas, which do not fulfill certain criteria in the light of the prevailing circumstances, are not taken up for further consideration.

- (c) **Search for Alternative:** comprises of searching and listing down the alternatives to the identified project ideas
- (d) **Evaluation of Alternatives:** The alternatives are then evaluated against various criteria and a weighted score is obtained. The alternative with the highest score is then selected.
- (e) **Investment Decisions:** Investments required for a project is one of the important criteria for evaluation of alternatives.

(ii) **Design:** In this stage of the project a detailed project report (DPR) is generated. The detailed project report consists of all details pertaining to requirements of facilities such as plants, machineries, equipments etc. and details of estimated costs and time.

(iii) **Execution:** In the execution stage all the items listed in the DPR are procured and all the facilities planned are constructed or are made available. Managerial challenges in the execution stage generally, pertain to implementation of plans as per schedules and optimization of available resources. Project managers can use tools such as Gantt charts to compare planned versus actual progress for all the items that were enlisted in the DPR.

(iv) **Termination:** During the termination phase the project is handed over to the concerned personnel. The staff employed in the project are deployed to other projects. The machineries, equipments and other facilities are also put to other uses. The entire termination phase has to be handled in a manner such as not to cause any negative effects on the environment. All wastes and unused items should be eliminated appropriately.

(v) **Organization of this book:** The book covers the topic of project management under four broad categories, given as below:

- Project Formulation and Appraisal
- Project Planning and Scheduling
- Implementation and Control
- Completion and Evaluation

(b) **Project Interfaces:** The phases in the project life cycle do not occur separately but overlap to a certain extent. One reason for overlapping of phases can be efforts by the management to optimize resources and time by conducting concurrently activities, which can belong to different phases.

(c) **Project Organization:** Project organization should facilitate coordination between diverse elements comprising the project, given the time and resource constraints. Project management can become complex especially during transition from one phase to another as the transition phase is characterized by maximum diversity. Depending upon the complexity of the project organizations can appoint liaison agents, task forces, dedicated teams, project co-ordinators, an entire project management cell or organize the project according to the matrix form of organization structure.

(d) **Project Monitoring and Control:** The project must be monitored on a continuous basis in order to ensure implementation as per plans. Any deviations from plans must be immediately taken note of and appropriate corrective actions should be taken.

(e) **Project Management Information System (PMIS):** PMIS comprises of people and equipments to capture data regarding progress of the project and enable prompt corrective actions wherever and whenever required, by the decision makers. Like most management systems PMIS is now-a-days computer based.

#### TOOLS AND TECHNIQUES IN PROJECT MANAGEMENT

(a) **PERT/CPM:** As already mentioned in History of PERT/CPM, both are project management techniques. CPM is worked out with single set of deterministic time estimates whereas PERT is worked out using three sets of probabilistic time estimates. PERT and CPM are otherwise similar in all other aspects. CPM comprises of constructing a network diagram depicting the activities and activity times in sequential manner and taking into consideration precedence rules. The technique is useful for optimization of time and resources.

(b) **Resource Levelling:** Network diagrams used in PERT/CPM technique, provide the information regarding the number of activities to be conducted during a particular time period and is hence helpful in planning the resources required. Critical activities in the network are given the first priority during resource allocation. Critical activities are those activities, which have zero slack. Slack is the latest start time less the earliest start time for an activity. In general activities

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with smaller slacks are given priority during resource allocation. In order to make optimum utilization of resources the project is monitored continuously to identify resources, which have become available due to completion of certain activities and then again to reallocate them to other activities.

**(c) Cost Management:** Costs are incurred on resources required to carry out the activities. The network diagram used in CPM/PERT can be used for estimating the costs activity wise as well as for the entire project. Actual vs. estimated costs can be continuously monitored and corrective actions taken when necessary. While comparing actual and estimated costs cumulative costs enable better monitoring. Reduction in time taken for completion of activities would mean committing more resources to those activities and hence increase in direct costs. However decrease in time can also lead to decrease in indirect costs. Project managers should strive towards minimizing the total costs, which is a sum of the direct and indirect costs.

**(d) Probability in Networks:** In PERT the expected time for the entire project is worked out by considering three estimates of time.

The three estimates of time are: Pessimistic time (P), most likely time (M) and Optimistic time.

Using the BETA distribution expected time  $T_E$  for each activity is calculated by applying the following formula:

$$T_E = \frac{O + 4M + P}{6}$$

The standard deviation  $sd$  for each activity is calculated by applying the following formula:

$$s.d = \frac{P - O}{6}$$

**(e) Project Appraisal:** Project Appraisal implies assessing whether or not a particular project can be undertaken. The decision to undertake a project is based on technical, commercial, financial, economical, environmental and managerial feasibility.

This implies that technologies required for the project should be available. The available technologies should confirm to quality standards. The market potential should justify investments in the project. The project should be able to meet the financial and economic goals. The project should not produce any adverse effects on the environment and the project should be manageable.

**(f) Computer Applications:** Computer applications and softwares are now available for PERT/CPM, resource levelling, cost management, project appraisal and project management information system. Computer applications make possible much quicker retrieval and processing of information resulting into high-level co-ordination, increased capacity to conduct parallel activities and savings in time and costs.

**SUCCESS FACTORS IN PROJECT MANAGEMENT**

Research on projects prove that project success is mainly determined by the following factors:

- Project Feasibility Study
- Project Planning
- Involvement of Stakeholders
- Project Leadership and Management
- Project Organization
- Project Monitoring and Control
- Support
- Timely Availability of Funds

**Project Feasibility Study:** The decision to undertake the project should be based on thorough feasibility study pertaining to techno commercial, financial, socioeconomic, environmental and managerial aspects. The study should be presented in a clear and logical manner.

**Project Planning:** The Detailed Project Report (DPR) should enlist details pertaining to schedule of activities and resources and facilities required.

**Involvement of Stakeholders:** All the stakeholders of the project must agree upon all decisions pertaining to the project.

**Project Leadership and Management:** A capable project manager and a team of capable people should manage the project. Effective and efficient project management is very essential for proper project execution. For management of conflict situations the involved parties should have a clear understanding regarding their objectives, roles, responsibilities and rights.

**Project Monitoring and Control a monitoring system** which can provide continuous information regarding project progress, should be installed, so as to enable prompt corrective actions whenever required.

**Support:** In case of external contingencies or unwanted influences, support should be available to project managers and their teams.

**Timely Availability of Funds:** Funds should be available as per plans and schedules.