
UNIT 1 INTRODUCTION TO PROJECT

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1.0 OBJECTIVES

After studying this unit, you should be able to:

- explain the concept, characteristics, and types of project;
- discuss the nature of agricultural projects;
- describe the phases of the project life cycle; and
- explain the meaning of project management, and critical factors associated with project implementation.

1.1 INTRODUCTION

You must be aware that the development of civilization has seen the creation of many unique ‘marvels’ and ‘organization of events’ by mankind. Around 2500 years B.C., the construction of great structures like the Pyramids by Egyptians, many grand structures including the Temple in Jerusalem by King Solomon, the development of roads, canals for water supply by Greeks and Romans, the great wall of China, etc. with unique structures were completed successfully without sophisticated machinery, modern

scientific knowledge, and technology. All those examples of construction projects from history used labour, skills of people, and managerial competence in planning different activities, meeting uncertainties and emergencies. From those examples, we find that mankind was using project activities ever since the dawn of civilisation to meet different purposes. With scientific innovations for energy like electricity and growing industrialisation, a modern world has emerged. Today, a majority of work in the industrial world is undertaken as a project to get output within the cost and time limits, with concern for quality. The projects have also crossed the boundaries of construction and industries to enter areas such as scientific research, defence, space science, new modes of transportation, medicine, biotechnology, information technology, etc.

This unit explains the concept and role of the project for taking any new development activities or we can say starting new business enterprises. You will understand the basic features and uniqueness of the project. You will also be briefly introduced to the concept of project management.

1.2 PROJECT

Before proceeding forward, you should have conceptual clarity about the term project.

What it is?

1.2.1 Meaning

A project may be described as an endeavour/assignment with the uniqueness of doing first time to achieve certain pre-decided goals and deliverables with given resources such as time, cost, manpower, materials, machinery, etc. with pre-defined quality as well unforeseen constraints. A project may be identified with the following features:

- By nature, the project has uniqueness, i.e., it does not involve the repetition of processes. Nevertheless, the operational activities to carry out a project may be identical.
- The project has a pre-decided time frame given by the client to complete it with dates of start and finish of operational activities, and deliverables.
- Has a budget approved by the client and agreed by the project manager to complete all operational activities and provide deliverables specified by the client within budget in a normal working situation.
- Resources such as manpower, material, and equipment are deployed as agreed between the client and project manager before the start of a project.
- Projects involve elements of risk and uncertainties due to natural calamities or unfavourable environments affecting the progress of work.
- Generally, projects are undertaken to bring beneficial changes as perceived by the client.

Before going further, let us understand three terms viz. programme, project, and task. The programme refers to a large endeavour, with long-range objectives spread over a longer period for implementation, catering to many end users/stakeholders. The programmes are broken into projects to achieve specific objectives. The projects are further broken into tasks for implementing planned activities. Our focus here is on projects.

The project can be defined in many ways. A few standard **definitions** are given below:

- A set of activities to deliver a specific and unique result that requires the efforts and inputs of more than one department and which will have an effect on more than one department and people/customers/stakeholders.
- A project is a temporary setup to create a unique output /product/service (Project Management Institute (PMI of USA, 2001).
- A combination of human and other non-human resources, such as material, machinery, finance, space, ideas, etc. pooled together in a temporary setup to achieve a unique and pre-decided purpose.
- It is a one-shot, time-limited, goal-directed major undertaking requiring the commitment of varied skills and resources. (PMI of U.S.A.)
- A project is an organized plan of activities carried out to reach a defined goal, often of a non-recurring nature with a specified terminal point. It is a package of time-bound, scheduled, and assembled a package of activities dedicated to the attainment of a specific objective of successful completion of work on time and within the allotted budget.
- In a precise sense, a project is a defined activity on which money is spent in the expectation of returns. There is a specific starting point, a specific endpoint and it is intended to achieve a specified objective. In addition, a project has a specific geographic location and would serve a group of population.
- A project in the context of developmental activities is a kind of investment that denotes purposefulness, size, location, etc.
- A project is a scientifically evolved work plan devised to achieve a specific objective within a specified period.
- A project is an organization of people dedicated to a specific purpose or objective.
- Projects generally involve large, expensive, unique, or high-risk undertakings which have to be completed by a certain date, for a certain amount of money, within some expected level of performance.
- At the minimum, all projects need to have well-defined objectives and sufficient resources to carry out all the required tasks.

A series of definitions spelled out above is intended to provide further clarity about the term 'Project'. Behind all these attributes, there must be a purpose.

1.2.2 Purpose

Usually, a project is a one-time activity with a complete focus on achieving the project objectives in the form of the pre-decided end result with quality parameters, within given time and resources. So, one important purpose behind a project always remains the focus on the objective to achieve for the first time. The other purpose we find is to focus on quality output within given time limits, with the optimum use of different resources to control cost. Most of the projects have complexities of different nature; hence, it requires a strong focus on coordination and control of different subtasks in terms of timing, quality of output for each subtask within cost norms, and performance standards.

It is difficult to say when the Projects and their scientific management started. Looking back into history, it is often associated with the space programme of NASA, in the sixties of the last century, when different programmes targeted at different planets were either showing no progress or going very slow. In fact, various techniques of project management were conceptualized and practiced in isolation for major construction.

At the beginning of the 20th century during World War I, the tool for monitoring the progress of activities associated with work, known as the *Gantt chart*, was introduced. Around 30 years later by the middle of the 20th century, the complex scientific innovations in different fields especially Defense, Space Science, transport vehicles for air, water, etc., and for very large work assignments, the available tools were found inadequate. The solution to this problem came through two networks inventions known as the Critical Path Method (CPM) developed by DuPont of France in 1957 and the other Project Evaluation and Review Techniques (PERT) by the U.S. Navy in 1958. In the beginning, these two networks were developed for planning, scheduling, and monitoring large projects. Around ten years later, the computer application to networking techniques resulted in the development of a method called *GERT* for a more realistic analysis of schedules. The network scheduling and costing techniques, known as the 'Cost Schedule Control System', were approved by the U.S. Government for Defense and NASA contracts. The next decade saw the development of new tools and techniques for different project components, like resource planning and control for different projects. This concept gave a new application called Performance Measurement System giving the percentage of work completed, thus giving more realistic information for forecasting about cost and date for completion of the project.

The application research during the last three decades of the 20th century resulted in the development of computer software to apply the latest techniques for scheduling, resource planning, costing, performance measurement, and forecasting for medium to large projects.

IBM became one of the first companies to use project managers' role in industrial setups in 1961, by deputing computer engineers called 'System Managers' with a responsibility to oversee the development and installation of different computer models across different operational lines in commercial units of industries. Further development is launching various software for monitoring and control, such as Prima Vera, MS-Project, etc. which are currently in use.

Consequent to a strong focus on achieving the stated objectives within the prescribed time frame, in the form of pre-decided output with quality parameters through optimum use of resources, the project approach has been used universally to complete major assignments in each sector of the economy. Whether it is a construction of a dam or a stadium to organize Olympic games, carrying the Olympic torch to the game venue, or construction of a space station and its placement in orbit, or sending 'Curiosity' the vehicle to explore life at 'Mars', or search of God particle, or research work, and even for disaster management, etc., the projects are formulated and carried out to achieve objectives and desired end result.

To sum up, a project is a proposal for investment for creating, expanding, and developing facilities to produce goods or provide services, with definite start and termination dates specified with a defined budget. Project activity has been in existence ever since the dawn of civilization. Illustrative examples are the Pyramids of Egypt, the Great Wall of China, etc. In other words, the concept of the project is not new. Modern projects

are, however, complex with added sophistication involving different sets of parameters and disciplines and the use of Information Technology for Project Planning, Monitoring & Control. A project as a whole is a sum of its parts with interdependencies.

1.2.3 Interdependencies

Interdependencies in a project are obvious due to its operational requirements. In a project, interdependencies are observed in different forms. The very unique interdependency exists among three major components of any project viz. time, cost, and quality due to the interface relationship between them. Changes in any one of these three components make a visible effect on the other two components. It is commonly observed that delay in implementing any project requires revision of project cost to maintain the agreed quality parameters.

The 'Parent Organization' which implements projects has its own functional departmental structures such as production, procurement, marketing, finance, etc. On one side, these functional departments interact with each other regularly. A high level of interdependency among functional departments may give rise to conflict among them.

Interaction of functional departments of parent organization with functional units created for different projects may vary from time to time in terms of their activities, like procurement, and have to be involved at the beginning; manufacturing and finance may be involved throughout the project life, or marketing may be involved at a later stage before completion of the project. The Project Manager has to identify these interdependencies and establish a clear communication channel with proper maintenance of interrelationships for smooth project activities. For example, a seed-producing company may have production farms at different locations for different crops and varieties. During sowing season, requirements of different types of equipment need to be planned by individual Project Managers in consultation with the engineers of equipment divisions of a parent company to provide well-maintained equipment at sowing time, to avoid waiting and clash of sowing dates with other farms.

The other inter-dependencies in a complex project can be observed with regard to different resources, like equipment/finances as well as human resources. The most difficult part of project management is noticed in the coordination and integration of different components while implementing the plan of a complex project, which requires varied expertise and skills drawn from the parent organization or from outside forming multidisciplinary teams (MTs) with different expertise. One important fact must be remembered that though human resources are controlled by the Project Manager about their roles and responsibilities, i.e., who will do what, when, and where; the functional manager decides who will be assigned to which project and for how long. The process of coordination of these MTs is called *Integration Management* and the process of managing this task of coordination across MTs is known as *Interface Coordination*. Bennis (1972) developed a solution to this problem called 'Transformed Relationship Evolved from Network Data' (TREND), analyzing and indicating dependencies and important linkages among MTs and workgroups.

1.2.4 Uniqueness

One of the characteristics of a work/assignment to be called a project is its uniqueness. Even two projects with the same objectives for construction or research, where many activities are repeated, differ in one or the other aspect due to customization. One of the important characteristics of a project is customization.

A certain degree of natural risk and uncertainty involved in each project makes it different from the other. Some important features like customization, risk, uncertainties, etc. provide uniqueness and do not allow it to become routine when the component of risk and uncertainty tends to become zero, the work/ assignment goes out from the ambit of a project and becomes routine. As long as the construction of high-rise buildings is done with design and construction takes place as per plan, it is called a project. Once the construction is based on repetitively erecting pre-fabricated structures as a specific activity with no risk, it becomes routine. Today, sending space vehicles to other planets is a project. In the future, once the risk and uncertainty involved in sending space vehicles to other planets come to zero, it will be a routine like going to another city or country by airplane. Remember the days when E-commerce was in infancy when the Dot.com address was created as a project, but today every company/ business activity has its website and dot.com address. Similarly, earlier commercial preservation activities for fruits and vegetables were undertaken as a project. Now, even the setting of high technology tetra pack unit has become a routine for packing liquids, such as milk or juices, to make them available even in remote villages.

The success of a project depends on the functioning of different multidisciplinary teams (MTs). As long as the members of MTs follow teamwork with motivation, the tasks undertaken get completed well in time. Hence, an intelligent Project Manager in the role of the HR manager must use some motivation techniques like financial awards, encouraging and offering complimentary words for members to achieve results, providing certainly needed amenities at the project site, etc. Researchers found that participatory management techniques are found to be the most successful means to develop teamwork among project members. Despite such a culture or environment, the scope for conflict is germane to Project.

1.2.5 Conflicts

The project manager operates in an environment of conflict. Various sources of these conflicts emerge from his functional responsibilities, such as work priorities, allocation of resources including human beings, working schedule, change in standards, meeting certain uncertainties, etc; all these may become major reasons for conflict in project management.

The project has to be executed economically, maintaining quality parameters and within time schedule by staff engaged on contract, which may result in various constraints, such as the latest knowledge, technology, manpower, facilities, adequacy of capital, activity schedule, etc. Despite these constraints, three major goals of the project *viz.*, time, cost, and operational systems need to be kept in perspective. Here, the project manager is required to balance the outcome of these constraints and negotiate with the client/user of a project to deal with some of the given parameters, like time, cost, schedule, manpower, etc. to reduce the effect of constraints as well as conflict in executing a project.

Four major stakeholders in a project, the client, parent organization, project team, and public may have conflicts of objectives and mutual interests. The client wants to make changes in the project as per his need in a changing situation, whereas the parent organization looks for profit optimization. A project manager as the executing agency faces these conflicts often. Members of project teams generally have a responsibility to report to two authorities, i.e. 'the project manager' and 'the functional head' of the parent organization, and face divided loyalty and priority. Functional managers

sometimes face inroads of their authority by project managers, especially demanding services of personnel. The functional manager may reject the demand to show his authority or due to work pressure compulsion at his end. It has been observed that the Project Manager often lacks the authority required to execute the responsibility assigned to him/her and in most cases, s/he relies on the goodwill of functional heads in the parent organization.

Every project in any multi-project organization competes for different types of requirements, including the resources of functional departments. The functional departments have their own compulsions, goals, needs, and objectives; that is why they functionally differ from each other. Sometimes, in unforeseen situations, the functional departments are not able to meet the needs of the project and request the project manager to change the schedule, standards, or even resources, which may put the project manager into a conflict of choice. Though the schedule and cost are initially set by functional departments, a project manager may insist on revising or changing due to practical difficulties in operation.

The conflict between contractor and user of services and products/ client or project manager is a regular feature. In practice, both the conflicting parties display the least concern for developing mutual trust and a spirit of teamwork and go for hard bargains to derive maximum self-advantage. The user wants to spend less to reduce cost, while the contractors aim at the maximum profit for themselves. Under such circumstances, the gain for one is a loss for the other.

Certain sources of conflict in a project may be listed as the setting of priorities, use of operating procedures, development and implementation of schedules, use of human resources, personal issues, and allocation of resources. However, the success of a project up to a large extent depends upon an important functionary engaged in the running project, designated as 'Project Manager', who remains the focal point to bring all efforts and resources together, heading the project organization, keeps close liaison with the parent organization, providing leadership and independent decision taking in coordination with other project experts and functionaries. The success of a project depends on the functioning of different multidisciplinary teams (MTs). As long as the members of MTs follow teamwork with motivation, the tasks undertaken are completed well in time. Hence, an intelligent Project Manager in the role of the HR manager must use some motivation techniques like financial awards, encouraging and offering complimentary words for members to achieve results, providing certain basic amenities at the project site, etc. Researchers found that participatory management techniques are found to be the most successful means to develop teamwork among project members.

Check Your Progress 1.1

Note : a) Write your answers in the space given below.

b) Match your answers with those given at the end of the unit.

1. Define the term Project.

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2. What is the purpose behind setting up the project?

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3. What do you understand from the term ‘interdependencies’ in the context of a project?

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4. Why the project is considered unique?

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1.3 CATEGORIES OF PROJECT

Projects have certain orientations leading to their categorization. A project may originate from any need to achieve certain definite objectives viz. construction (Pyramids, Taj Mahal), development (Delhi Metro, Euro Tunnel), or a combination of both (space station), operations during the war, artistic work, and making of sculpture, rehabilitation of human life, post disasters like earthquake or tsunami, varietal improvement for a particular crop, introducing a new approach for agricultural or rural technology extension, scientific researches for a breakthrough in any field, etc.

A project is identified as a combination of human and other non-human resources such as material, machinery, finance, space, ideas, etc. pooled together in a temporary setup to achieve unique and pre-decided purposes. Projects can be of various shapes, sizes, or duration, from small and straightforward to extremely large and highly complex.

Projects may be categorized broadly based on sector/discipline/operational area, organizational form, and management aspects. In organizations and businesses, a project can be related to any functional area, particularly introducing or changing products/services. A list of some functional area that requires a project is as under:

- People, project staff, and their management;
- Products and services;
- Materials, manufacturing, and production;
- IT and communications;

- plant, vehicles, equipment;
- storage, distribution, transportation, logistics;
- buildings and premises;
- finance, administration, acquisition, and divestment;
- procurement and disposal;
- purchasing, sales, marketing;
- human resources development and training;
- customer service and relations;
- quality, health, and safety;
- legal and professional;
- technical, scientific, research, and development;
- new business development; and
- and anything else which needs planning and managing within organizations.

1.4 CHARACTERISTICS OF PROJECT

Projects have some features or characteristics. To qualify an assignment of work/task to be called a project, it must have some of the following characteristics:

- A specific and definable purpose that can be spelled out in terms of cost, efforts required for performance, and time schedule to get the end result (Output).
- Every project has some uniqueness, even for the most commonly repeated activities like house construction, scientific research to test new seeds, etc, as each project is a one-time activity.
- Projects are temporary endeavours started with definite goals and outputs, ad hoc establishment with people, materials, machinery, and facilities. The establishment is disbanded once the goals are achieved.
- Large projects have complexity due to the use of advanced technology, size of operation, and deployment of large quantities of resources resulting in interdependency regarding the use of resources, efforts, time utilization, etc.
- Since each project differs from the other one, it involves new risks and uncertainties.
- Due to commitments of organizations to project results on time, at pre-declared quality parameters within limited resources, organizations may call for special efforts to meet deadlines to maintain their reputation.
- The project follows a 'process' to achieve pre-defined and set definite goals. Each project passes through certain phases called the project life cycle with beginning, growth, maturity, and end.
- The project requires a variety of skills, resources, and expertise; hence the actual work is performed by people from a variety of functional areas employed by contractors and outsiders.

- Certain important aspects of work such as decision making, output, accountability, and rewards are shared by the team members of a project supporting functional units.
- The people working as members of the project team return to original positions or are deployed in other projects, once a particular project activities come to a close; whereas the functional units are generally permanent establishments.
- Project Management generally sets up many other support services like procurement, accounting, personal appraisal, information system, etc.
- The project is a typical endeavour to bring improvement through a beneficial change from 'state A' to 'state B'.
- Projects may have various stakeholders. The four main stakeholders in any project are the client, parent organization, project team, and people.

Let us also refer to British Standards (BS.6046 Part I (1984), in order to get an overall perspective of the project.

- Project duration is usually pre-determined (finite) with a definite start and termination date specified.
- What happens during a project often affects the rest of the subsequent life of the product (hardware or service).
- Project organisation is often temporary and may change from one phase to the next.
- Projects contain some elements of uncertainty and risk.
- Many projects are non-repetitive.
- Finally, projects are not isolated; they interact with other projects and organisations; their structures and systems are interactive organisationally, technically, economically, and socially.

1.5 ORGANIZATIONAL FORM

Project organisation functions as a temporary setup and terminates its functioning once a project is completed. The members of the project team normally return to their parent organisations or are re-assigned to new projects.

An important uniqueness of a project is its optimum resource utilization. That is why a majority of projects use a matrix organization structure. Matrix organization structure allows many projects to run simultaneously using human and non-human resources optimally. A project may be with only one permanent person, the project manager, who can run it successfully with his coordination skills. Projects from different sectors like manufacturing, construction, IT, and research, may require different organizational structures depending on the project needs and its unique features.

Considering organizational forms, projects are formulated and run as pure or 'stand alone' project organisations, matrix organization, or mixed organization. In pure project form, the project functions as a self-contained identity having its staff, technical as well as administrative, with obligations to follow specified procedures relating to personnel,

financial, administrative, and control matters, and is required to provide a periodic progress report to the parent organization. The project manager enjoys complete operational freedom in decision-making with accountability. This form of organization has certain advantages as well as disadvantages.

In order to derive advantages and minimize disadvantages, the form of matrix organization was evolved, which is a combination of pure project form and functional organization structure. The matrix project is not separated from the parent organization running multi projects simultaneously, which is not the case in regard to the stand-alone project. The project manager of Project I (PM-I) reports to a programme manager designated to supervise other projects also. A Project I is allotted few staff members by other functional divisions e.g., procurement, manufacturing, finance, personnel, etc. The allotment of staff may be for full or part-time as per the need of a project. These project staff members work under dual control. The PM-I has control over what s/he will do, whereas the respective manager of the functional department decides on who will be allotted to which project and which technology is to be used. Thus, every project manager under this arrangement in a matrix organization framework is required to coordinate with the programme manager as well as other functional managers for staff utilisation.

The mixed organizational form is not often used; however, the pure project and pure functional organizations co-exist resulting in a mixed organization form. Many organizations declare their large, successfully run projects after reaching to maturity stage as subsidiaries or allow them to operate as independent units declaring it a venture firm under a parent organization.

1.6 NATURE OF AGRICULTURAL PROJECTS

The agricultural sector projects are dealt with in different manner for project formulation, implementation, analysis of critical parameters, and appraisal because they carry different sets of risks, though they pass through the same stages of the project life cycle and follow the same principles of project management. Generally, agriculture and veterinary projects have five features viz. physical, economic, social, infrastructure, and institutional aspects.

The physical features include (i) geographical location where a project is located, (ii) climatic parameters, such as rainfall, period of rainfall, its intensity and variation, average/maximum humidity, temperature, and its variation, rate of water evaporation, etc. for dryland farm project as well as irrigated project, (iii) soil and topography, its agricultural potential, fertility, mineral content and suitability for irrigation purposes, (iv) water resources and their sources, viz., surface or underground, (v) crop varieties and livestock species, mechanization in crop production, pest endemic and control mechanism followed in that area.

Economic features include resources (i) Agricultural and livestock resources at project location/region, dependency of people on these resources, approximate value of production in terms of the rupee, (ii) Land use, farming system, and cropping pattern – which includes production from crops and livestock, crop yield and inputs, agricultural practices and technology used, supply of inputs, subsidies to farmers on inputs, marketing, and logistic facilities, taxation on products, etc., (iii) Other economic activities undertaken by farmers such as forestry, fisheries, sericulture, etc.

Social features include issues related to (i) land tenure and land holdings by farmers. Land tenures should be seen in the context of the owner as a cultivator, tenant cultivator with certain conditions, sharing the output with the owner, landless labour cultivating purely on wages, size of a land plot, and the effect of agrarian reforms on land tenure. (ii) Rural population and migration of labour to urban towns for employment during a non-harvesting period or getting better remuneration in town affecting labour supply for cultivation in rural areas. (iii) Social services available in terms of schools, health care services, dispensary, communication facilities, etc.

Infrastructure is one of the essential features of the project undertaken in rural area. Electricity, roads, communication facilities, etc., and a number of beneficiaries using them play an important role in the success of a project.

Institutions in rural areas like Government agencies provide support and facilities to farmers like agriculture credit banks, agri-input supplying agencies, marketing agency, crop insurance agencies, grain storage facilities, cooperative institutions, veterinary hospitals, etc. These are important features for the success of Agriculture and Veterinary projects.

‘Agricultural projects’ are handled differently for analysis of critical parameters, appraisal, and project formulation as they carry different sets of risks.

Check Your Progress 1.2

- Note :** a) Write your answers in the space given below.
b) Match your answers with those given at the end of the unit.

1. List any three categories of the project.
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2. What is the organisational form of projects?
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3. Why do agriculture projects display complexities and are handled differently?
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1.7 PROJECT LIFE CYCLE

In the preceding sections, the characteristics and categories, including the complexities in Agriculture projects have been explained. It is essential to understand that every project has its life cycle. The description given below is intended to provide clarity.

Owing to the definitions and characteristics of a project, all projects pass through the same path from beginning to its termination. The path followed by a project is termed the project life cycle. During its life cycle, a project passes through four main stages called phases. In the majority of projects, a pattern of progress in activities to achieve goals is marked by a slow-fast-slow pattern. However, the pressure of three main components viz. time limit for completion, cost, and performance remains the main driving force throughout the project life cycle. The four phases of the project life cycle are termed Conception (Initiation), Definition (selection, planning, scheduling), Execution (Action, monitoring & control), and Operation (Closure).

The conception phase starts with recognition of a problem to be solved or opportunity to be availed of and setting up a project is considered necessary. At this stage, the preliminary goals and all the possible means to achieve them are specified. The next step is to search for a consultant or system developer group (SDG), that examines the environment and set project objectives, search for alternative solutions, and resources and develop strategies, conducts technical, economical, and environmental feasibility for executing the project. The contractor, SDG conducts a feasibility study to find out whether each option/alternative solution addresses the business problem before giving a formal proposal or letter of interest to the client.

After the client decides to accept one of the proposals and commits to own the proposal and pay for the project, the project team gets involved in the establishment of a formalized set of plans to achieve goals developed at the first stage of the life cycle of a project. The contractor/SDG expands the project management team with required experts to list necessary resources, undertake planning, schedule various activities, prepare estimates and budgeting, workout performance requirements, support systems, and system interfaces needed to execute Project. The scope of the project is defined in terms of reference before going for detailed planning. The comprehensive plan includes schedules of activities, budget, required resources, assurances, control measures, quality targets, etc., as well as an implementation system. The contractor/SDG evaluates the project for acceptability and sends the proposal to the project management team for final evaluation by top management/client, for revisions/modifications or even abandonment, as deemed appropriate.

The third phase of the project is considered to be crucial as the client acquires different systems to be placed for the execution of the project; that is why this phase is referred to as the 'acquisition' phase. The major activities of the project are executed with the support of sub-contractors/operators and the project management team overseeing and monitoring the progress of work, controlling the resources, developing progress reports, and forward to top management/clients for their perusal and direction. Near the end, when the project reaches its completion, the end result/output becomes part and parcel of the client's asset. The client operates the project with the technical support of the project team to make it functional in all respects.

In the final phase called 'operation' or project closure phase, the client takes overall control of deliverables and activities. The project management team starts handing

over project documentation to the business, releasing equipment and other resources, terminating contracts, and communicating about the closure of the project to various stakeholders. For some time, the contractor remains associated with the client to provide certain needed services and support like maintenance or evaluation.

Among all the phases of the project, the maximum time is allocated to the second and third phases, depending upon the nature of the project, where maximum efforts are put to achieve the project goals.

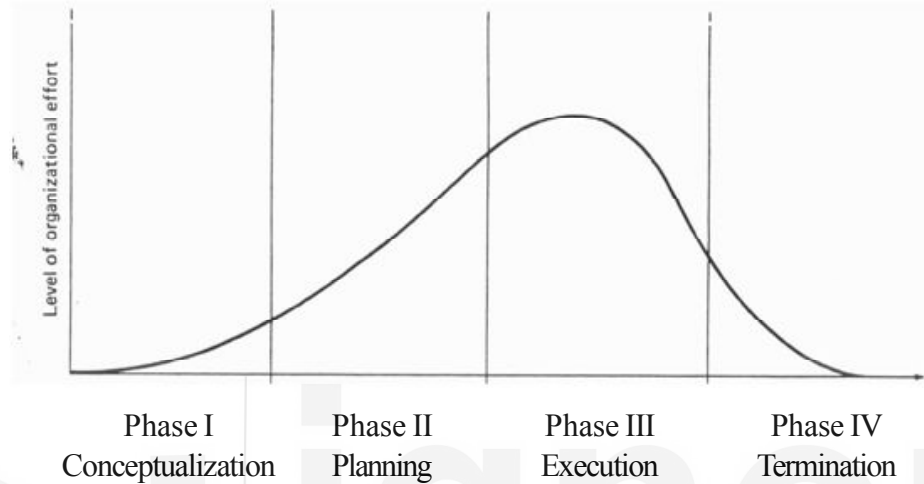


Fig.1.1: Stages in the project life cycle. (Based on Adams and Barndt; King and Cleland).

Check Your Progress 1.3

- Note :** a) Write your answers in the space given below.
b) Match your answers with those given at the end of the unit.

1. What is meant by project cycle?

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2. What are the different phases through which a project passes before completion?

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1.8 PROJECT MANAGEMENT

Let us think about what is Project Management? And why it is required? Some standard definitions provide broader perspectives of project management.

The British Standards BS 6079:2000 defines project management as *“the planning, monitoring and controlling all aspects of a project and the motivation of all*

those involved in it to achieve the project objectives on time and to the specified cost, quality and performance”.

The International Standards Organisation (ISO 10006:1997 (E) has defined it as *“the planning, organising and monitoring and controlling of all aspects of a project in a continuous process to achieve its objective”.*

Project Management Institute of USA (PMI) has defined Project Management as the *“application of knowledge tools and techniques to project activities to meet project requirements”.*

We may note that the crucial aspects are time management, cost management, resources management, and quality management to achieve the desired objective. We shall go further into detail.

‘Management’ as a function in nutshell is explained as the integration and arrangement of needed resources to perform certain tasks, in order to achieve organizational goals by an individual or group of persons called manager or management. The specific roles of the manager or management differ as per the organization and task, but this function remains common to all. ‘Management’ includes certain basic functions like planning of activities, organizing resources, providing leadership and control in relation to various parameters.

From time to time, ever since the start of the twentieth century, management was looked at from different viewpoints viz. *classical, scientific, and bureaucratic*. Various principles were propagated in each viewpoint. In the 1930s, Elton Mayo put forth the concept of ‘Social Men’ and introduced *behavioural* viewpoint. Similarly, during Second World War, another viewpoint, i.e., the *systems approach* was introduced explaining the understanding of the management of the system and the environment in which it functions. Later, the viewpoint of the *contingency approach* came to indicate that none of the viewpoints alone, can guide a manager in different situations.

The project viewpoint of management relies a lot on the principles of classical and behavioural viewpoints and uses a goal-oriented system approach to achieve project goals effectively with time and quality commitment. To be effective, the project organisation follows certain systems like ‘horizontal hierarchy’ and ‘informal communication’. The task of project manager becomes difficult as he gets work done by temporary manpower with a diverse background. The various management principles under traditional management are used in project management with the bottom line of delivering the project results on time, within cost, and assured quality.

Project management may also be referred to as a combination of ‘skills’, ‘tools’, and ‘process’ to accomplish a series of tasks effectively. Project management requires a set of certain skills, specialised knowledge, and relevant experience for enhancing the chances of success of a project and minimizing risks. Knowledge and skills in the use of different tools such as aim setting, planning, accounting, project monitoring, software application, registers, checklists, review systems, etc. make his performance commendable for effective management of essential components of a project, such as time, cost, quality, risk, change, etc. The knowledge of different processes and appropriate techniques coupled with experience becomes an added advantage for project managers.

The term Project management has various names in technical terminology such as team management, task force management, ad hoc management, matrix management

or programme management, etc. Whatever the name we give to project management, all the forms have two things in common. (i) a project manager and (ii) a project team or project organization. The one responsible person in the setup, called the project manager, is given complete responsibility and authority to plan, organise, give direction, and control project activities. Based on the nature of the assignment, its objectives, and goals the project management may be further categorized into task-specific, these are as follows:

- Programme management
- Taskforce management
- New venture management
- Product Management
- Commercial Project Management with profit as an objective
- Government/Non-profit project management
- Military Project management
- Research & Development Project management
- New Product Development Project management
- Marketing of a New Product management
- Service Project Management in the field of Auditing, Consultancy, etc.

We may state that both Project Management and Operations Management strive to achieve the set goals by managing the environment, humans, and other resources. The management principles apply equally to both, such as planning, organising, staffing, motivating, monitoring, and controlling activities. A crucial difference is that while the project organisation comes to an end after achieving the goal, the general manager takes over the operational phase as an ongoing activity, repetitive in nature.

To sum up, project management is transient; it is unique in the sense that no two projects are alike. The critical factors in a project are time, cost, and resources, with concern for quality. From concept to commissioning, the resources – men, materials, machines, and money - need to be put to optimum use. Management holds the key to realising the objective, i.e., achieving the end result by traversing through different stages.

1.8.1 Characteristics of Project Management

Having understood the meaning of Project Management, we may identify the following characteristics of project management:

- A functionary designated as ‘Project Manager’ acts as a coordinator of all the activities and arranges necessary resources to achieve a single project objective.
- The Project Manager as head of the temporary project organisation operates independently from the normal chain of management.
- Project activities require a variety of resources and people with different skills, provided by contractors operating outside the project organisation. The Project Manager is responsible for integrating these resources and skills to achieve project activities.

- The Project Manager keeps close coordination with functional managers of the organisation for different support systems to work in a project team.
- The focus of the project remains on delivering the output as a product or service on time, within cost, as per technical specification. The functional organisation maintains resources for doing other activities of organisations and sometimes has a conflict with the project manager for resources.
- The responsibility for decision making, output, reward, and accountability lies with the support units of contractors and sub-contractors, the project team, and the project manager.
- The project manager is responsible for integrating all the skills and expertise required by the project. He directly negotiates with functional managers for different support services to meet deadlines. The project manager is responsible for integrating all the skills and expertise required by the project. He directly negotiates with functional managers for different support services to meet deadlines.
- Project management gives rise to different systems, like project and personal evaluation, procurement of resources, accounting, and financial management, communication and information systems, etc.

1.8.2 Critical Factors in Project Management

Certain critical factors need to be reckoned with by Project Management. An attempt is made to summarise those factors.

Management of projects carries various complexities because of their predefined parameters for implementation such as 'aims and objectives that have to be achieved', 'on schedule', 'within budget', and 'acceptability by the client who pays for project and end-users for whom the project is meant' etc. However, various experts in this field tried to identify the critical factors which play a decisive role in implementing project activities. Jeffrey K. Pinto and Dennis P. Slevin identified ten critical factors.

- 1) **Project Mission:** Project Mission refers to the condition where the goals of the project are clear and understood by members of a project team and various stakeholders as well as other departments. It clearly defines statements related to goals and general directions with a belief about the success of a project.
- 2) **Top Management Support:** Willingness of top management to participate in the project, not only to provide authority, support, and direction to provide leadership, influence on the client (sometimes provides finances and uses the output) to accept or express resistance to the project output as well as in the allocation of sufficient resources (financial, manpower, time, etc). In absence of support from management, manpower and funding resources may not be available for the project. Management's agreement for the project is important, as it adds value to the business, or solves a pressing problem. If management does not see the value of the project, they will be reluctant to support it. At this time, the project manager has to give full commitment to the successful achievement of project goals.
- 3) **Project Schedule/Plan:** Developing a plan is more than just taking on the tasks. At this stage, deliverables need to be defined along with the necessary tasks to produce them and associated risks with each task, develop a detailed specification for time schedules with due dates, milestones, manpower requirements with

accountabilities, and equipment associated with each task. The schedule/plan also includes alternatives, safety measures, budget requirements at each stage, monitoring systems for performance concerning time and budget, feedback mechanism for corrective actions, etc. In fact, the project schedule/plan provides the first step for taking the project forward.

- 4) **Client Consultation:** For the success of a project, one important step is to ensure agreement among the client (Project sponsors), various stakeholders, and the project management team on the purpose and goals formulated for the project. Ultimately, what are the changes the project will bring, what problems it will solve, and in which form results will be seen are important. Clear measurable goals on the one hand help the project team to implement the project and compare projected results with the actual. The clear measurable goals, on the other hand, help define the project scope. The client as one who pays for the project and uses the project output is the most important stakeholder. For successful implementation of the project and to bring about the change, the client consultation and involvement at different stages make it possible for sponsors to see whether his/her and future clients' needs are fulfilled. It requires a well-established communication system and active listening between client and project manager, as well as between project manager and project team.
- 5) **Personnel:** As a project is defined as the combination of human and non-human resources to achieve specific goals within time and budget parameters, the level of knowledge, skills, goals, and personalities of members of the project team must be considered in assessing the environment of the project organization for which a sound and effective system for recruitment, selection, and training is essential from the beginning of a project.
- 6) **Technical Tasks:** It refers to the necessity of technology and the members of a project team with the required skills to perform different technical tasks. Some of the risks, the analysts have identified as major risks are technical incompatibility or non-availability of needed technology or skilled people and cost-effectiveness.
- 7) **Client Acceptance:** This refers to the final stage of implementation or 'selling' the final project to its user, who pays for the project. Many project managers carry a wrong belief that if they implement other stages of the project efficiently with cost-effectiveness, the client will accept the project, but in fact consultation and participation of the client or intended user in the beginning stages of the project give him a better understanding and more likelihood of him to accept the project. Sometimes, even the "intermediaries" are engaged to act as a liaison between the project implementation team and the client as an aid to getting client acceptance.
- 8) **Communication:** The communication network acts as the lifeline of the project in two ways. First, it creates an environment for efficiency and success of a project by providing essential data to concerned members of the team, and secondly, the communication between the client and project team acts as a channel for the exchange of views and ideas about project objectives, and changes in procedures and policies, etc. Communication channels are needed to inform the relevant stakeholders of the progress of the project. Management and project sponsors may require regular status reports. Suppliers, clients, and/or customers may need statements of work, contracts, and progress reviews. The project team will need

task assignments and regular briefings. The frequency and types of communication for each channel should be clearly defined and managed. The communication plan should be part of a project plan and then communication work as a lifeline, as it has been observed that many projects fail because of poor communication.

- 9) **Monitoring & Feedback:** This refers to control mechanisms designed at every stage of project implementation. Monitoring and feedback help the project manager to compare the actual performance with what was projected in the plan and take corrective action. In fact, the monitoring contributes to the optimum utilization of various project resources, particularly financial.
- 10) **Troubleshooting:** Whatsoever be the perfectness in formulation and planning of the project, it is really impossible to guess and foresee the problem actually faced by the project teams while implementing different phases of the project. Every project manager keeps contingency plans and alternative solutions to handle unforeseen problems known as troubleshooting mechanisms. This mechanism not only provides a solution to an unforeseen problem but also the ability to identify and foresee potential problem areas.

Besides the ten critical factors mentioned above, there are a few more factors that make a project a success or failure *viz.* appropriate and clearly defined scope, competence and experience of project manager, building a project team of competent and committed members, leadership, availability of adequate resources, etc.

Check Your Progress 1.4

Note : a) Write your answers in the space given below.

b) Match your answers with those given at the end of the unit.

1. Define Project Management.

.....

2. Name important critical factors that need to be considered by the Project Management.

.....

1.9 LET US SUM UP

A project may originate from any need to achieve certain definite objectives. The project has certain 'characteristics' such as specific and definable purpose, uniqueness, ad-hoc establishment disbanded once the goals are achieved. In projects, the complexity, interdependency regarding the use of resources, risks, and uncertainties,

need special efforts to complete the project within the stipulated time frame, ensuring optimal utilization of resources.

Projects can be of various shapes, sizes, or duration, from small and straightforward to extremely large and highly complex. Projects may be ‘categorized’ broadly based on sector/discipline/ operational area, organizational form, and management aspects.

The project passes through a life cycle comprising four phases, termed as Conception (Initiation), recognizing a problem to be solved or opportunity to be availed of and confirming its existence as a project is considered necessary, Definition (selection, planning, scheduling) includes an elaboration of specific project objectives, forms of the outcome, scope, detailed plans by the project team and project manager, once the client decides to accept project proposal and gives commitment. The execution phase is considered to be crucial as the client acquires different systems to be placed for the execution of a project in terms of action, monitoring, and control; and the Operation (Closure) phase is when the client takes overall control of deliverables and activities and project management team starts handing over of project documentation to client, releasing equipment and other resources, terminating contracts and communicating about the closure of the project to various stakeholders. The critical factors in a project are Time, Cost, and Resources, consistent with quality.

1.10 KEYWORDS

Programme	: A large activity to encompass similar projects associated to achieve specific goals.
Interdependencies	: Denote relationship between organizational functions, where a function depends on another function/task for completion.
Uniqueness	: A characteristic that differentiates an object, process, and person from the other one due to certain features.
Risk	: Can be defined as the possibility that the outcome of a particular event/activity does not turn out as planned for action.
Multidisciplinary Team	: Comprises members with varied skills to assist the Project Manager in implementing varied project activities.
Conflict	: A perceived difference of values between two or more parties that result in mutual opposition/ disagreement.
Uncertainty	: A situation where information about alternatives and future events is not available to a decision maker.
Integration Management	: The intricate process of coordinating the work and timing of different groups associated with a project.
Parent organization	: An organization operating multi-projects simultaneously with functional departments.
Matrix organization Form	: Combination of a pure project and functional organization structure, where members of the project team are

controlled Project Manager as well as the Head of the functional department.

Project Life Cycle : The life cycle the project passes through in four phases viz. Conception (Start), Definition (Growth), Execution (Maturity), and Operation (Closing) phases.

Project Management : Managing any piece of work as discrete project activity or set of activities with specific objectives, planned, monitored, and controlled to give output within cost, time, and quality.

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1.12 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1.1

1. A project may be described as an endeavour/assignment with the uniqueness of doing first time to achieve certain pre-decided goals and deliverables with given resources such as time, cost, manpower, materials, machinery, etc. with pre-defined quality as well unforeseen constraints.
2. An important purpose behind the project is to achieve an objective for the first time. The other purpose is the focus on quality output within given time limits, with the optimum use of different resources, controlling cost.
3. Interdependencies in a project are inherent because of its operational systems and requirements. One of the unique interdependencies exists among three major components of any project viz. Time, Cost, and Quality are known as the 'Quality Triangle'. As and when any one of the three components is disturbed from a pre-decided position, the other two components are naturally influenced.
4. One of the characteristics of a work/assignment to be called a project is its uniqueness. Even two projects with the same objectives for construction or research, where many activities are repeated, differ in one or other aspect due to customization.

Check Your Progress 1.2

1. Projects may be categorised broadly based on sector/discipline/operational area, organizational form, and management aspects. Some functional area that requires a project is people, project staff and their management; products and services; materials, manufacturing, and production; IT and communications; etc.
2. Pure or 'stand alone' project organization, matrix organization, or mixed organization.
3. The 'Agricultural Projects' are handled differently for analysis of critical parameters, appraisal, and project formulation, as they carry different sets of risks. Generally, these projects have five features viz. (1) physical related to geographical location, climatic parameters, soil and topography, water resources, crop varieties, and livestock species (2) economic related to agricultural and livestock resources, land use, farming system and cropping pattern, economic activities undertaken by farmers, (3) social features include tenure and land holdings by farmers, rural

population and migration of labour to urban towns, social services available in terms of schools, health care services, communication, etc. (4) infrastructure which includes electricity, roads, communication facilities, etc; and (5) institutional aspects, which include agriculture credit banks, agri-input supplying agency, marketing agency, crop insurance agencies, grain storage facilities, cooperative institutions, veterinary hospital, etc; which make them different from other projects.

Check Your Progress 1.3

1. All projects pass through the same path from beginning to their termination. The path followed by a project is termed the project life cycle.
2. The project passes through a life cycle comprising four phases termed Conception (Initiation) recognizing that a problem is to be solved or an opportunity to be availed of and confirming its existence as the project. Definition (selection, planning, scheduling) includes an elaboration of specific project objectives, forms of the outcome, scope, and detailed plans by the project team and project manager, once the client decides to accept the project proposal and give commitment. The execution phase is considered crucial as the client acquires different systems to be placed for the execution of a project in terms of action, monitoring & control; and the Operation (Closure) phase is when the client takes overall control of deliverables and activities and the project management team starts handing over project documentation to client, releasing equipment and other resources, terminating contracts and communicating about the closure of the project to various stakeholders.

Check Your Progress 1.4

1. Project Management denotes planning, monitoring, and controlling all aspects of a project and the motivation of all those involved in it to achieve the project objectives on time and to specified cost, quality, and performance.
2. Project management carries various complexities. Experts in this field with their practical experience tried to identify critical factors which play a decisive role in the management of project activities during implementation viz., project mission, top management support, project schedule/plan, client consultation, project personnel, technical tasks, client's acceptance, communication, troubleshooting, monitoring, and feedback.