

CHAPTER ONE

1. GENERAL INTRODUCTION ABOUT PROJECT

After completing this chapter, students will be able to:

- ✓ Understand the meaning and definition of project,
- ✓ Explain the features of project,
- ✓ Narrate projects and plans

1.1. Meaning and Definition of a project

A project is a task with a desired end point. For example, building a new house is a project, the end point being when the house is built. Similarly, creating a new piece of software or an app is a project, as is launching a new product for a business. Projects can be used to complete many different types of tasks.

Usually the term ‘project’ is applied to tasks with some degree of complexity. The word ‘project’ is not applied to such simple activities which do not benefit from the rigor of managing as a project. Projects have a degree of complexity. They are complex enough that just thinking through and remembering the tasks required or writing them down as a ‘to do’ list is not a reliable enough way to ensuring you complete them. Projects fulfil some clear predefined objective, in a planned period of time and to a planned cost. Once the project is complete something will have changed – for example, you have a new house, a new app or a new product.

There is no one comprehensive definition for a project. Its definition varies from author to author, from organization to organization, and based on the nature, objective and other characteristics of the project. As a result you may find several definitions of a project in the literature some of which are provided below.

- *A project is a proposal for an investment to create, expand and/or develop certain facilities in order to increase the production of goods/services/ during a certain period of time in a community, region, country, market area and/or certain organization (firm, public organization, NGO, etc.*
- *USA Project Management Institute, defined project as it is a one shot, time limited, goal directed, major undertaking, requiring the commitment of varied skills and resources*
- *A project also described as a combination of human and non-human resources pulled together in a temporary organization to achieve a specified purpose.*
- *A project, ideally, consists of an optimum set of investment-oriented actions, based on comprehensive and coherent sector planning, by means of which a defined combination of human and material resources is expected to cause a determined amount of economic and social development.*

- A unique process consisting of a set of coordinated and controlled activities with start and finish dates, undertaken to achieve an objective conforming to specific requirement including constraints of time, cost and resources. (ISO-8402)
- A project is any scheme or part of scheme for investing resources, which can be reasonably analyzed and evaluated as independent unit (Little and Mirrlees, 1974).
- In relation to agricultural activities, Gittinger (1982) defined project as a whole complex of activities in an undertaking that involves uses of resources to gain benefits.
- A project is an organized effort to do something useful or attain a useful end result which is sometimes defined as a plan, venture or enterprise (Angus and Norman, 1997).
- Project is a temporary organization to which resources are assigned to undertake a unique, novel and transient endeavour managing the inherent uncertainty and need for integration in order to deliver beneficial objectives of change (Turner and Müller, 2003).

From the above all definitions we can learn that

- A project is an economic/development activity
- It requires commitment of scarce resources
- It brings some benefit from its accomplishment
- The benefit should exceed its cost
- Implementation of a project needs resources or inputs.
- Every project converts the given inputs into outputs through the process of implementation

A major misunderstanding about a project is relating it to only construction or creation of such physical facilities as buildings, roads and dams. However, project may involve intangible things such as creation of awareness (e.g. about HIV/AIDS), eradication of diseases (e.g. polio vaccination), combating harmful practices (e.g. genital mutilation) and capacity building (e.g. training to enhance service delivery capabilities of public sector employees). Thus, projects may range from physical or technical (construction of physical facilities) to mixed (involving both physical and nonphysical things) to nonphysical (dealing purely with behavioral aspects of an organization).

1.2. Characteristics of a project

Generally, all projects are characterized by a certain features which may be common to all. Thus, the following are typical features of a project:

- ❖ **Objective:** A project has a fixed set of objectives. Once the objectives are achieved the project ceases to exist. Collectively, project outputs and outcomes are identified as goals. Thus, each project

has a specific objective that can be identified, quantified or valued. A distinction is usually made of the output and outcomes of a project. The output of a project refers to the tangible or intangible thing created by undertaking the project and the goods and services that this thing delivers. A key point to note in relation to project objective is that they should be stated in a way that facilitates measurement of achievements.

The general rule is that project objective should be SMART

Specific: well defined and clear to anyone that has a basic knowledge of the project,

Measurable: how do we know how far away completion is and when it has been achieved

Achievable: indicate what should be done to achieve the objective,

Reliable/achievable: Is the objective achievable with the available resources and timeframe, and

Time-based: it should identify a definite target date for completion and/or frequencies for specific action steps that are important for achieving the goal on/within a specific time period.

- ❖ **Life Cycle:** Like organic entities, projects have life cycles. From a slow beginning they progress to a buildup of size, then peak, begin a decline, and finally must be terminated by some due date.
- ❖ Uniqueness though the desired end results may have been achieved elsewhere; they are at least unique to this organization. Moreover, every project has some elements that are unique. No two construction or R & D projects are precisely alike. Though it is clear that construction projects are usually more routine than R & D projects, some degree of customization is a characteristic of projects. In addition to the presence of risk, as noted earlier, this characteristic means that projects, by their nature, cannot be completely reduced to routine. No two projects are exactly similar even if the plants are exactly identical or are duplicated the two projects may differ by the location, infrastructure, the sponsoring agencies and the people who works under the two projects make each project unique.
- ❖ **Resources:** include human, material, financial and information. A typical project may involve organizations such as the owner, user, contractor, supplier and financier. These organizations may be involved in a project through their different functional units and contribute, among others, human resources from different professions including engineering, architecture, accounting and environment, to mention some. Projects have limited budgets, both for personnel as well as other resources.
- ❖ **Single entity:** A project is a single entity and is normally entrusted to one responsibility center, while participants in the project are many.

- ❖ **Team work:** Any project calls for team work-. The team members may be from different discipline, organization, and even country
- ❖ **Change:** A project sees many changes throughout its life. While some of these changes may not have any major impact, there can be changes which will change the entire course of the project.
- ❖ **Risk and Uncertainty:** Every project has a risk associated with it. The degree of risk and uncertainty will depend on how a project has passed through the various stages of its life cycle.

1.3. Classification of a project

Project may be broadly classified as:

- Industrial/Commercial projects: For example, establishment of factories, industries, service rendering enterprises, etc.
- Agricultural projects For example, establishment of farming, breeding, forestry, horticulture, fishery, etc.
- Infrastructure projects For example, establishment of roads, airport, schools, health stations, hospitals, universities, etc.

Alternative classification of projects: Basically, three types of project can be identified depending upon how new resources committed to them relate to existing economic activities:

- *New Investment:* Designed to establish a new productive process independent of previous lines of production. They often include a new organization, financially independent of existing organization.
- *Expansion Projects:* Repeating or extending an existing economic activity with the same output, technology and organization.
- *Updating projects:* Replacing or changing some elements in an existing activity without a major change of output. It involves some change in technology but within the context of an existing though possibly reformulated organization.

1.4. Project Parameters/Success Factors

During a project's life, the management team focuses on three basic parameters: quality, cost, and time. Traditionally, it is said that a successfully managed project is the one that is completed at the specified level of quality, on or before the deadline, and within the budget.

Time: projects are constrained by a specified period of time during which they must be completed. They are not supposed to continue indefinitely. Thus, the first constraint that governs project management involves this basic requirement: The project should come in on or before its established schedule.

Budget: A second key constraint for all projects is a limited budget. Projects must meet budgeted allowances in order to use resources as efficiently as possible. Companies do not write blank checks and hope for the best. Thus, the second limit on a project raises the question: was the project completed within budget guidelines?

Performance: all projects are developed in order to adhere to some initially determined technical specifications. We know before we begin what the project is supposed to do or how the final product is supposed to operate. Measuring performance, then, means determining whether the finished product operates according to specifications. The project's clients naturally expect that the project being developed on their behalf will work as expected. Applying this third criterion is often referred to as conducting a quality check.

This so-called triple constraint was once the standard by which project performance was routinely assessed. Today, a fourth criterion has been added to these three (see in figure 1.1)

Client (or customer) satisfaction: The principle of client acceptance argues that projects are developed with customers or clients in mind, and their purpose is to satisfy customers' needs. If client acceptance is a key variable, then we must also ask whether the completed project is acceptable to the customer for whom it was intended. Among others, is newly added parameter that partially indicates success in implementation as well as possibilities for future replication (or sustainability). In general, each of the parameters is specified in detail during the planning phase of the project and a basis for controlling the project during the implementation phase.

1.5. Plan, projects and programs

1.5.1. Projects and planning

Planning in general is a conscious effort to direct human energy for the purpose of securing a rationally desirable end. Planning is a means to an end. It is a guide to achieving certain objectives in an optimum manner by means of orderly sequencing of activities. In other words, planning is a form of decision making in using scarce resources in selective and economical ways to achieve a pre-determined objectives and goals.

Planning is necessary because:

- It helps to make necessary arrangements in advance of possible challenge
- It helps an organization to think ahead and anticipate future events
- it gives clear picture of future events to measure and control actual activities

- it helps to identify operational problems of past performance and future corrections

Plan requires projects: a sound plan requires a great deal of knowledge about existing and potential project. Since a plan lay down growth rate target, for Gross Domestic Product (GDP), investment, employment etc., a realistic assumption must be established with regard to such growth. This presupposes a knowledge of the rate at which good projects can be planned. Thus, good and realistic plan cannot be formulated in the absence of a great deal of project planning and without proper economic appraisal of projects.

Project requires plan: since projects commit scarce resources, project selection is meaningful only when it is placed within the broader development-planning framework. The best economic appraisal of projects cannot be made without referring framework and plans and policies. To choose the right project one must have an estimate of demand for the product. But the estimation of demand could be more realistic if the plan is also realistic.

1.5.2. Project and Program

Some people use the terms “Program” and “project” as synonymous. But there is a difference. A program is usually larger in scope, is activity-oriented, and is not necessarily time bound. For example, health program, educational program, agricultural or industrial development program may consist of one or more fertilizer projects, and so on. The project objective must aim at meeting the program objectives. While program objectives may be broader, and project objectives are more specific and focused.

It is necessary to distinguish between projects and programs because there is sometimes a tendency to use them interchangeably.

- A project refers to an *investment activity* where resources are used to create capital assets, which produce benefits over time and has a beginning and an end with specific objectives, a program is an *ongoing development* effort or plan involving a number of projects.
- Programs may or may not necessarily be *time bounded*. Yet programs cannot live forever, they have limited life cycle, which however, may or may not be explicitly stated. So in effect in terms of time delimitation, there is only relative difference between programs and projects. But projects are *time limited* and have a definite life cycle.
- A development plan or a program is therefore *a wider concept* than a project. It may include one or several projects at various times whose specific objectives are linked to the achievement of higher level of common objectives.

- Projects in such context are the *concrete manifestations of the development plans* and programs in a specific place and time. One can think of *projects as subunits and bricks of programs*, which constitute a component of or the entire national plan.
- A project is a scheduled undertaking for the purpose of creating a product or service. Program management, on the other hand, is the act of creating and managing multiple projects, most of the projects are usually related to one another.
- Project management is usually short-lived with specific time constraints while program management is an ongoing process in order to achieve the goals and objectives. The job of a project manager usually involves working on finite projects or objectives. The program manager works more often with strategy.

In general: Program in general is a group of related projects that are managed in a coordinated way to achieve certain objective. A project normally originates from a plan which can be a national plan or corporate plan. A program is thus, larger in scope, not necessarily time bounded and, its objectives are broader

For Example,

- The national goal/plan: Poverty Eradication
- Strategy: Increase productivity (in all sectors)
- 1. Development program: Increase agricultural productivity

This may result in a number of projects like,

- Construction of dams (irrigation infrastructure)
- Upgrading the skill of agricultural practices
- Construction of training centers
- The national goal/plan: Poverty Eradication
- Strategy: Increase productivity (in all sectors)
- 2. Development program: Improve the health of the community

Health program may have a number of projects like,

- Construction of hospitals
- Training of health officers
- Expansion of health centers.

1.6. Project Management

Project management has been practiced for hundreds, actually thousands, of years. Long before computers and sophisticated scheduling techniques became available, the ancestors of today's professional project managers had to determine resource requirements, arrange for material and equipment, and strive to meet a schedule imposed by, in many cases, a powerful leadership entity. They knew that any construction type of undertaking or project endeavor, large or small, required a goal, a set of objectives, a plan, coordination with many functional groups, the management of resources, and the ability to manage change. Additionally, it became very clear that every project requires strong and adaptive leadership.

Project managers, by nature of the position, will work with and manage teams and a variety of stakeholders, some of whom can be expected to be a real challenge to work with. Considering this factor, project managers must continue to develop the skills necessary to balance the expectations and demands of each stakeholder while managing project deliverables. Today's project managers see themselves as managing part of a business as well as managing a project. Applying project management is certainly a factor in achieving organizational objectives, but it is important to understand the definition and nature of a project.

Project management is the application of knowledge skills, tools, and techniques to project activities to meet project objectives. Effective project management is accomplished through the integration of five major project management processes: initiation, planning, execution, monitoring and controlling, and closing. As projects are authorized by a project sponsor, a project manager is assigned and becomes accountable for the success of the project through effective leadership and the application of project management techniques. The project manager will ensure coordination between functional organizations and must have the ability to apply the appropriate amount of managerial and cross-organizational support and guidance to achieve success as the project is executed.

Project management, as a discipline or profession, also subscribes to a code of ethics and professional conduct specifically focused on integrity, respect, fairness, and honesty. This includes business ethics as well as project management ethics because we now believe that we are managing our business by projects and that the project managers are actually managing part of a business. Project management can be defined as the process of achieving project objectives through the traditional organizational structure and over the specialties of the individuals concerned. Project management is applicable for any ad hoc (unique, one-time, one-of-a-kind) undertaking concerned

with a specific end objective. (Project management 8th edition) Project managers perform the following major functions/roles:

1. Identify and communicate the benefits of project management.
2. Set objectives clearly using SMART criteria.
3. Establish guidelines and criteria for selection of a project manager. Emphasize soft skills as well as managerial skills.
4. Resolve conflicts and problems,
5. Establish expectations with executives at project start-up.
6. Communicate project sponsor support and executive support to the team. Understand line manager priorities. Create a positive working relationship.
7. Prepare and communicate acceptance criteria. Communicate the scope statement.
8. Obtain sponsor and executive support, establish clear objectives, and develop a communications plan.
9. Reward and recognize project teams and develop team-building activities.
10. Control technical quality, budget, and schedule of the project
11. Develop a risk management plan and a process for managing issues.
12. Establish a project management office, require documentation of lessons learned, and ensure that management support is visible.

Typical Project Problems

1. Scope may not be clearly defined when commitment is made to a client.
2. There may not be enough resources allocated (people, money, materials, time, space, etc).
3. Conflict of interest between or among stakeholders (ops vs. engineers, sales vs. technical support, line vs. staff).
4. Commitment to unrealistic dates – the PM may be too optimistic about the completion date of the project.
5. There may be unclear roles and responsibilities. 6. Things may go wrong for some natural reasons.

CHAPTER TWO PROJECT CYCLE

After completing this chapter, students will be able to:

- Understand the meaning and definition of project cycle.
- Explain the World Bank Project Cycle
- Differentiate World Bank Project Cycle and UNIDO Project Cycle.

Project cycle

There tends to be a natural sequence in the way projects are planned and carried out. Before any project is actually realized it goes through various planning phases. Therefore, the different stages through which project planning proceeds from inception to implementation are often called “the project cycle”. The stages or phases through which the project passes are necessary for its completion and they constitute a specific sequence that is cyclical in nature identified as *project life cycle*.

A project life cycle are important because they demonstrate the logic that governs a project. They also help us develop our plans for carrying out the project. They help us decide, for example, when we should devote resources to the project, how we should evaluate its progress, and so forth. A project cycle is a sequence of events, which a project follows. These events, stages or phases can be divided into several equally valid ways, depending on the executing agency or parties involved. Some of these stages may overlap.

Every program, project, or product has certain phases of development known as life-cycle phases. A clear understanding of these phases permits managers and executives to better control resources to achieve goals. During the past few years, there has been at least partial agreement about the life-cycle phases of a product. They include:

- Research and development
- Market introduction
- Growth
- Maturity
- Deterioration
- Death

Today, there is no agreement among industries, or even companies within the same industry, about the lifecycle phases of a project. This is understandable because of the complex nature and diversity of projects. The theoretical definitions of the life-cycle phases of a system can be applied to a project. These phases include:

- Conceptual
- Planning
- Testing
- Implementation
- Closure

The first phase, the conceptual phase, includes the preliminary evaluation of an idea. Most important in this phase is a preliminary analysis of risk and the resulting impact on the time, cost, and performance

requirements, together with the potential impact on company resources. The conceptual phase also includes a “first cut” at the feasibility of the effort.

The second phase is the planning phase. It is mainly a refinement of the elements in the conceptual phase and requires a firm identification of the resources required and the establishment of realistic time, cost, and performance parameter.

The third phase testing is predominantly a testing and final standardization effort so that operations can begin. Almost all documentation must be completed in this phase.

The fourth phase is the implementation phase, which integrates the project’s product or services into the existing organization. If the project was developed for establishment of a marketable product, then this phase could include the product life-cycle phases of market introduction, growth, maturity, and a portion of deterioration.

The final phase is closure and includes the reallocation of resources. Consider a company that sells products to consumers. As one product begins the deterioration and death phases of its life cycle (i.e., the divestment phase of a system), new products or projects must be established.

2.1. World Bank Project Cycle (The Baum Cycle)

Project with the characteristics already outlined above typically run through at least several separable stages of activity which can be thought of as constituting a definite sequence that some author’s /institutions/ have called a project cycle. The first basic model of a project cycle is that of Baum (1970), which has been adopted by the World Bank and initially recognized four main stages, namely.

1. Identification
2. Preparation
3. Appraisal and Selection
4. Implementation

At a later stage (in 1978) the author has added an additional stage called “Evaluation” which usually closes the cycle as it gives rise to the identification of new projects.

1. Identification

Project identification consists in finding project ideas that could contribute towards achieving specified development objectives. But, where do projects come from? There is no simple answer.

Some may be "resource based" - stem from the opportunity to make profitable use of available resources; "market based" - arise from an identified demand in home or overseas markets; and "need based" - to make available to all people in an area where minimal amounts of certain basic material requirements and services exist. Once some project ideas have been put forward, the first

step is to select one or more of them as potentially promising. This calls for a quick preliminary screening by experienced professionals who could also modify some of the project proposals. Preliminary screening is conducted to reduce to a manageable number the project alternatives to which more work and time will be devoted. As a result of preliminary screening exercise, some of the project alternatives will be rejected and those that are promising will be advanced to the next stage.

2. Preparation

Once projects have been identified, there begins a process of progressively more detailed preparation and analysis of project plans. At this stage the project is being seriously considered as a definite investment action.

Project preparation sometimes called project formulation covers the establishment of technical, financial, economic, social and institutional aspects of the project. Following preliminary screening, promising project options should be investigated in a systematic manner. The analysis of the projects technical, commercial, social, environmental, financial, economic and institutional aspects should be detailed and comprehensive enough to decide on the future of the project with confidence.

3. Appraisal and Selection

It is the comprehensive and systematic assessment of all aspects of a proposed project. During appraisal, it should be verified that the proposed project, in combination with other policies, contributes towards achieving certain development objectives.

After a project has been prepared, it is generally appropriate for a *critical review* or an independent appraisal to be conducted. This provides an opportunity to re-examine every aspect of the project plan to assess whether the proposal is appropriate and sound before large sums are committed. It is done both in the field and at the desk level. Appraisals should cover at least seven aspects of a project, each of which must have been given special consideration during the project preparation phase:

- a) Technical – here the appraisals concentrate in verifying whether what is proposed will work in the way suggested or not.
- b) Financial – the appraisals try to see if the requirements for money needed by the project have been calculated properly, their sources are all identified, and reasonable plans for their repayment are made where necessary.
- c) Commercial – the way the necessary inputs for the project are conceived to be supplied is examined and the arrangements for the disposal of the products are verified.

- d) Incentive – the appraisals see to it whether things are arranged in such a way that all those whose participation is required will find it in their interest to take part in the project, at least to the extent envisaged in the plan.
- e) Economic – the appraisal here tries to see whether what is proposed is good from the viewpoint of the national economic development interest when all project effects (positive and negative) are taken into account and check if all are correctly valued.
- f) Managerial – this aspect of the appraisal examines if the capacity exists for operating the project and see if those responsible ones can operate it satisfactorily. Moreover, it tries to see if the responsible are given sufficient power and scope to do what is required.
- g) Organizational – the appraisal examines the project if it is organized internally and externally into units, contract policy institution, etc so as to allow the proposals to be carried out properly and to allow for change as the project develops.

These issues are the subjects of specialized appraisal report. And on the basis of this report, financial decisions are made – whether to go ahead with the project or not. In practice, there can be quite a sequence of project selection decisions. Following appraisal, some projects may be discarded.

4. Implementation

The objective of any effort in project planning and analysis clearly is to have a project that can be implemented to the benefit of the society. Thus, implementation is perhaps the most important part of the project cycle. The major priority during this stage is to ensure that the project is carried out in the way and within the period that was planned.

In this stage, funds are actually disbursed to get the project started and keep running. A major priority during this stage is to ensure that the project is carried out in the way and within the period that was planned. Problems frequently occur when the economic and financial environment at implementation differs from the situation expected during appraisal.

It is during implementation that many of the real problems of projects are first identified. Because of this, the feedback effect on the discovery and design of new projects and the deficiencies in the capabilities of the project actor can be revealed.

Therefore, to allow the management to become aware of the difficulties that might arise, recording, monitoring and progress reporting are important activities during the implementation stage. There are some aspects of implementation that are of particular relevance to project planning and analysis.

- i. The first is that the better and more realistic a project plan is, the more likely it is that the plan can be carried out and the expected benefit realized. This emphasizes once again the need for careful attention to each aspect of project planning and analysis.

- ii. The second is that project implementation must be flexible. Circumstances will change and project managers must be able to respond intelligently to these changes.

5. Evaluation

Once a project has been carried out, it is often useful to look back over what took place, to compare actual progress with the plans, and to judge whether the decisions and actions taken were responsible and useful. Evaluation can help not only in the management of the project but also help in the planning of future projects. As a result of undertaking evaluation, major achievements and problems are identified, recommendations for remedial action made and lessons of experience drawn (experience with one project can give rise to new ideas for extension of the existing project as well as formulation of new project). And, finally, evaluation should be undertaken when a project is terminated or is well into routine operation.

Different people may do evaluation.

- *Project manager* will be continuously evaluating its experience as implementation proceeds.
- *The sponsoring agency*, perhaps the operating ministry, the planning agency or an external assistance agency – may undertake evaluation.
- In large and innovative projects, the project's administrative structure may provide a separate *evaluation unit* responsible for monitoring the projects implementation and for bringing problems to the attention of the projects' management.

2.2. UNIDO – Project Cycle

UNIDO project life cycle (Behrens and Hawranek, 1991) consisting of pre-investment, investment and operational phases, and although, the aforementioned models use different terminologies and divide the project life cycle into different number of phases. The very essence of project life cycle is that projects are first identified in the form of ideas followed by different types of studies to determine their feasibility, execution of the feasible one/s, use of the outputs of the project to deliver goods and services (operating and maintain project output) and assessment of whether the projects support the organization in achieving its goals. UNIDO has established a project cycle comprising three distinct phases):

1. The pre investment phase,
2. Investment phase and
3. Operational phase phases.

2.2.1. The pre- investment phase

A. Project Identification

Project identification amounts to finding projects which could contribute towards achieving specified development objectives. In principle, especially in developing countries like Ethiopia, project identification should be an integral part of the macro-planning exercise with sectoral information and strategies as the main source of project ideas. In practice, however, projects are not always derived from national and sectorial plans; they originate from multiple sources such as investment promotion agencies, private consultants and private investors. Irrespective of their origin project ideas should, in general, aim at: overcoming constraints to the development effort, be they material, human or institutional constraints; or, meeting unsatisfied needs and demand for goods and services. Constraints, needs and demand should be interpreted broadly to include, for example, foreign exchange constraints that might necessitate projects for import substitution or export promotion.

Opportunity studies:

The identification of investment opportunities is the starting – point in a series of investment – related activities, when potential investors (private or public) are interested in obtaining information on newly identified viable investment opportunities.

Where does Projects Originate? The variety of projects makes it impossible to prepare an exhaustive list of sources from where project ideas emanate; much depends on the experience, and even imagination, of those entrusted with project creation. In general, we can distinguish two levels where project ideas are born: the macro-level and the micro-level.

At the macro-level, project ideas emerge from:

- ❖ National, sectorial,, or regional plans and strategies supplemented by special studies, often called opportunity studies, conducted with the explicit aim of translating national and sectorial programs into specific projects;
- ❖ Constraints in the development process due to shortages of essential infrastructure facilities, problems in the balance of payments, etc.;
- ❖ A government's decision to correct social and regional inequalities or to satisfy basic needs of the people through development projects;
- ❖ A possible external threat that necessitates projects aiming at achieving, for example, self-sufficiency in basic materials, energy, transportation, etc.;
- ❖ Unusual events such as droughts, floods, earth-quakes, hostilities,
- ❖ A government's decision to create locally project implementing capacity in such areas as construction
- ❖ Multilateral or bilateral development agencies and as a result of regional or international agreements in which a country participates.

At the micro-level, the variety of sources is equally broad. Project ideas emanate from:

- ❖ The identification of unsatisfied demand or needs;
- ❖ The existence of unused or underutilized natural or human resources and the perception of opportunities for their efficient use;
- ❖ The need to remove shortages in essential materials, services or facilities that constrain the development effort;
- ❖ The initiative of private or public enterprises in response to incentives provided by the government;
- ❖ The necessity to complement or expand investments previously undertaken; and
- ❖ The desire of local groups or organizations to enhance their economic independence and improve their welfare.

B. Project Preparation – Feasibility Studies

A feasibility study should provide all data necessary for an investment decision. The commercial, technical, financial, economic and environment prerequisites for an investment project should therefore be defined and critically examined on the basis of alternative solutions already reviewed in the pre – feasibility study.

If the pre-feasibility study indicates that the project is, *prima facie*, promising and further work is justified, the project enters the stage of preparation.

Project preparation takes the form of a feasibility study conducted by the agency sponsoring the project or by consultants. At this point it would be helpful to address a question often raised, i.e. what is the difference between a pre- feasibility and a feasibility study? The answer is simple: they differ only with respect to the amount of work needed to decide if a project is viable. The table of contents is the same in both; it is the details and the sophistication that vary.

How Much Preparation: At this point we can ask how far in detail should project preparation advance before the project is ready for appraisal. This is a practical question and the answer depends upon the magnitude and the characteristics of the project. Projects that commit relatively small amounts of investment funds do not deserve painstaking and expensive preparation. After all, the risks taken in implementing small projects are small; of course, what is small is a practical question. Furthermore, projects that: (i) consist of a large number of small, dispersed components (e.g. hundreds of primary schools or village water supplies) or, (ii) depend heavily on community participation, need not be prepared in detail before an investment decision is made. Often, those responsible for project planning complain that too much information is asked from them and that they have to spend unnecessarily long time in project preparation. In most cases their complaints are not justified. They should realize that resources are scarce and mistakes expensive. Furthermore, time spent on project preparation is not lost time. There is a trade-off between project preparation and implementation. The better a project is prepared the easier and faster its implementation and the lower the probability of cost overruns.

The need for professional project preparation does not imply that this stage should include engineering design that precedes implementation and which provides more accurate cost estimates. However, it is essential that the project is prepared to a level that its characteristics are clearly presented, its objectives and beneficiaries accurately defined and its merits and shortcomings thoroughly discussed. It is only on such a sound base that appraised judgment can be formed by the authorities responsible for investment decisions. Obviously, when it is expected that the project will be financed entirely or partly by multilateral or bilateral aid agencies, their specific requirements and standards of project preparation should be taken into account. Before proceeding to the stage of project appraisal we should mention that pre-feasibility and feasibility studies become much easier to conduct when precise and comprehensive terms of reference are prepared for these studies. Issued to a working group of local experts or to outside consultants, the terms of reference should make clear that the project should be researched carefully and all its aspects illuminated.

C. Appraisal and Investment Decision

After the completion of preparation, the project has been nursed by the sponsoring agency; now it changes hands. The project proposal in the form of a feasibility study is submitted to the investment decision makers for a broad and impartial appraisal. Appraisal is the comprehensive and systematic assessment of all aspects of the proposed project. After appraising the project carefully, appraisers will decide whether it will be implemented or not, with or without minor modifications.

Criteria and Questions: At the early stages of the project cycle we might say that the evaluation criteria are mainly, but not exclusively, technical and micro-economic in character. It is at this stage, and before an investment commitment is made, that the project should be reviewed again to confirm that it accords with the broad development objectives, or criteria set by donors, or bankers or other parties who have a stake in the project. The framework within which the project is appraised is broad and multi-faceted.

During appraisal, it should be verified that the project, in combination with other policies, contributes the maximum possible benefits towards achieving certain development objectives.

To this end the following questions could be answered to the viability of a project:

- ❖ Does the project belong to a sector where the country needs additional investment?
- ❖ Does the project meet urgent needs of the sector, that is, does it reflect sound sub-sector allocations;
- ❖ Does the project represent the least-cost alternative in achieving sector and sub-sector objectives?
- ❖ Is the project of optimum size, too big or too small?
- ❖ is the timing of the project right or the proposed investment is premature;
- ❖ is the project well designed with reasonably accurate cost and benefit estimates or are there still many loose ends; and How smoothly the appraisal will proceed depends on how well the project has been prepared. Even this indicative list of questions shows that a meaningful appraisal is possible only if the project has been carefully and professionally researched and planned.

To the appraisal of these aspects of the project we can add the review of, and a judgment about its noneconomic dimensions, e.g. dependency for key inputs and outputs on unreliable foreign markets. The nature and range of the non-economic aspects vary from project to project and relate to the stated objectives of the development strategy and the conditions in the country.

2.2.2. The Investment phase

The Project in Motion

The next stage in the project is the actual implementation of the project, followed by operation. Implementation begins immediately after the final decision on the project ends when it starts rendering the benefits envisaged. While in earlier stages of project planning there was more thinking and less action, in this stage the combination switches in favor of the latter: more action and less thinking is needed. It is the time when the conclusions reached and the decisions made are put into action.

The phase is divided into the following stages:

- 1) *Establishing the legal, financial and organizational basis for the implementation of the project.*
- 2) *Technology acquisition and transfer, including basic engineering.*
- 3) *Detailed engineering design and contracting, including tendering, evaluation of bids and negotiations.*
Detailed engineering design will include site preparation final selection of technology construction planning and time scheduling as well as flow charts and scale drawings preparation. Negotiations are concerned with legal obligations arising from the acquisition of technology, construction of buildings, purchase and installation of machinery, and financing
- 4) *Acquisition of land construction work and installation.* This involves site preparation construction of buildings and other civil works, together with erection and installation of equipment
- 5) *Pre-production marketing, including the securing of supplies and setting up of the administration of the firm. This and secures critical supplies prepares the market for the new product*
- 6) *Recruitment and training of personnel.* This stage proceeds simultaneously with the construction stage to ensure timely commissioning and the expected growth in productivity and efficiency in plant operations.
- 7) *Plant commissioning and start-up.* It is usually a brief but technically critical span in project implementation. It links the preceding construction phase with the operational (production) phase. The success achieved in this stage demonstrates the effectiveness of implementation planning and execution of the project and has a bearing on the future performance of the project.

The need to pay particular attention to project implementation cannot be over emphasized. No matter how carefully a project has been prepared and evaluated, the expected benefits are realized only when it is

properly implemented; it is not project reports but studiously executed projects that deliver the envisaged benefits. Of course, it is easier to execute a well prepared project but sound preparation is not a substitute for careful programming and close control during implementation. This is all the more so because most projects face problems during implementation and some of them cannot be identified in advance; they emerge as we proceed in the execution of the project. Some implementation problems are the result of general factors such as changes in the economic and political situation of the country or the world market while others are project specific.

2.2.3. Operational phase

This is the production phase that commences after commissioning and start-up. The resultant challenges of this phase are viewed from the short-term perspective and long-term perspective. In the short-term challenges may arise with regard to application of production techniques operation of equipment, inadequate labour productivity due to a lack of qualified staff and labour etc. Most of these problems have their origin in the implementation phase.

The long-term view relate to the chosen strategies and the associated production and marketing costs as well as sales revenues. These have a direct relationship on the projections made during the pre-investment phase. If such strategies and projection prove faulty any remedial measure will not only prove difficult but may be too expensive.

CHAPTER THREE

PROJECT IDENTIFICATION

INTRODUCTION

Project identification is the first and, perhaps, the most crucial stage of both project cycles. It is from this idea that the project will be based, and a poor idea or lack of ideas is likely to lead to poor or no projects. It is at this stage that an initial screening of project ideas will take place, with some project ideas being abandoned as impractical or of a low priority. Ideas for projects can come from a range of different sources and organizations including ministries, individuals, local communities, nongovernment organizations, and donor and international agencies. There will usually be more project ideas than resources to implement them, and therefore only small portions of these are ever likely to lead to the full implementation of an actual project. Mechanisms are therefore needed not only to identify different project ideas, but also to put these priorities for development and eventual implementation. This section discusses these issues: who identifies project ideas, source of project ideas, and the different roles of governments, private sector, NGOs and local communities in this process.

At the end of this chapter, students will be able to:

- Understand the sources of project ideas.

- Explain project ideas
- Differentiate between macro and micro sources of project ideas.

3.1. PROJECT IDENTIFICATION

Project identification is the findings of project that could contribute towards achieving specific development objectives. Often, project ideas should, in general, aim at overcoming constraints on the national development effort. It is the first stage in project cycle to identify an idea, which enable to launch a project. The question at this stage is where do project idea come from?

3.2. SOURCES OF PROJECT IDEAS

How to come up with a project before grasping to project preparation? Usually we can distinguish two levels where project ideas are generated from:

3.2.1. MACRO LEVEL

At macro level project ideas emanated from:

- National, sector or regional plans
- Constraints in the development process due to shortage of essential infrastructure facilities
- Government's decision to correct social and regional inequalities or to satisfy basic needs of the people through development projects.
- Possible external threat that necessitates projects aiming at achieving, for example, selfsufficiency in basic materials, energy, transportation, etc.
- Unusual events such as droughts, floods, earthquakes, etc.
- Government decision to create locally project-implementing capacity in such areas as construction, etc.
- Multilateral or bilateral development agencies.
- Regional or international agreements in which a country participates.

3.2.2. MICRO LEVEL

At micro level project ideas emanated from:

- Existence of unused or underutilized natural and human resources and the perception of opportunities for their efficient use
- Identification of unsatisfied demand or needs
- The need to remove shortage in essential materials, services, or facilities that constrain the development effort.
- The initiative of private or public enterprises in response to incentives provided by the government
- The Necessity to complement or expand investments previously undertaken
- The desire of local groups or organizations to enhance and improve their welfare.

During identification, the analyst should eliminate project proposals that:

- Are technically unsound and risky
- Have no market for the output
- Have inadequate supply of inputs
- Are very costly in relation to benefits
- Assume over ambitious sales and profitability, etc.

As a result, some of the project alternatives will be rejected and those that are promising will be advanced to the next stage called project preparation or feasibility (pre-feasibility and feasibility) study.

3.3. Opportunity Studies and Preliminary Screening

Preliminary screening is required to eliminate ideas that are not promising from beginning. The following six dimensions should be considered for preliminary project idea screening:

a. Compatibility with promoter

The idea must be compatible with the interest, personality, and resources of the entrepreneur, i.e.

- It must fit the personality of the entrepreneur.
- It must be accessible to the entrepreneur.
- It must offer the entrepreneur the prospect of rapid growth and high return on investment.

b. Consistency with governmental priorities

- Is the project consistent with national goals and priorities?
- Is there any environmental effect contrary to government regulations?
- Can the foreign exchange requirements of the project be easily accommodated?
- Will there be any difficulty in obtaining the license for the project?

c. Availability of inputs

The input requirements, their availability and cost should be considered. Resources and inputs required must be reasonably assured.

d. Adequacy of the market

The size of the present market must offer the prospect of adequate sales volume, potential for growth, and a reasonable return on investment. To check adequacy, see for:

- Present and future demand
- Market share of own and competitor
- Domestic and export market
- Quality-price relationship vis-à-vis competitive products
- Economic, social, demographic trends for demand
- Barriers to the new entry, sales and distributions system, patent protection, projected increase in consumption, etc.

e. Reasonableness of cost

Cost structures of the proposed project must enable it to realize an acceptable profit with a competitive price.

f. Acceptance of level of risk

To ascertain degree of risk involved, the following factors should be considered:

- Vulnerability to business cycle
- Change in technology
- Competition from substitute
- Competition from imports
- Government control over price and distribution, etc.

3.4. Pre-feasibility Studies

Since formulation of the feasibility study is costly and time consuming task, further assessment of the project idea is made in a pre-feasibility study. It is an intermediate stage between the project identification and a detailed feasibility study. The principal objectives of it are to determine:

- ❖ All possible project alternatives are examined
- ❖ The project concept justifies a detailed analysis of a feasibility study
- ❖ The project idea on the basis of available information should be considered either non-viable or attractive enough
- ❖ The environmental situation at the planned site and the potential impact of the projected production process are in line with national standards.

The difference between the feasibility study and the pre-feasibility study is in the extent of detail of the information obtained. The structure of the pre-feasibility study should be the same as the structure of the feasibility study. However, detailed review of the available alternatives must take place at this stage since it is costly and time consuming to do this in the feasibility stage. In particular, the review should cover the various alternatives identified in terms of:

- ❖ Project or corporate strategies and scope of the project
- ❖ Market and marketing concept
- ❖ Raw materials and factory supplies
- ❖ Location, site and environment
- ❖ Engineering and technology
- ❖ Organization and overhead costs
- ❖ Human resource
- ❖ Project implementation schedule and budgeting

In general, the pre-feasibility study involves subjective judgment of the project in terms of:

Availability of an adequate market: - judgments relating to the number of potential customers, needs of the customers, strength of the competitors, availability and access to sales and distribution network and export possibilities.

Project growth potential: - assessment of indicators on projected increase in the number of customers, increase in the rate of acceptance of the products, the general economic, social and political trend which could affect the growth potential of the project.

Investment costs: - Costs of raw materials transportation costs, distribution costs, labor costs, production costs and investment costs are usually considered. If the above costs are very high sustainability of the project is questionable.

Demand and supply factors: - This involves the projection of both short term and long term requirements of the project's output and examining the implications of these on the project's capacity. Many projects fail because they have started with a very large capacity only to operate at a much lower capacity. On the other hand, increasing the capacity of the project shortly after it starts operation is very costly.

Social and environmental considerations: - the project should also conform to the social considerations of the locality in which it is implemented. In addition; especially in industrial projects, due consideration should be given to the environmental effects of it on the surrounding.

CHAPTER FOUR PROJECT PREPARATION

At the end of this chapter students will be able to:

- ✓ Understand the process of market and demand analysis
- ✓ Understand the process of technical analysis
- ✓ Perform the process of Financial and Economic Analysis
- ✓ Evaluate financial feasibility of projects
- ✓ Conduct ecological analysis
- ✓ Identify the types of Financial evaluation criteria
- ✓ Identify the cost taken into consideration in financial analysis

4.2. Market and demand analysis

The objective of an investment project is benefit from utilization of resources and satisfying the market demand in a society. This market analysis is an important key in determining the magnitude of investment, location, technology requirement, production program, etc. The market analysis (the concept of marketing) is the orientation of management with regard to their business decisions that is market makes all participants in an organization to orient their thinking towards the market. The major objective of market analysis is to determine whether there is a gap between demand and

supply, i.e., is there a market for the product. The key steps involved in market and demand analysis are organized into seven sections as follows.

- Situational analysis and specification of objectives
- Collection of secondary information
- Conducting market survey
- Characterization of the market
- Demand forecasting
- Uncertainties in demand forecasting
- Market planning.

The key steps in market and demand analysis and their inter-relationships are illustrated in the

1. Situational Analysis and Specification of Objectives

A situation analysis provides one with the current status of the key aspects of the market and its participants. The aspects include customers, competitors, and middlemen. It analyses the characteristics of these aspects such as customer's preferences and purchasing power, strategies and actions of competitors, and practices of middlemen. A situation analysis may generate data that will provide a vague idea of the market and provide a basis for rough demand and revenue projection. If the situation analysis points a promising picture for the project, a formal market study is warranted to provide more accurate and reliable data that can be used for investment decision making.

To carry out such a study it is necessary to specify the objectives as clearly and as comprehensive as possible. A common approach to do this is to structure them in the form of questions.

2. Collection of Secondary Information

Information may be obtained from secondary and /or primary sources. Secondary information is information that has been gathered in some other context and is already available. Primary information, on the other hand, represents information that is collected for the first time to meet the specific purpose on hand. Secondary information provides the base and the starting point for the market and demand analysis. General sources of Secondary information:

The important sources of secondary information that is useful for market and demand analysis are as follows:

- National level Report prepared by the Government
- Plan Report by the /government
- Statistical abstract

- Economic Survey
- Annual Reports by the Ministry
- Bulletin of Banks
- Publication of Advertising agencies
- Other publications

Secondary information should be used with great caution. Its reliability, accuracy, and relevance for the purpose on hand should be determined before use.

3. Conduct of Market Survey

Secondary information, though useful often, does not provide a comprehensive basis for market and demand analysis. It needs to be supplemented with primary information gathered through a market survey, specific to the project being appraised. The survey could be a census; where the entire population is covered or a sample survey; only a proportion of the population is covered. Census studies are prohibitively costly and infeasible because proper sampling can produce the same or even more accurate results than census studies. Information sought in a market survey may cover one or more of the following areas:

- Total demand and rate of demand growth
- Demand in different segments of the market
- Income and price elasticity of demand
- Motives for buying
- Purchasing plans and intentions
- Satisfaction with existing product
- Unsatisfied needs
- Attitude towards various products
- Social economic characteristics of buyers
- Customer preferences etc

Typically, a sample survey consists of the following steps:

1. *Define the target population;* in defining the target population the important terms should be carefully and unambiguously defined. The target population may be divided into various segments which may have differing characteristics. For example, all television owners may be divided into three to four income brackets.

2. *Select the sampling scheme and sample size:* there are several sampling schemes, simple random sampling, cluster sampling, sequential sampling, stratified sampling, systematic sampling and non-probability sampling. Each scheme has its advantage and limitations. The sample size, other things being equal, has a bearing on the reliability of the estimates - the larger the sample the greater reliability.
3. *Develop the questionnaire:* the questionnaire is the principal instrument for eliciting information from the sample of the respondent. The effectiveness of the questionnaire as a device for eliciting the desired information depends on its length, the type of questions, and the wording of questions. Developing the questionnaire require a thorough understanding of the product, and its usage, imagination, insights into human behavior, and familiarity with the tools of descriptive and inferential statistics to be used later for analysis.
4. *Recruit and Train the Field Investigators:* recruiting and training of field investigators must be planned well since it can be time consuming. Great care must be taken for recruiting the right kind of investigators and imparting the proper kind of training to them.
5. *Obtain information as per the questionnaire from the sample respondent:* respondent may be interviewed personally, telephonically, or by mail for obtaining information. Personal interview ensures a high rate of responses. They are, however, expensive and likely to result in biased responses because of the presence of the interviewer. Mail survey are economical and evoke fairly candid responses. The response rate, however, is often low, telephonic interview, common in western countries have very limited applicability in Ethiopia because telephone tariffs are high and low telephone connection.
6. *Scrutinize the information gathered:* information gathered should be thoroughly scrutinized eliminate data which is internally inconsistent and which is of dubious validity. Sometimes data inconsistencies may reveal only after some analysis.
7. *Analyze and Interpret the Information:* information gathered in the survey need to be analyzed and interpreted with care and imagination. After tabulating it as per a plan of analysis, suitable statistical investigation may be conducted, wherever possible and necessary. For the purpose of statistical analysis, a variety of methods are available. They may be divided into two broad categories; parametric and non-parametric methods.

4. Characterization of Market

Based on the information gathered from the secondary information survey and the market survey, the market for a product may be described in terms of the following:

a) *Effective Demand; Past and Present:* In competitive markets *effective demand* is the *apparent consumption* which is defined as: production + imports – exports – changes in stock level. This figure has to be adjusted for the consumption of the product by the producers.

Consumption series can be computed.

b) *Breakdown of Demand:* Total / aggregate demand may be broken in to different segments which may be defined by: nature of product; consumer groups; geographical region etc

c) *Price:* It may be wise to distinguish between the following prices: manufacturer's price; wholesaler's price; retail price etc

d) *Methods of Distribution and Sales Promotion:* Since methods of distribution and sales promotion vary among different products, it will be helpful to describe the fore going aspects for the product on hand

e) *Consumers:* Consumers may be characterized demographically using such attributes as age, income, sex etc or attitudinally using such attributes as preferences, habits, intentions etc

f) *Supply and Competition:* The location, present production, planned expansion, capacity utilization level of competitors is crucial information. Substitutes and near substitutes should be noted too.

g) *Government Policy:* The role of the government in influencing the market and demand of a product may be significant; as such government policies and legislations that have an impact on the product should be spelt out.

5. Demand Forecasting

After gathering information about the various aspects of the market and demand from primary and secondary sources, attempt may be made to estimate future demand. A wide range of forecasting method is available to the market analyst.

6. Uncertainties in demand forecasting

Demand forecasting is subjected to error and uncertainly that arise from three main sources Data about past and present market lack standardization, few observations influence abnormal factors etc. Methods of forecasting inability to handle unquantifiable factors, unrealistic assumption excessive data requirement etc. Environmental changes shift in government policy international development, discovery of new sources of raw materials.

5. Market planning

The following are the steps followed in market planning

A) *Current marketing situation*. This deals with:

- Market situation e.g. size growth rate etc.
- Competitive situation e.g. the competitors objectives strategies strengths etc.
- Distribution situation e.g. distribution capabilities of competitors
- Macro-environment e.g. social, political economic technological variables etc.

b) *Opportunity and issue analysis*. In this section SWOT analysis is conducted

c) *Objectives*. Objectives which have to be clear, specific and achievable are spelt out

d) *Marketing strategy*. The marketing strategy covers the following: Target segment, positioning, product line, price, distribution, sales force, sales promotion and advertising.

e) *Action program*. This entails operationalizing the strategy in to time phased activities.

4.3. Raw materials and supplies study

There is technical relationship between input and output; the amount of input determines the output amount. Conversely, you have determined the product type and capacity. The next step to produce as per the above step is what input to use. The selection of raw material and supplies depends primarily on the technical requirements of the project and the analysis of supply markets. Important determinants for the selection of raw materials and factory supplies are environmental factors such as resource depletion and population concerns, as well as criteria related to project strategies for example, the minimization of supply risks and the cost of materials inputs. In order to keep the cost of the supply low, key aspects are to be identified and analyzed in terms of requirements availability, cost, and risks which may be significant for the feasibility of a project. The raw materials and supplies study consists of thorough analysis on what type of input? Where to find? How much it costs? Etc. Thus, the following approaches are often used to study raw materials and supplies.

4.3.1. Classification of Raw Materials and Supplies

A. Raw Materials (Unprocessed and Semi Processed)

Agricultural Products: The quality, present & potential must be identified. In food processing industries, only the marketable surplus of agricultural products should be viewed as basic raw materials, after meeting the consumption and sowing requirements. In the case of commercial crops the market surplus is the total production minus sowing requirements. In order to estimate the

supplies and availability of agricultural products it may be necessary to collect the data on past crops and their distribution by market segment. Projects based on agricultural produce to be grown in the future may call for actual cultivation on experimental farms under varied conditions.

Livestock and Forest product: In most cases of livestock product and forest resources, specific surveys are called for to establish the viability of an industrial project.

Marine Product: For marine based raw materials, the major problem, to assess the potential of availability, the yields and the cost of collection. Availability of marine products may not only depend on ecological factors but also on national policy and bilateral and multilateral arguments

Mineral products: Detailed information on the proposed exploitable deposit is essential. Unless the reserves are known to be very extensive, the study should give details of the viability open cast or underground mining, the location, size, depth and quality of deposit and the composition of the ore with other elements i.e. impurities. A detailed analysis of physical, chemical and other properties of the subject ore be processed and the results ought to be incorporate in the feasibility report.

B. Processed Industrial Materials and Components

Such inputs can be generally classified under base metals; semi processed materials relating to a wide variety of industries in different sectors and manufactured parts, components and subassemblies for assembly-type industries, including a number of durable consumer goods and engineering goods industry. In all these cases, it is necessary to define requirements availability and costs in some detail to ensure that the specification in the case of the two latter categories suit the production programs envisaged for the projects. For base metals availability during a particular time may depend on unstable international markets, as such their substitutability should be carefully examined. In case of process intermediates a careful analysis of their external availability and cost couple with the implication of their domestic manufacture should be made. While the same considerations prevail for assembly-type industries, backward linkages considerations should be made.

C. Factory supplies and Auxiliary Materials

A part from basic raw materials and processed industrial materials and components all manufacturing projects require various auxiliary materials, usually subsumed as factory supplies chemicals, additives, packaging materials, paints, oil, greasing, cleaning material etc. The requirement of such auxiliary materials should be taken in to account in the feasibility study.

D. Utilities

A detailed assessment of the utilities required (electricity, water, steam, compressed air, fuel, effluent disposal) can only be made after analysis and selection of location, technology and plant capacity, but a general assessment of these is a necessary part of the input study. An estimate of utilities consumption is essential for identifying the existing sources of supply and any bottlenecks and shortage that exist or are likely to develop so that appropriate measures can be taken to provide for either internal or external additional supplies in good time.

4.3.2. Specification of Requirements

In order to estimate the requirement of materials and supplies during the future operation of the plant, such requirements should be identified, analyzed and specified in the study both quantitatively and qualitatively. A number of factors could have a strong influence on the type, quantities, and qualities of the project inputs in particular the following:

- *Socio- economic factors*: social and cultural environment, socio economic infrastructure (social and economic policies and regulation infrastructural service, transport and communications system etc)
- *Commercial and financial (business) factors*: projects size, skills and production of the labor force, market demands regarding product quality, product mix, competition for material supplies and services etc.
- *Technical factors*: type of industry, technology and production process, type machinery and equipment, production capacity and estimated production etc.

Normally specifications will be based on preliminary project design, and only when the detailed specifications of the inputs available are known, the final engineering design of the project can be prepared. However, it is very important to consider during this stage of project design that there exists not only a relationship between material input and engineering design, but also interdependence with the market and marketing concept location aspects and the availability of human resources.

4.3.3. Availability and Supply

The source and the constant availability of basic production materials are crucial to the determination of the technical and economic viability as well as the size of most industrial projects. A feasibility study must show how the materials and inputs required will be provided. General availability, data about materials potential users and supply sources and programs will have to be analyzed and described. A final assessment of input requirement can be made only after the plant

capacity as well as the technology and equipment to be used are defined. If a basic input is available within a country, its location and the area of supplies, whether concentrated or dispersed should be determined. The alternative uses likely to be made of such materials and the consequent impact on availability should be assessed for the project in question. The question of transportability and transport costs should be carefully analyzed. When the basic material has to be imported either in whole or in part, the implication of such imports should be fully assessed. First the sources of imported inputs have to be determined. Secondly, the uncertainty of inputs should be stated. Thirdly, the implication of domestic production of basic materials that was being imported should be analyzed. In most developing countries such production is accompanied by imported control and user industries have to adjust to domestic supplies of basic materials.

4.3.4. Supply Marketing and Supply Program

Supply marketing

The objectives of supply marketing are basically cost minimization, risk minimization (reliability of supplies) and the cultivation of relation with supplier.

Supply Program

The overall purpose of the outline of a supply program in the feasibility study is to show how supplies of materials and inputs will be secured. Evidence should be presented to justify the assumption and suggestions. Cost estimates should be based on the supply program presented.

A supply program should deal with the following:

a) Identification of Supplying Sources and Suppliers

In the identification of a particular key supplier, consideration should be given to its geographical location, ownership, main activities, financial strength and profitability, production capacity, output over the last years, key customers and business experience with the type of products and the country concerned. An estimate of the level of priority that the supplier is likely to give the contract is crucial.

b) Agreement and Regulations

Letter of intent regarding supply contacts and obligation should be referred to and the general terms of suggested agreements, such as period of validity, payment terms, currency conditions and guarantees, outlined. Import policies and regulations including application procedures for obtaining import licenses validity periods, permits to acquire or use foreign currency possible tax exemptions,

and duty free imports, the existence of import restrictions etc., should be described and their consequences for the project analyzed.

c) Means of Transport

Means of transport for key materials and inputs by air, water, road or rail should be identified in the study. The availability, capacity, reliability and technical condition of the facilities must be analyzed. The study should consequently not only identify existing means of transport but also analyze their condition, describe how they can be used and suggest measures to be taken by the company concerned in order to obtain some confidence on the level of reliability and capacity. Loading and unloading facilities should be analyzed too.

D) Storage

Storage facilities are usually required at the plant, but may also be needed at ports, railway stations, or other places. The study should indicate the capacity of such facilities describe their utilization and present estimated quantities to be stored on the basis of anticipated production levels and delivered of materials and inputs

E) Risk Assessment

Identification and assessment of risks and uncertainties in the supply program should be presented. A distinction should be made between external and internal project risks factors, including failure of suppliers to meet their obligations, delayed consignments, supply shortages, quality defects, transport breakdown, utility malfunctions, strikes, climate variations, changed import regulations and shortages of foreign exchange for imports.

4.3.5. Costs of Raw Materials and Suppliers

a) Unit Costs

Not only the availability but also the unit costs of basic materials and factory supplies have to be analyzed in detail as this is a critical factor for determine project economies. In the case of domestic materials current prices have to be viewed in the context of past trends and future projections of the elasticity of supply.

The cost of alternative means of transport should also be considered. For imported materials and inputs *CIF* prices (including costs, insurance and freight) should be invariably be adopted together with clearing charges (including loading and unloading) port charges, tariffs, local insurance and taxes, and costs of internal transport to the plant.

b) Annual Costs

Estimates of annual operating costs for materials and supplies are to be made. The price basis for the estimates (price level, quotations from suppliers, world market prices comparisons with similar inputs in other projects etc) should be stated in order to enable the reader to check their reliability.

It should be made clear whether the cost estimates refer to a hypothetical level of production at full capacity utilization during the operation phase or to the first year (or some other year) of operation phase according to the time schedule for project implementation.

Some costs vary with the production level the plant in question, while others are more or less fixed. Taking into consideration the expected variations in the proposed plant it is advisable to divided cost item into *variable* and *fixed costs*. Costs estimates for materials and inputs can be expressed either as the cost per unit produced or in terms of a certain production level for, example 100,000 units per year. The later alternative can also be expressed as full capacity utilization which is equivalent to a certain production level. In either case, it will be possible to carry out a sensitivity analysis of different levels production and of capacity utilization in the financial calculations.

When calculating indirect costs, the amounts resulting from environment protection and population control measures should be established per production or per accounting period, whichever is appropriate. In order to arrive at the total operating costs by product as well as by total costs per year, the estimated costs per unit are multiplied by the total number of unit to be produced.

c) Overhead Costs of Supplies

When estimating material and input requirements of the project, the project planner has to plan not only for the level of production cost center but also at the level of service, administration and sales cost centers.

4.4. Location, Site, and Environmental Impact Assessment

4.4.1. Location and Site

4.4.1.1. Choice of Location

Location analysis has to identify a location suitable for the industrial project under consideration. The choice of location and site necessitates an assessment of demand, size, and input requirement. Although most often the terms '*location*' and '*site*' are used synonymously, they should be distinguished. Location refers to a relatively broad area like a city, an industrial zone, or a coastal area; site refers to a specific piece of land where the project would be set up. The locational requirements and conditions that are significant for the selection of both location and site should be judged against the defined corporate strategies and the financial and economic impacts.

The feasibility study should also indicate on what grounds alternatives locations have been identified and give reasons for leaving out other locations that were suitable but not selected.

Traditional approach to industrial location focused, on the proximity of raw materials and marketing's, mainly with a view to minimizing transport costs. The modern view requires consideration of commercial, technical and financial factors, but also of the social and environment impact a project might have.

Generally, the choice of location is influenced by a variety of considerations: proximity to raw materials and markets, availability of infrastructure, labor situation, governmental policies, and other factors.

Proximity to Raw Materials and Markets

Proximity to the sources of raw materials and nearness to the market for the final products are an important considerations for location. In light of a basic location model, optimal location is one where the total cost (raw material transportation cost plus production cost plus distribution cost for the final product) is minimized. Practically, it means that:

- i) A resource – based project like a cement plant or a steel mill should be located close to the source of the basic material (for example, limestone in the case of a cement plant and iron ore in the case of a steel plant;
- ii) A project based on imported material may be located near a port; and
- iii) A project manufacturing a perishable product should be close to the center of consumption.

A great many industrial products, however, are not affected by any one particular factor. Petroleum products and petrochemicals, for example, can be located at source, near consumption centers or even at some intermediate point. A wide range of consumer goods and other industries can be located at various distances from materials and markets without unduly distorting project economics.

Availability of Infrastructure In a feasibility study, availability of power, transportation, water, and communications should be carefully assessed before a location decision is made.

Inadequate supply of power or its high unit cost in a particular area can constitute a major constraint for a project or for a particular technological process such as electrical smelting. The project has to provide its own power source, where the location of resource – based project cannot be changed. Power requirements can be defined in relation to plant capacity, and the supply and cost at various locations should be studied. In assessing power supply, the following should be looked into: the

amount of power available, the stability of the power supply, the structure of the power tariff, and the investment required by the project for a tie – up in the network of the power supplying agency.

Transportation facilities (by rail, road, air, or water) may be available for the inflow of various inputs and for the marketing of outputs. The availability, reliability, and cost of transportation for various alternative locations should be assessed.

Water requirement for the project can be assessed based on the given plant capacity and technology. Once the required quantity is estimated, the amount to be drawn from the public utility system and the amount to be provided by the project from surface or sub – surface sources may be determined. Moreover, the following factors may be examined i.e. its relative costs, relative dependability, and relative qualities. In addition to power, transport, and water, the project should have good communication facilities, including telex telephone, and internet should also be ascertained for alternative locations.

Labor Situation

In project where there is labor-intensive, the labor situation in a particular location becomes important. The key considerations in evaluating the labor situation are:

- ✓ Availability of labor, skilled, semi – skilled and unskilled
- ✓ Existing labor rates
- ✓ Labor productivity
- ✓ State of industrial relations
- ✓ Labor legislation
- ✓ Other major factors

Governmental Policies

Policies and regulations of a government have a considerable influence on location. In most of the cases of public sector projects, location is directly decided by the government.

In the case of private sector projects, location is influenced by certain governmental restrictions and inducements. Most often the government may forbid the setting up of industrial projects in certain areas which suffer from urban congestion. Particularly, the government may offer inducements for establishing industries in back ward areas. These inducements consist of subsidies, concessional finance, sales tax loans, power subsidy, income tax benefits, lower promoter contribution, and so on.

Other Factors

Before making final location selection decision, several other factors have to be assessed as well. These are:

- ✓ Climatic conditions
- ✓ General living conditions
- ✓ Proximity to ancillary units
- ✓ Ease in coping with pollution / controlling pollution

Climatic Conditions: The climatic conditions like temperature, humidity, wind, sunshine, rainfall, snowfall, dust, flooding, and earthquakes have an important influence on location decision.

General Living Conditions: the general living conditions, such as the cost of living , housing situation, safety, and facilities for education, health care, transportation and recreation need to be assessed carefully.

Proximity to Ancillary Units: Most of the firms depend on ancillary units for components and parts. Coordination becomes easy, transportation costs are lower, and inventory requirements become considerably lower, if the ancillary units are located in a nearby area.

Ease in Coping with Environmental Pollution: A project may eventually cause environmental pollution in various ways: it may throw gaseous emissions; it may produce liquid and solid discharges; it may cause noise, heat, and vibrations. The locational study should analyze the cost of alleviating environmental pollution to tolerable levels at alternative locations.

4.4.1.2.Site Selection

After the completion of final locational selection, a specific project site and, if available, site alternatives should be defined in the feasibility study. This will require an evaluation of the characteristics of each site. The structure of site analysis is basically the same as for location analysis and the key requirements, identified for the project, may give guidance also for site selection. For sites available within the selected area, the following requirements and conditions are to be assessed:

- ✓ Ecological conditions on site (soil, site hazards, climate etc.)
- ✓ Environmental impacts (restrictions, standards, guidelines)
- ✓ Socio – economic conditions (restrictions, incentive, requirements)
- ✓ Local infrastructure at site location (existing industrial infrastructure, economic and social infrastructure, availability of critical project inputs such as labour and factory supplies)

- ✓ Strategic aspects (corporate strategies regarding possible future extension, supply and marketing policies)
- ✓ Cost of land
- ✓ Site preparations and development, requirements and costs

The cost of land tends to differ from one site to another in the same broad location. Sites close to a city cost more whereas sites away from the city cost less.

The cost of site preparation and development depends on the physical features of the site, the need to demolish and relocate existing structures, and the work involved in obtaining utility connections to the site. Some sites may require substantial work on site preparation and development, or it may be exposed to site hazards such as strong winds, fumes, and flue gases from nearby industries or to risks of floods. The required land area should be specified on the basis of buildings, technical installations and facilities included in the project. Moreover, topography, altitude and climate may be of importance for a project, as well as access to water, electric power, roads and railways or water transport.

Construction Requirements

The choice of location and site may sometimes strongly affected by the construction and installation works during the future project implementation. Among the relevant aspects of it, such as the existence of local contractors, availability of building materials, means of transport for heavy machinery and equipment to be bought to the site, a developed social infrastructure and a climate where construction workers accept to live for certain years probably three to five years are important. Existing facilities of different kinds may for instance reduce the construction cost and consequently the investment costs as well as financing required. Hence, the feasibility study should therefore identify and describe requirements and demands during the construction and installation phase.

Structures and Civil Works

Structures and civil works may be divided into three groups: (i) Site preparation and development, (ii) Buildings and structures, and (iii) Outdoor works.

Site Preparation and Development

Site preparation and development includes the following: (i) grading and leveling of the site; (ii) demolition and removal of existing structures; (iii) relocation of existing pipelines, cables, roads, power lines, etc; (iv) reclamation of swamps and draining and removal of standing water; (v)

connections for the following utilities from the site to the public network: electric power (high tension and low tension), water, for drinking and other purposes, communications (telephone, telex, internet, etc.) roads, railway sidings; and (vi) other related works.

Buildings and Structures

Buildings and Structures may have divisions, such as (i) factory or process buildings; (ii) ancillary buildings required for stores, warehouses, laboratories, utility supply centers, maintenance services, and others; (iii) administrative buildings; (iv) staff welfare buildings, cafeteria, and medical service buildings; and (v) residential buildings.

Outdoor Works

Outdoor works include (i) supply and distribution of utilities (water, electric power, communication, Steam, and gas); (ii) handling and treatment of emission, wastages, and effluents; (iii) transportation and traffic signals; (iv) outdoor lighting; (v) landscaping; and (vi) enclosure and supervision (boundary wall, fencing, barriers, gates, doors, security posts, etc.)

4.4.2. Environment Impact Assessment (EIA)

The site environment impact analysis will cover the impact of the project and the alternatives (in terms of size, technology etc) on the surrounding area, including its population, flora and fauna. This analysis should be integrative and interdisciplinary, assessing the overall impact which taking into account the synergetic effects of inter-linked systems.

Environmental impact assessment is part of the project planning process. Through statute or practice, it is an integral part of feasibility analysis. Environmental benefits or costs of a project are usually externalities or side effects that affect the society in whole or in part.

In countries where the analysis of environmental impact is required by law, the usual procedure is for the promoters of the projects to prepare an extensive environmental impact statement.

Where such legal provision for environmental protection do not yet exist an environmental impact assessment should be made in the interest of the investor, in particular when the intention is to apply for international financing. A growing consciousness and concern for environmental problems and ecological consequences have in fact become noticeable worldwide. Therefore, trends anticipated in the industry life cycle should also be considered in investment planning especially for industries with high potential environmental impact. Unexpected costs for later plant adaptations, conservation, rehabilitations or even the shutdown of operations can be avoided or minimized to countries where environmental protection standards and guidelines are not yet defined.

Objectives of Environmental Impact Assessment

The general objective of environmental impact assessment in, project analysis is to ensure that development projects are environmental sound.

The specific objectives of environmental impact assessment are as follows:

- To promote a comprehensive, interdisciplinary investigation of environmental consequences of the project and its alternatives for the affected natural and cultural human habitat.
- To develop an understanding of the scope and magnitude of incremental environmental impacts (with and without the project) of the proposed projects for each of the alternatives project designs.
- To incorporate in the designed any existing regulatory requirements
- To identify measures for mitigation of adverse environmental impacts and for possible enhancement of beneficial impacts.
- To identify critical environmental problems requiring further investigation
- To assess environmental impact quantitatively and qualitatively, as required, for the purpose of determining the overall environmental merit of each alternative.

Stages of Environmental Assessment

The environmental impacts of each of the project cycle will usually differ one to the other. As first, a preliminary environmental impact assessment is made by using a check – list or standardized set of criteria to ensure consideration of all relevant environmental factors, and to determine which impacts would need to be analyzed in detail during the second stage.

In the second stage, the environmental impact assessment consists in the identification and evaluation of environmental impacts resulting from the project. Sometimes a site visit with all members of the assessment team is essential if the environmental situation is complex and significant for the investment decision.

The third stage of environmental impact assessment involves the preparation of the environmental impact statement. The final environmental impact statement should specify any mitigation measures that can possibly make the recommended alternative environmentally acceptable.

4.5. Production Program and Plant Capacity

4.5.1. Production program

A production program defined as the level of output to be achieved during specified period and from this viewpoint, it should be directly related to the specific sales forecasts. It would be prudent to recognize that full production may not be practicable for most projects during the initial production operations.

Production program consist of the whole range of project activities and requirement, including production levels to be achieved under the technical, ecological, social and economic constraints. This necessitates identifying the principal products or products range including byproducts, determining the volume of production and relating production capacity to the flow of materials and performance of services at the selected site.

Determination of the production program

Market requirements and marketing concept: The range and volume of products to be produced depends primarily on the market requirements and the proposed marketing strategies. This production program and volume have to be designed under the constraints determined for the market conditions and the availability of resources both at various levels of production, the latter determining the minimum sales price for products.

Owing to various technological, production operations and commercial difficulties most projects experiences initial problems that can take the form of a gradual growth of sales and market penetration on the one hand and a wide range of production problems such as the adjustment of labor and equipment to the technology selected on the other. Even if full production were to be achieved in the first year, marketing and sales might prove to be a bottleneck. Depending on the nature of the industry a production and sales target of 40-50 per cent of overall capacity for the first year should be considered reasonably.

Once a production program defines the levels of outputs in terms of end products, and possible of intermediate products and the interrelation between various production lines and processes, the specific requirements of materials and labor should be quantified for each stage.

Technology and know-how: An important factor in determining the production program and plant capacity is the *technology and know-how* to be utilized in the project. Specific processes are often related to certain levels of production or become technically and economically feasible only at such levels.

The nature of technology choice and usage constitutes a key factor in the determination of plant capacity. Each technically possible alternative must in addition consider social, ecological,

economic and financial conditions, because production programs and plant capacity are functions of various interrelated socio-economic strategic and technical factors.

4.5.2. Plant capacity

Plant capacity (also referred to as production capacity) refers to the volume or number of units that can be manufactured during a given period. Plant capacity may be defined in two ways:

feasible normal capacity and *nominal maximum capacity*.

Feasible normal capacity refers to the capacity attainable under normal working conditions. This may be established on the basis of the installed capacity, technical conditions of the plant, normal stoppages, and downtime for maintenance, holidays, and shift patterns.

Nominal maximum capacity is the capacity which is technically attainable and this often corresponds to the installed capacity guaranteed by the supplier of the plant.

Plant capacity is influenced by the following factors:

Technological requirement

For many industrial projects, particularly in process type industries, there is a certain minimum economic size determined by the technological factor. For example, a cement plant should have a capacity of at least 300 tons per day in order to use the rotary kiln method; otherwise, it has to employ the vertical shaft method which is suitable for lower capacity.

Input constraints

In developing countries, there may be constraints on the availability of certain inputs. Power supply may be limited, basic raw materials may be scarce; foreign exchange available for imports may be inadequate. Constraints of these kinds should be borne in mind while choosing the plant capacity.

Investment cost

When serious input constraints do not exist, the relationship between capacity and investment cost is an important consideration. Typically, the investment cost per unit of capacity decreases as the plant capacity increases.

Market conditions

The anticipated market for the product/service has an important bearing on the plant capacity. If the market for the product is likely to be very strong, a plant of higher capacity is preferable. If the market is likely to be uncertain, it might be advantageous to start with a smaller capacity. If the market, starting from a small base, is expected to grow rapidly, the initial capacity may be higher

than the initial level of demand-further additions to capacity may be affected with the growth of the market.

Resources of the firm

The resources, both managerial and financial available to a firm define a limit on its capacity decision. Obviously, a firm cannot choose a scale of operations beyond its financial resources and managerial capability.

Government policy

The capacity level may be influenced by the policy of the government. Traditionally, the policy of developing countries was to distribute the additional capacity to be created in a certain industry among several firms regardless of economics of scale. This policy has been substantially modified in recent years and the concept of 'minimum economic capacity' has been adopted in several industries.

4.6. Technology and Engineering Study

Technology is defined as the application of scientific knowledge for productive purposes. This entails the use of science to produce products, services or processes.

4.6.1. Assessment of technology required

The primary goals of technology assessment are to determine and evaluate the impacts of different technologies on the society and national economy (cost-benefits analysis, employment and income effects, satisfaction of human needs etc), impacts on the environment (environmental impact assessment) and techno-economic feasibility assessed from the point of view of the enterprise.

To allow the careful assessment of the suitability of the technological alternatives a logical sequence should be followed: identification, technology description and project layout, technology market and alternatives, assessment of availability, technology forecast, assessment of the local integration, and description of the social economic impact. *A. Identification*

The technology required is defined not only by the marketing concept and the available raw material and factory supplies but also by various social economic, ecological financial commercial and technical conditions. It should identify, describe and assess the critical elements of the technology required. Special consideration should be given to existing or possible future constraints on the acquisition and use of available technologies to further development needs and to the possibility of feasible technological alternatives.

B. Technology description and project layout

The preparation of a plant layout and design is essential for every project. The first initial stage should be the preparation of a preliminary project plan and layout on the basis of the production activities and the technologies alternative envisaged. These second stage of project layout and design can only be drawn when the details relating to technology plant capacity and machine specification are finalized.

The preliminary project layout should include several charts and drawings, which need not be according to scale, but which would define the various physical features of the plant and their relationship with one another.

C. Technology market and alternatives

The selection of appropriate technology is undoubtedly one of the key elements of such a study. The study should identify both alternatives technologies and alternatives sources of technology. The evaluation would then aim at selecting the technology and the source from which it may be secured. The study should also discuss the contractual terms and conditions which may be of special significance in relation to the acquisition of a particular technology.

D. Assessment of availability

The market for industrial technology is highly imperfect with alternatives technologies and sources available from only one or a few sources and alternatives production technologies may be difficult to find. In this connection, the UNIDO Industrial and Technological Information Bank (INTIB) became operational in 1980, its main objectives being to ensure a quicker, easier and greater flow of information to people who need to select technologies.

E. Technology forecast

Technological forecast provides an assessment and forecast of technological trends during the project implementation phase and the project life cycle, on the one hand or the period limited to the planning horizon for the project on the other. A technology forecast is especially important for investment projects in highly innovative.

F. Assessment of the local integration

An issue of major significance in technology choice is the level of integration or local value added that can be achieved with respect to a particular technological usage. The study should define the extent of integration that should be proven technology that has already been applied and utilized and which can be related to local conditions. The parameters of the appropriate level of integration should be indicated.

G. Description of the social economic impact

Public policies with regard to the acquisition of foreign technologies, technology absorption and development have to be identified. The socio-economic infrastructure, including the structure of the labor force may have a significant impact on the feasibility of the technology to be selected for the project.

4.6.2. Selection of Technology

The choice of technology is influenced by variety considerations this are: plant capacity, principal inputs, investment outlay and production cost, use by other units, product mix, and latest developments, ease of absorption, ecological and environmental impact.

- *Plant capacity:* Often, there is a close relationship between plant capacity and production technology. To meet a given capacity requirement perhaps only a certain production technology may be viable.
- *Principal inputs;* The choice of technology depends on the principal inputs available for the project. In some cases, the raw materials available influence the technology chosen. For example, the quality of limestone determines whether the wet or dry process should be used for a cement plant.
- *Investment outlay and production cost:* The effect of alternative technologies on investment outlay and production cost over a period of time should be carefully assessed.
- *Use by other units:* The technology adopted must be proven by successful use by other units, preferably in the specific country.
- *Product mix:* The technology chosen must be judged in terms of the total product-mix generated by it, including saleable by-products.
- *Latest developments:* The technology adoption must be based on the latest developments in order to ensure that the likelihood of technological obsolescence in the near future at least, is minimized.
- *Ease of absorption:* The ease with which a particular technology can be absorbed can influence the choice of technology. Sometimes a high level technology may be beyond the absorptive capacity of a developing country which may lack trained personnel to handle that technology.

4.6.3. Appropriateness of technology

Appropriate technology refers to those methods of production which are suitable to local economic, social and cultural conditions. In recent years, the debate about appropriate technology has been sparked off mainly by Schumacher and others. The advocates of appropriate technology should be evaluated in terms of the following questions:

- Whether the technology utilizes local raw materials?
- Whether the technology utilizes local man power?
- Whether the goods and services produced cater to the basic needs?
- Whether the technology protects ecological balance?
- Whether the technology is harmonious with social and cultural conditions?

4.6.4. Acquiring Technology

When technology has to be obtained from some other enterprises, the means of acquisition have to be determined. These can take the form of *technology licensing*, *outright purchase* of technology or a *joint venture involving participation in ownership by the technology supplier*.

1. Technology licensing: this gives the licensee (the one who receive the technology) the right to use the patented technology and get related know how on a mutually agreed basis. The contract for technology licensing should be carefully scrutinized with respect to:

- **Definition:** The details of the technology including processes and products together with the technology service required from the technology supplier should be clearly defined. This should include all necessary documentation such as blue prints, specifications, production drawings etc
- **Duration:** Since the duration of a technology agreement must be adequate for affective technologies absorption, the period required for such absorption should be defined, together with the scope for progressive technological upgrading and renewal.
- **Warranty:** The appropriate warranty or guarantee relating to the technology and knowhow supplied should be indicated
- **Access to improvements:** Provision should be made for the licensee to have access to improvements made by the licensor during the period of agreement.
- **Payments:** Technology payments can be in the form of a lump sum payment or continuing royalties or a combination of the two. The suggested form and appointed level of payment should be indicated.

- *Civil Works:* Structures and civil works may be divided into three categories site preparation and development, buildings and structures and, outdoor works. *A. Site preparation and development :*

This covers the following (i) grading and leveling of the site, (ii) demolition and removal of existing structures (iii) relocation of existing pipelines, cables, roads, power lines, etc; (iv) reclamation of swamps and draining and removal of standing water, (v) connections for the following utilities from the site to the site to the public network: electric power (high tension and low tension), water for drinking and other purposes, communications (telephone telex, internet etc,) , roads, railway sidings and (vi) other site preparation and development work.

B. Building and structures

Buildings and structures may be divided in to (i) factory or process buildings, (ii) ancillary buildings required for stores, warehouses, laboratories, utility supply centers, maintenance services, and others (iii) administrative buildings (iv) staff welfare buildings cafeteria and medical service buildings and (v) residual buildings.

C. Outdoor works

Outdoor works cover (i) supply and distribution of utilities (water, electric power, communication, steam, and gas) , (ii) handling and treatment of emission, wastages and effluents (iii) transportation and traffic signals; (iv) outdoor lighting (v) landscaping and (vi) enclosure and supervision (boundary wall, fencing, barriers, gates, doors, security posts etc,)

2. Outright purchase (purchase of technology): this mode of acquiring technology may be used in certain kinds of industries. It is appropriate when:

- I. there is no possibility of significant improvement in technology in the foreseeable future
- ii. There is hardly any need for technological support from the seller of technology

3. Joint venture agreement: the supplier of technology may participate technically as well as financially in the project. Financial participation is typically in the form of equity holding. It's argued that financial participation may strengthen the motivation of technology supplier to transfer improvement promptly.

4.7. Human Resource and Organizational Study

4.7.1. Human Resource Requirement

Human resource requirement means determination of human resource requirement and cost for the project. The human resources requirement at various levels and during different stages of the project

must be defined as well as their availability and cost. On the basis of the quantitative human resource requirement of the project, the availability of personnel and training needs, the cost estimates for wages, salaries other personnel-related expenses and training are prepared for the financial analysis of the project.

Human resources as required for the implementation and operation, industrial project need to be defined by categories such as management as supervision personnel and skilled and unskilled workers and by functions such as general management, production management and supervision, administration (accounting, purchase etc.) production control, machine operation and transport.

The numbers, skills and experiences required depend on the type of industry, the technology used, plant size, the cultural and socio-economic environment of the project, location as well as proposed organization of the enterprise. Human resource requirements will obviously also depend on the management structure, organizational layout, operating plan and other factors related to the financial and commercial features of the project.

Staff and labor requirements have to be planned for the implementation or pre-production phase as well as for the start-up and operation phases. Particular attention should be paid to those enterprise functions which are essential for the feasibility of the investment and for which special professional skills and experience of employment and workers are required as in the areas of enterprise management (entrepreneurial and management functions), marketing, raw material and factory supplies, production processes and product characteristic, organization, and personnel and construction management.

The identification of these significant requirements already at the stage of the feasibility study is both difficult and important. Some common examples of mistakes and their consequence are:

- Failure to provide the project implementation team with experienced and committed personnel often to delays and additional costs.
- Bad timing of recruitment may lead to delays and poor utilization of production capacity during the first operating years.

Timing of requirements

1. Pre -production phase:

During the pre-production phase, it may be assumed that labor requirements occur mainly in conjunction with preparatory measures needed to start the operational phase. Thus the managerial staff, supervisors, some foremen, and special machine operators have to be recruited in advance, not

only to be trained, but also to attend to the construction of building and the installation of equipment that they will later be operating.

2. Operational phase:

Requirements during the operating phase may vary over time. Capacity utilization is usually improved gradually and additional shifts may be introduced bringing about production and possibly additional requirements in certain personnel categories. A distinction should be made between variable and fixed wage and salary costs as well between the local and foreign labor components.

Availability and Recruitment

Assessment of supply and demand

The following factors should be given due consideration when the availability and employment of human resources are analyzed: The general availability of relevant human resource categories in the country and the project region. The supply and demand situation in the project region. Recruitment policy and methods

Training policy and program

The study should indicate the current supply and demand situation in the region as well as possible shortages in relevant categories. Strong demand from existing industries and expected demand from projects under construction might make it more difficult for the project in question to recruit human resources with the professional background and skills required.

Recruitment planning

Recruitment policy and methods and means of the retaining key personnel for long periods, probable terms of employment and possible fringe benefits to employees and their families should be identified. Difficulties in the recruitment of key personnel (such as managers, supervisors and skilled labor) can be dealt with in different ways:

Recruitment is combined with intensive training of key personnel in order to meet quality requirements foreign expertise is recruited. An attempt is often made to compensate for the lack of experience of local managerial talent through the employment of foreign personnel, either by hiring individual expatriate or by signing management contracts with foreign companies. Although this is an expensive course and does not immediately serve the important aim of developing indigenous managerial skills (especially if it extends over long period as is often the case) the employment of expatriates may be necessary for the successful implementation of a project.

Training Plan

Since the lack of experienced and skilled personnel can constitute a significant bottleneck for project implementation and operation in developing countries, extensive training programmes should be designed and carried out as part of the implementation process of investment projects. Training can be provided at the factory by managerial and technical personnel and others, by specially recruited experts or by expatriate personnel. The timing of training programs is of crucial importance since personnel should be sufficiently trained to be able to take up their positions as and when required. Training requirements should be defined separately for the preproduction and for the operation phase in order to provide adequately for production and operational training costs.

Cost Estimates

The manning tables prepared for each department can be used for estimating labor costs.

Estimating the total wage and salary costs.

4.7.2. Organizational Set-Up

Organization is the means by which the operational functions and activities of the enterprises are structured and assigned to organizational units represented by managerial staff, supervisors and workforce, with the objective of coordinating and controlling the performance of the enterprises and the achievement of its business targets.

The organizational structure of an enterprise indicates the delegation of responsibilities to the various functional units of the company and is normally shown in a diagram. Usually, the organization is designed primarily in line with the different functions in the enterprise such as finance, marketing, purchasing, and manufacturing. However, there is no unique organization pattern. It is also possible to base organizational structures on products or production lines (for instance profit or cost centers) or on geographical areas or markets; the latter are typical for marketing organizations.

Organizational Design

The organization design for both the construction and the operating phase depends on internal and external project requirements and conditions and is prepared for the following two reasons: First, the organization of the project and enterprises should aim at the optimal coordination and control of all project inputs, which make it possible to implement the project strategically economically. Secondly, the organizational set up serves to structure the investment and production costs and to determine the costs linked with the corresponding organization units.

The design of the organization usually includes the following steps:

- The goals and objectives for the business are stated;
- The functions that are necessary to achieve the goals are identified;
- The necessary functions are grouped or related;
- The organizational framework or structure is designed;
- All key jobs are analyzed designed and described,
- A recruitment and training program is prepared.

The organizational planner will then have to consider some of fundamental aspects of optimal organization. These may include:

- The span of control that is the numbers of employees reporting to supervisor.
- The number of organization levels
- A subdivision of activities by functions, process, equipments, location, product or classes of customers.
- The distribution of responsibilities and authority.

4.8. Financial and Economic Analysis

Basically, financial analysis should accompany the design of the project from the very beginning. This is only possible when the financial analyst is integrated into the feasibility study team at an early stage. From a financial and economic point of view, investment can be defined as a long term commitment of economic resources made with the objectives of producing and obtaining net gains (exceeding the total initial investment) in the future.

4.8.1. Total investment costs

Initial investment costs

Initial investment costs are defined as the sum of *fixed assets* (fixed investment costs plus preproduction expenditures) and *net working capital*. Fixed assets constituting the resources required for constructing and equipping an investment project, and net working capital corresponding to the resources needed to operate the project totally or partially.

Investment required during plant operation

The economic life time is different for the various investments (buildings, plant, machinery and equipment, transport equipment etc). In order to keep a plant in operation, each item must therefore be replaced at the appropriate time and the replacement costs must be included in the feasibility study.

Pre-production expenditures

In every industrial project certain expenditure due, for example, to the acquisitions or generation of assets are incurred prior to commercial production. These expenditures, which have to be capitalized, include a number of items originating during the various stages of project preparation and implementation.

Preliminary capital-issue expenditures: These are expenditures incurred during the registration and formation of the company, including legal fees for preparation of the memorandum and articles of association and similar documents and for capital issues.

Expenditures for preparation studies: There are three types of expenditures for preparatory studies: Expenditures for pre-investment studies; consultant fees for preparing studies, engineering and supervisor of erection and construction; other expenses for planning the project

Other pre-production expenditures: Included among other pre-production expenditures are the following:

- Travel expenses
- Preparatory installation: such as workers, camps, temporary offices and stores.
- Pre-production marketing costs, promotional activities, creation of the sales network etc.
- Training costs including fees, travel, living expenses, salaries and stipends of the trainees and fees payable to external institutions;
- Know-how and patent fees
- Interest on loans accrued or payable during construction
- Insurance costs during construction

Trial runs, start-up and commissioning expenditures: This item includes fees payable for supervision of starting-up operation, wage, salaries, fringe benefits and social security contributions of personnel employed, consumption of production materials and auxiliary supplies, utilities and other incidental start-up costs. Operating losses incurred during the running period up to the stage when satisfactory levels are achieved also have to be capitalization.

Net working capital

Net working capital is defined to embrace *current assets (the sum of inventories, marketable securities, prepaid items, accounts receivable and cash) minus current liabilities (accounts payable)*. It forms an essential part of the initial capital outlays required for an investment project because it is required to finance the operations of the plant.

4.8.2. Production Cost

- ❑ It is essential to make realistic forecasts of production and manufacturing costs for a project proposal in order to determine the future viability of the project.
- ❑ The production costs are classified into four major categories. They are:
 1. Factory costs,
 2. Administrative overhead costs,
 3. Depreciation and cost of financing and
 4. Operating Cost (the sum of factory and administrative overhead costs).

4.7.3. Marketing Costs:

- ❑ Marketing costs comprise the costs for all marketing activities and may be divided into direct marketing costs and indirect marketing costs.
 - Direct marketing costs – are costs for packaging and storage, sales, product advertisement, transport and distribution costs.
 - Indirect marketing costs – are costs related to marketing department. They are salaries for personnel, materials and communication, market research, public relation and promotional activities.

4.7.4. Project Cash Flows

Cash flows are basically either receipt of cash (cash inflow) or payments (cash outflows) typical operational cash flows for a project are shown below

Operational cash outflows

- Increase in fixed assets (investment)
- Operating costs (less depreciation)
- Marketing expenses
- Production and distribution losses
- Corporate (income taxes)

Operational cash inflows

- Revenues from selling of fixed assets
- Sales revenues
- Other income due to plant operations

4.7.5. Methods of Financial Evaluation

The process of identifying the financial benefits is called capital budgeting, which may be defined as the *decision-making process* by which organizations evaluate projects that include the purchase of major fixed assets such as buildings, machinery, and equipment.

1. Cash flow discounting in financial evaluation

Basic assumptions underline cash flow discounting in financial evaluation

The basic assumption underlying the discounted cash-flow concept is that money has a time value. A sum of money available now is worth more than an equal sum available in the future. This difference can be expressed as a percentage rate indicating the relative change for a given period which, for practical reasons, is usually a year. Considering that a project may obtain a certain amount of funds (F). If this sum is repaid after one year including the agreed amount of interest (I) the total sum to be paid after one year would be $(F+I)$ where, $F+I = F(1+r)$ and r is defined as the interest rate (in percentage per year) divided by 100 (if the interest rate is, for example 12.0 per cent then r equals 0.12).

(a) Net Present Value (NPV) Method

$NPV = \text{present value of cash flow} - \text{present value of initial cost}$

The *decision rule* associated with NPV method is to accept all proposals with a NPV greater than zero. This indicates accepting all projects that add value after providing a return, consistent with the cost of capital and risk. Where two or more projects are mutually exclusive, then the project with the highest NPV should be chosen. The following example will make the concept clear:

Example 1: A firm is considering investing in a project which costs 6,000 Br and has the following cash flows

YR	1	2	3	4
C.F	1500	3000	2000	2500

The cost of capital is 10% and the project has no salvage value. Using the NPV method advise the firm on whether to invest in the project

YR	CF	PVIF (10%)	P.Vs
1	1500	0.9091	1363.65
2	3000	0.8264	2479.20
3	2000	0.7513	1502.60

4	2500	0.6830	1707.50
Total P.Vs =			7053.00
Less project cost			(6000.00)
NPV =			1053.00

Decision: Accept the project since NPV > 0

Merits of NPV criterion:

- It recognizes the importance of the time value of money.
- It takes into consideration the benefits occurring over the entire life of the project.
- It follows the principle of shareholder's wealth maximization.

Demerits of NPV criterion

The main drawbacks of this method are:

- In some cases it may be difficult to determine the appropriate discount rate. The choice of an appropriate discount rate is important because the relative desirability of the project will change with the change in discount rate.
- This method favors the project with the higher NPV. In some cases, the project with a higher NPV may involve a higher initial outlay which may exceed the budgeted investment outlay for the project.
- This method may not give satisfactory results when the two projects in question have different economic lives.

Internal Rate of Return (IRR)

IRR is the discount rate that equates the NPV of a project to zero. It is the project rate of return (Yield)

Steps in the IRR trial and error calculation method

- Compute the NPV of the project using an arbitrary selected discount rate
- If the NPV so computed is positive then try a higher rate and if negative try a lower rate.
- Continue this process until the NPV of the project is equal to zero
- Use linear interpolation to determine the exact rate

Example 3: A project has the following cash flows

YR	1	2	3	4
C.F	300	400	700	900

The cost of the project is 1500 Br. Determine whether project is acceptable if the cost of capital is 18% using the IRR method.

1. We first select an arbitrary discount rate say 9% and compute the NPV

YR	C.F	PVIF (9%)	P.Vs
1	300	0.9174	275.22
2	400	0.8417	336.68
3	700	0.7722	540.54
4	900	0.7084	637.56
Total P.Vs=			1790.00
Less cost			(1500.00)
NPV at 9%=			290

2 since, NPV at 9% is positive and large we select another discount rate larger than 9%, say 15%

YR	C.F	PVIF (15%)	P.Vs
1	300	0.8696	260.88
2	400	0.7561	302.44
3	700	0.6575	460.25
4	900	0.5718	514.62
Total P.Vs			1538.19
Less cost			(1500.00)
NPV at 15%			38.19

3 since, NPV at 15% is positive but not large, we select a slightly higher rate, say, 18%

	YR	C.F	PVIF (18%)	P.Vs
1	300	0.8475	254.25	
2	400	0.7182	287.28	
3	700	0.6086	426.02	
4	900	0.5158	462.22	

Total P.Vs	1431.77
Less cost	(1500.00)
NPV at 15%	- 68.23

Since NPV at 18 is negative, IRR therefore lies between 15% and 18%, and since zero NPV will be between -38.23 and 38.19, to get the correct (exact) IRR we have to interpolate between 15% and 18% using interpolation formula

Decision: Reject the project since IRR is less than the required rate of return (cost of capital)
Advantages of *IRR*

- Can be used to compare projects of different sizes
- Considers time value of money
- Indicates the exact profitability of the project *Disadvantages of IRR*
- Some projects have multiple IRRs if their NPV profile crosses the x-axis more than once (project cash flow signs change several times)
- Assumes re-investment of cash flows occurs at project's IRR which could be exorbitantly high
- Doesn't provide a decision criteria
- Not conclusive for mutually exclusive projects

c) Profitability Index (PI)/ present value index (PVI)/ benefit-cost ratio

It is the relative measure of project's profitability and can be used to compare projects of different sizes

PI = present value of cash flows/Initial cost

Decision criteria: If, $PI > 1$, Accept project, $PI < 1$, Reject project, $PI = 1$, Indifferent

Example 4: A project has the following cash flows

Year	1	2	3	4
CF	300	400	700	900

If the required rate of return is 9% and the project initial cost is 1500 Br, calculate the PI of the project and advise if the project is acceptable

YR	CF	PVIF 9%	PVs
1	300	0.9174	275.52
2	400	0.8417	336.68
3	700	0.7722	540.54
4	900	0.7084	637.46

$$\text{Total PV} = 1790.00$$

Decision: The project is acceptable since $PI > 0$

Advantages of PI

- Recognized time value of money
- Compares projects of different sizes
- Gives a decision criteria

Disadvantages of PI

- Does not indicate the risk

2. Traditional or Non-Discounted Method

A. Accounting (average) rate of return (ARR)

It considers the accounting profits of a firm over a period of time.

Average, annual, profits

$$AR = \frac{\text{Average, annual, profits}}{\text{Average, investments}} * 100$$

Average, investments

Where average investment = $\frac{1}{2}$ (cost of project + salvage value)

Illustration:

Assume 90,000 Br is invested in a project with the following after tax net profits.

Year	1	2	3
Net profit	20,000	10,000	30,000

The life of the project is 3 years and no salvage value, compute ARR of the project

$$\text{Average_profits} = \frac{20,000 + 10,000 + 30,000}{3} = 20,000$$

Average investment = $\frac{1}{2}$ (90,000 + 0) = 45,000

$$\text{ARR} = \frac{20,000}{45,000} * 100\% = 44\%$$

Advantages of ARR

- Easy to compute and use
- Computed from readily available accounting information
- Ignores time value of money
- Ignores uncertainty of cash flows and there is no consideration of risk in calculation
- Uses accounting profits rather than cash flows

Disadvantages of ARR

- Doesn't give a decision criteria
- Not consistent with investor's wealth maximization

B. Payback period

This is the number of year taken to recover the original (initial) investment from annual cash flows. The lower the payback period the better the project is.

Example 1: Assume a company wants to invest in two mutually exclusive projects of 1000 Br each generating the following cash flows. If the required rate of return is 10%. Which of the projects should the company invest in?

Year	1	2	3	4	5	6
A	500	400	300	400	0	0
B	100	200	300	400	500	600

Yr	cash flows of A	Cumulative frequency of A	cash flows of B	Cumulative frequency of B
1	454.51	454.51	90.91	90.91
2	330.58	785.09	165.29	256.20
3	225.40	1010.49	225.40	481.60
4	273.21	1283.70	273.21	754.81
5		1283.70	310.46	1065.46
6		1283.70	338.68	1403.95

Pay back for A = 2.95years Pay back for B = 4.79years. The management should undertake project A since it has a lower pay back period.

Example 2:

Year	Project A	Project B
1	30000	7000
2	30000	15000
3	35000	20000
4	35000	56000
5	40000	45000

Year	Project A		Project B	
	Net cash flow	Accumulated cash flow	Net cash flow	Accumulated cash flow
1	30000	30000	7000	7000
2	30000	60000	15000	22000

<u>3</u>	35000	<u>95000</u>	20000	<u>42000</u>
<u>4</u>	35000	<u>130000</u>	56000	<u>98000</u>
<u>5</u>	40000	<u>170000</u>	45000	<u>143000</u>

Payback period

Project A: 3 years + 5000*/35000

Payback period for Project A= 3.14 years

Project B= 3 years + 28000/56000

Payback period for Project B= 3.5 years

The management should undertake project A since it has a lower pay back period.

The major advantages of this method are:

- Like ARR it is easy to calculate PB.
- It takes into account cash flows (and is hence superior to ARR).
- It helps identify projects which can earn quick returns (useful in industries where rapid technological change is common).

This method has the following drawbacks:

- It does not consider the cash flows after the payback period.
- It does not consider the timing of cash flows.
- It does not show whether or not the project that has been accepted is going to maximize the wealth of the stakeholders.

The evaluation method for this method are:

- The project is accepted when the actual payback period is less than the required or predetermined payback period.
- The project is rejected when the actual payback period is greater than the required or predetermined payback period.
- When there are mutually exclusive projects, the one with the lowest payback period but less than cut off payback period must be selected.

CHAPTER FIVE

PROJECT IMPLEMENTATION, MONITORING AND EVALUATION

5.1. Organization

The primary formal relationships for organizing are responsibility, authority, and accountability. They enable us to bring together functions, people, and other resources for the purpose of achieving objectives. The framework for organizing these formal relationships is known as the organizational structure.

It provides the means for clarifying and communicating the lines of responsibility, authority, and accountability.

Line and Staff Organization

When staff specialists are added to a line organization to "advise; "serve;" or "support" the line in some manner, we have a line and staff organization. These specialists contribute to the effectiveness and efficiency of the organization. Their authority is generally limited to making recommendation to the line organization. Sometimes this creates conflict. However, such conflict can be reduced by having staff specialists obtain some line experience, which will tend to make them better understand the problems facing the line managers they support. Such functions as human resources management and research and development are typical staff functions.

Most large organizations belong to this type of organizational structure. These organizations have direct, vertical relationships between different levels and also specialists responsible for advising and assisting line managers. Such organizations have both line and staff departments. Staff departments provide line people with advice and assistance in specialized areas (for example, quality control advising production department).

Divisional Organization

A divisional organizational structure gives a larger business enterprise the ability to segregate large sections of the company's business into semi-autonomous groups. These groups are mostly selfmanaged and focused upon a narrow aspect of the company's products or services. As with any organization structure, divisions have both strengths and weaknesses.

Unlike departments, divisions are more autonomous, each with its own top executive-often a vice president-and typically manage their own hiring, budgeting and advertising. Though small businesses rarely use a divisional structure, it can work for such firms as advertising agencies which have dedicated staff and budgets that focus on major clients or industries.

In this type of structure, the organization can have different basis on which departments are formed.

They are:

(i) Function,(ii) Product,(iii) Geographic territory,(iv) Project and(iv) Combination approach.

Matrix Organization

It is a permanent organization designed to achieve specific results by using teams of specialists from different functional areas in the organization. This type of organization is often used when the firm has to be highly responsive to a rapidly changing external environment.

In matrix structures, there are functional managers and product (or project or business group) managers. Functional manager are in charge of specialized resources such as production, quality control, inventories, scheduling and marketing. Product or business group managers are in charge of one or more products and are authorized to prepare product strategies or business group strategies and call on the various functional managers for the necessary resources.

The matrix organizational structure divides authority both by functional area and by project. In a matrix structure, each employee answers to two immediate supervisors: a functional supervisor and a project supervisor. The functional supervisor is charged with overseeing employees in a functional area such as marketing or engineering. Project supervisors manage a specific and often impermanent project. The problem with this structure is the negative effects of dual authority similar to that of project organization. The functional managers may lose some of their authority because product managers are given the budgets to purchase internal resources. In a matrix organization, the product or business group managers and functional managers have somewhat equal power. There is possibility of conflict and frustration but the opportunity for prompt and efficient accomplishment is quite high.

5.2. Project Planning

Project planning is a rational determination of how to initiate, sustain, and terminate a project. After the initiation stage, the project is planned to an appropriate level of detail. The main purpose is to plan time, cost and resources adequately to estimate the work needed and to effectively manage risk during project execution. As with the initiation process group, a failure to adequately plan greatly reduces the project's chances of successfully accomplishing its goals.

The success of a project is never an accident. When you take up a project, you cannot simply start the implementation and find your way as the project develops. If you try that, you can lose direction quite early, miss your goals and deadlines, and overspend your resources on the wrong priorities,

leading to the failure of the project. So, a project should be clearly structured and managed. There are five different project management phases.

5.2.1 Project management phases

Following are the five project management steps:

1. **Initiation:** Project initiation is a phase where you define a business case at a broad level and create a project charter consisting of broad goals, budget, rough timeline, constraints, etc.
2. **Project planning:** During this phase, teams establish specific measurable goals, deliverables, a clear project roadmap, risks and ways to manage them, tracking mechanisms, project management tools, communication methodologies, etc.
3. **Execution:** During this stage, managers establish workflows, and the work is done by the teams.
4. **Project monitoring and controlling:** In this project management phase, the progress towards the milestones is monitored using the tracking mechanisms. Reports are generated and reviewed by stakeholders, and changes are implemented according to the inferences and findings.
5. **Completion and closure of the project:** At the end of the estimated project period, the project is completed and handed over. The outcomes and deliverables are reviewed and quantified, and the success/failure of a project is determined. The teams review performance, success and failures, and take with them the learning from the project for continuous improvement of their own performance as well as the performance of the organization.

The Crucial Project Planning Phase

Among these project management steps, project planning is one of the most important stages, as the project starts to take shape in it, and it can make the difference between success and failure of the project.

5.2.2. What is project planning?

Project Planning generally consists of: Determining how to plan (e.g. by level of detail or rolling wave); Developing the scope statement; Selecting the planning team; Identifying deliverables and creating the work breakdown structure; Identifying the activities needed to complete those deliverables and networking the activities in their logical sequence; Estimating the resource requirements for the activities; Estimating time and cost for activities; Developing the schedule; Developing the budget; Risk planning; and Gaining formal approval to begin work.

Additional processes, such as planning for communications and for scope management, identifying roles and responsibilities, determining what to purchase for the project and holding a kick-off

meeting are also generally advisable. For new product development projects, conceptual design of the operation of the final product may be performed concurrent with the project planning activities, and may help to inform the planning team when identifying deliverables and planning activities.

Components of a project plan

Project planning involves defining three different aspects of a project. They are:

1. Scope of the project

Scope of the project includes project requirements, the vision behind it, measurable goals, outcomes and deliverables, and the activities that can and cannot be done for the successful completion of the project.

2. Budget and allocation of resources

Budget is one of the most critical aspects of a project. Budget needs to be allocated for different phases, tasks and activities based on their priorities and requirements. Allocating fewer resources for something is equally damaging to the project as allocating more for the same. Project

planning carefully weighs different requirements and priorities of the project before determining the budget for each. In addition to the budget, the project also needs other resources, such as manpower, tools and facilities. Project planning also takes these into account.

3. Timelines

Every task and activity in the project takes a certain amount of time for different teams to complete. Adequate time should be given for each, and there should be an estimated timeline for each. Further, a project may be implemented in the long term. So, it may be divided into various phases, which will be deemed complete at the achievement of specific milestones. Project planning involves defining these timelines, creating a schedule for each team and individual, and determining the milestones for various phases of the project.

5.2.4. Importance of project planning

Project planning requires a concerted effort from your teams to work towards common goals for the project to succeed. If you don't have a project plan, you may accidentally let your teams make their own plans that they deem fit. It can cause chaos and different teams may take the project in different directions, leading to catastrophic failure of the project. So it is absolutely essential to have a project plan.

When you do project planning, and when your team follows a predetermined project plan using industry-standard project management tools, you are more likely to prioritize the tasks correctly, cross milestones according to the schedule, and meet objectives within the specified time and allocated resources. So, a project plan plays a crucial role in the success of the project.

Why Project Planning?

One of the objectives of project planning is to completely define all work required so that it will be readily identifiable to each project participant.

This is a necessity in a project environment because:

- If the task is well understood prior to being performed, much of the work can be pre planned.
- If the task is not understood, then during the actual task execution more knowledge is gained, in turn, leads to changes in resource allocations, schedules, and priorities.
- The more uncertain the task, the greater the amount of information that must be processed in order to ensure effective performance.

These considerations are important in a project environment because each project can be different from others, requiring a variety of different resources, but having to be performed under time, cost, and performance constraints with little margin for error.

There are four basic reasons for project planning:

- To eliminate or reduce uncertainty
- To improve efficiency of the operation
- To obtain a better understanding of the objectives
- To provide a basis for monitoring and controlling work

Planning is decision making based upon futurity. It is a continuous process of making entrepreneurial decisions with an eye to the future, and methodically organizing the effort needed to carry out these decisions. Furthermore, systematic planning allows an organization to set goals. The alternative to systematic planning is decision making based on history. This generally results in reactive management leading to crisis management, conflict management, and fire fighting.

5.3 Project Control

Project Control is a formal process in project management.

The *PMBOK* defines *Project Control* with the following statement:

“A project management function that involves comparing actual performance with planned performance and taking appropriate corrective action (or directing others to take this action) that will yield the desired outcome in the project when significant differences exist.”

Project Control involves the regular review of metrics and reports that will identify variances from the project baseline. The variances are determined by comparing the actual performance metrics in the execution phase against the baseline metrics assigned during the Planning Phase. If significant variances are discovered (variances that place the completion of the project in jeopardy) adjustments are made to the project plan.

- A significant variance does not explicitly require a change to the project plan but these variances should be reviewed to determine if preventative action is necessary. Controlling also includes taking preventative action in anticipation of possible problems.
- Project Control is important because it may determine the success of the project by the stakeholders.
- Project success relates to project cost, completion date, customer expectations,

performance, etc.

5.3.1. The Project Control Process

Controlling procedure need to address such questions:

- Are we on planned track?
- Are we on expected budget?
- Are we on planned schedule?
- Are we delivering what we said we would?
- Are we meeting quality and performance standards?
- Are we meeting stakeholder expectations?
- What have we accomplished?
- Will the project objectives be met?
- What deviations/variances exist?
- What corrective actions are we taking?

The project control includes project status reporting, schedule control, cost control, quality control and risk control.

▫ Controlling process consists of following steps:

1) Establish A Baseline of Measurement:

The baseline of measurement is actually represented by your project plan. This includes your control schedule, project budget, and any design or performance specifications related to project deliverables. The estimates embodied in these documents create the basis from which variance is measured. The success of project measurement and control depends on how accurate estimated baseline is? What if an estimate is wrong? What if an element of your baseline is a poor representation of what's actually achievable?

In case of variance it is difficult to know who is responsible for variance, estimator or task performer. The baseline is derived from the cost and duration information found in work breakdown structure and scheduling decisions.

2) Measuring Progress and Performance:

Time and Budget are two quantitative measures. Many methods are available to measure these two. Qualitative measures (i.e. technical specification, production function, reliability etc.) are difficult to measure. Tracking time performance is easier than monitoring budgets. Some of valuable and essential control techniques are:

- Gantt Chart
- Control Chart
- Critical Path Method (CPM)
- Program Evaluation and Review Technique (PERT)
- Critical Ratios

3) Analysing the Performance:

Almost all the projects need to be guided right throughout in order to receive the required and expected output at the end of the project. Project status report must be generated on every week or every month. Comparisons of actual and expected (planned) must be done for proactive correction.

Variances

Variances are deviations from plan. Think of a variance as the difference between what was planned and what actually occurred. There are two types of variances: positive variances and negative variances.

📌 **Positive variances:** Positive variances are deviations from plan that indicate an ahead-of-schedule situation has occurred or that an actual cost was less than a planned cost. This is a good news to the project manager, who would rather hear that the project is ahead-of-schedule or under budget.

⚠️ Positive variances bring their own set of problems, which can be as serious as negative variances.

⚠️ Positive variances can allow for rescheduling to bring the project to completion early, under budget or both.

⚠️ Resources can be reallocated from ahead-of- schedule projects to behind-schedule projects. It can also result from schedule **slippage**. Consider budget. Being under budget means that not all dollars were expended, this may be the direct result of not having completed work that was scheduled for completion during the period.

📌 **Negative variances:** Negative variances are deviations from the plan that indicate a behindschedule situation has occurred or that an actual cost was greater than a planned cost. Being behind a schedule or over budget is not what the project manager wants to hear.

Negative variances, just like positive variances, are not necessarily bad news. For example, you might have over spent because you accomplished more work during the report period than was planned. But, in over spending during this period, you could have accomplished the work at less cost than was originally planned. In most cases, negative time variances affect project completion only if they are associated with critical path activities or if the schedule slippage on non-critical path activities exceeds the activity's total float. Negative cost variances can result from uncontrollable factors such as cost increases from suppliers or unexpected equipment malfunctions. Some negative variances can result from inefficiencies or error.

5.3.2. Project Control Techniques

a) Gantt chart:

A Gantt chart, commonly used in project management, is one of the most popular and useful ways of showing activities (tasks or events) displayed against time. Typically, tasks are shown on the vertical axis, and the project time span is represented on the horizontal axis. Each task has a

corresponding bar that shows the time span required for that task. The bar can be filled in to show the percentage of the task that has been completed.

Gantt chart represents:

- What the various task/ activities are?
- When each activity begins and ends?
- How long each activity is scheduled to last?
- Where activities overlap with other activities, and by how much overlap?
- The start and end date of the whole project?

b) Control Chart:

Control chart is an efficient way of analysing performance data to evaluate a project process. Control charts, also known as Shewhart charts named after Walter A. Shewhart. Every process has variation. Some variation may be the result of causes which are not normally present in the process. Some variation is simply the result of numerous, ever-present differences in the process.

The control chart is a graph used to study how a process changes over time. Data are plotted in time order. A control chart always has a central line for the average, an upper line for the upper control limit (for ahead from scheduled) and a lower line for the lower control limit (for behind the schedule). These lines are determined from historical data. By comparing current data to these lines, we can draw conclusions about whether the process variation is consistent (in control) or is unpredictable (out of control, affected by special causes of variation).

One goal of using a Control Chart is to achieve and maintain process stability. Process stability is defined as a state in which a process has displayed a certain degree of consistency in the past and is expected to continue to do so in the future.

The control chart is a graph used to study how a process changes over time. Data are plotted in time order. A control chart always has a central line for the average, an upper line for the upper control limit (for ahead from scheduled) and a lower line for the lower control limit (for behind the schedule). These lines are determined from historical data. By comparing current data to these lines, we can draw conclusions about whether the process variation is consistent (in control) or is unpredictable (out of control, affected by special causes of variation). This consistency is characterized by a stream of data falling within control limits based on plus or minus 3 standard deviations (3 Sigma) of the centreline.

The control chart is used to:

- ✎ Monitor effects of the variables on the difference between target and actual performance of project.
- ✎ Analyse and understand process variables
- ✎ Determine process capabilities.

c) Critical Path Method:

The Critical Path Method or Critical Path Analysis is a mathematically based algorithm for scheduling a set of project activities. It is an important tool for effective project management. Critical path method commonly used with all form of projects, including construction, software development, research project, product development, engineering and plant maintenance, among the others. Any project with the interdependent activities can apply this technique of scheduling. Critical path method is based on mathematical calculations and it is used for scheduling project activities. This method was first introduced in 1950s as a joint venture between Remington Rand Corporation and *DuPont Corporation*.

The initial critical path method was used for managing plant maintenance projects. Although the original method was developed for construction work, this method can be used for any project where there are interdependent activities. In the critical path method, the critical activities of a program or a project are identified. These are the activities that have a direct impact on the completion date of the project.

Key Steps in Critical Path Method:

1. Identifying the key activities of project
2. Determining the Sequence of Activities
3. Drawing Network Diagram
4. Time estimate for each activity
5. Identifying the Critical Path: The critical path is the longest path of the network diagram. The activities in the critical path have an effect on the deadline of the project. If an activity of this path is delayed, the project will be delayed.

d) Program Evaluation and Review Technique:

CPM assumes low uncertainty in scheduled timings. The Program Evaluation and Review Technique (PERT) is a network model that allows for randomness in activity completion times. PERT was developed in the late 1950's for the U.S. Navy's Polaris project.

PERT process involves following steps:

- 🖱 Specifying the task/activities
- 🖱 Determining the sequence of activities
- 🖱 Constructing Network Diagram
- 🖱 Estimate the Time
- 🖱 Critical Path
- 🖱 Update the PERT chart

There are three estimation times involved in PERT; Optimistic Time Estimate (O), Most Likely Time Estimate (M), and Pessimistic Time Estimate (P).

Optimistic Time Estimate: This time assumes that everything will go according to plan and with minimal difficulties.

Most Likely Time Estimate: This is the time that, in the mind of the functional manager, would most often occur should this effort be reported over and over again.

Pessimistic Time Estimate: This time assumes that everything will not go according to plan and maximum difficulties will develop.

Critical Ratios: Schedule Performance Index (SPI) and Cost Performance Index(CPI) ratios are critical tools in project management.

o

The budget (Cost) and the schedule (Time) are two important considerations in any project, and since projects that overrun budgets and time frames are not viable for organizations.

SPI and CPI ratios are generated from Earn Value System.

e) **Schedule Performance Index:**

The ratio of schedule efficiency that indicates the percent of work performed out of the total work scheduled. A number less than 1 indicates that the project is behind schedule.

$$SPI = EV/PV$$

f) **Cost Performance Index:**

The ratio of cost efficiency or value earned per unit actual cost. A number less than 1 indicates that the project is spending more money than budgeted.

$$CPI = EV/AC$$

Lastly, compare the schedule and cost performance indices to each other to determine

The Critical Ratio (CR), $CR = SPI \times CPI$ Where:

SPI= Schedule Performance Index

CPI=Cost Performance Index

EV=Earned Value (Budgeted Cost of Work Performed)

PV= Planned Value (Budgeted Cost of Work Scheduled)

AC=Actual Cost (Actual Cost of Work Performed)

5.4. Human Aspects of Project Management

For the successful execution of a project, a satisfactory human relation is must without such a system other systems of project management do not work well. To achieve satisfactory human relations in the project setting, the project manager must successfully handle problems and challenges related to: Authority, Orientation, Motivation, Group functioning.

- i. **Authority:** In project management, the project manager whose activities cut across functional lines of command lacks the desired formal authority. While the manager has formal control emanating from contracts and agreement:" as far as outside agencies involved in project work are concerned, in his own organization he has to be contacted with split authority, and dual subordination. His effective authority would stem from his ability to develop rapport with the project personnel, his skill in professional reputation and stature, his skill in communication and persuasion.
- ii. **Orientation:** Most of the managers, working for a project are engineers or technologist when an engineer assumes managerial responsibility, he faces some different type of problems, which he is supposed to: Perform the task of planning, organizing, directing and controlling the resources of the firm in the world of uncertainty. Adopt a more creative approach to solve non program and unstructured problems. Attach greater importance to efficient utilization of resources and resolution of human relation problem. Thus, for achieving the task he must himself be an accomplished engineer turned manager.
- iii.**Motivation:** The project manager works within the boundaries of a socio-technical system. The principal behavioural factor, which he can influence, is the motivation of the project personnel. In order to succeed in motivating project personnel, the project manager must be a perceptive observer of human beings, must have the ability to appreciate the variable needs of human being, and must have a skill in several styles of management suitable to different situations.

- iv. **Group Functioning:** For building an effective group the company must presume a genuinely participative style of management. With the managerial philosophy the project manager can facilitate the development of mutual trust and acceptance, open communication, co-operation and project attitude. In this task the needs leadership capabilities, sensitivity to human nature, perceptiveness, concern for welfare of others, maturity and impartial approach. Actually this is difficult and challenging task.

5.5. Pre -requisites for Successful Project Implementation

Project execution has a direct correlation to project progress and stakeholder's expectations but, time and cost over runs of the project are the main hurdles in successful implementation of a project. This problem is very common especially in the public sector. Due to such time and cost over runs, projects tend to become uneconomical, resources are not available to support other projects and overall development is adversely affected.

To minimize time and cost over runs and thereby to improve the prospects of successful completion of projects, following things can be done:

- 1) Adequate formulation of the project
- 2) Sound project organization.
- 3) Timely availability of funds.
- 4) Better contract management.
- 5) Use of the principle of responsibility accounting.
- 6) Proper planning for implementation.
- 7) Judicious tendering and procurement of required equipment.
- 8) Advance actions and effective monitoring.

Chapter Six

Social Cost Benefit Analysis (SCBA)

What is SCBA?

SCBA called economic analysis is a methodology developed for evaluating investment projects from the point of view of the society (economy) as a whole. It is based on the assessment of the utility of a project for the society as distinct from the financial and economic utility for the promoter group. While in the latter the focus is limited to financial benefits and costs directly accruing to the enterprise, in social cost benefit analysis the benefits and costs accruing to the

society as a whole are considered. It is a technique for making enterprise decisions, from society's stand point.

For example: Suppose, a manufacturer produces cigarettes and sell it Rs.40 a packet and another manufacturer produces soaps and sell it Birr 20 a bar.

Now, if we think about the impact of soaps and cigars on the society, the question may be:

- ✓ Does the price of cigar take note of the smoker's higher probability of cancer?
- ✓ Does the price of soap take note of the benefits from the use of soap e.g. reduced risk of spread diseases?

Obliviously, a commercial entrepreneur can't give well answer to these questions.

- ✦ While the concept of SCBA is simple, the methodology to be adopted for such an analysis is quite elaborate and intricate. As it is based not only on the consideration of quantitative information but also on qualitative information and subjective judgment.
- ✦ Therefore, to reflect the real value of a project to society, one must consider the impact of the project on society.
- ✦ Thus, when we evaluate a project from the view point of the society (or economy) as a whole, it is called Social Cost Benefit Analysis (SCBA)/Economic Analysis.

Scope of SCBA

SCBA can be applied to both public and private investments.

- **Public Investment:** SCBA is important especially for the developing countries where govt. plays a significant role in the economic development.
- **Private investment:** Here, SCBA is also important as the private investments are to be approved by various governmental and Quasi-governmental agencies which bring to bear larger national considerations in their decisions.

Objectives of SCBA

The main focus of SCBA is to determine:

- i. Economic benefits of the project in terms of shadow prices.
- ii. The impact of the project on the level of savings and investments in the society.
- iii. The impact of the project on the distribution of income in the society; and
- iv. The contribution of the project towards the fulfilment of certain merit wants (selfsufficiency, employment etc.).

6.1 Rationale for SCBA

- In SCBA the focus is on social costs and benefits of a project.
- These often tend to differ from the monetary costs and benefits of the project.
- The principal reasons for discrepancy are:
 - Market imperfections
 - Externalities
 - Taxes and subsidies
 - Concern for savings
 - Concern for redistribution
 - Merit wants
 - Market imperfection
 - Market prices, which form the basis for computing the monetary costs and benefits from the point of view of the project sponsor reflect social values only under conditions of perfect competition, which are rarely, if ever, realized by developing countries.
 - When imperfection exists, market prices do not reflect social values.

The common market imperfections found in developing countries are:

- i. Rationing
- ii. Prescription of minimum wage rates, and
- iii. Foreign exchange regulation.

Rationing of a commodity means control over its price and distribution. The price paid by a consumer under rationing is often significantly less than the price that would prevail in a competitive market. When minimum wage rates are prescribed, the wage paid to labour are usually more than what the wage would be in a competitive labour market free from such wage legislations.

The official rate of foreign exchange in most of the developing countries, which exercise close regulation over foreign exchange, is typically less than the rate that would prevail in the absence of foreign exchange regulation. This is why foreign exchange usually commands premium in unofficial transactions.

Externalities

Externalities are impacts of a project which can be both harmful and beneficial. A project may have beneficial external effects. For example, it may create certain infrastructural facilities like roads which benefit the neighboring areas. Such benefits are considered in SCBA, though they are

ignored in assessing the monetary benefits to the project sponsors because they do not receive any monetary compensation from those who enjoy this external benefit created by the project. Likewise, a project may have a harmful external effect like environmental pollution.

In SCBA, the cost of such environmental pollution is relevant, though the project sponsors may not incur any monetary costs. It may be emphasized that externalities are relevant in SCBA because in such analysis all costs and benefits, irrespective to whom they accrue and whether they are paid for or not, are relevant.

In choosing a particular project the additional benefits derived from a particular project should exceed the corresponding additional cost

The cost benefit analysis can be undertaken in three steps

Step-1: This step involves the identification of alternatives to be assessed.

Step-2: In this step a prediction of the likely consequences associated with each alternative projects

This means the likely effect of the project on the social and environmental aspects is predicted **For**

Example:

Consider a development project - Construction of Dam. In this step the possible intangible benefits that a project may bring to the community and on the environment is predicted.

These are benefits like,

- The number of unemployed people that would get employment opportunity
- Benefit obtained from the infrastructure improvement (saved time, reduced cost, etc.)
- Decrease yearly flood damage (soil erosion, deforestation, reduced property damage)
- Recreational benefit to the society
- Intangible Cost (harmful impact of the project)
- Deforestation created by the project
- Number of people displaced from the site

Example 2

Consider the Railway project- Here we need also to identify and describe changes that can be brought out by the project in the transport sector. The Railway projects might have the following social benefits and costs:

- **Potential benefits:**

- ✓ It reduces motor vehicles operation and maintenance cost to both government and private sector as they switch over from road to railways.
- ✓ It will reduce travel time of people using the road (opportunity cost of time)
- ✓ Reduce atmospheric pollution in the city
- ✓ Reduce investment and operation cost of road
- ✓ Reduce traffic accident in the city
- **Expected cost of the project**
- Loss of revenue to private investor
- ≡ Number of people losing their job

Step-3: Involves the task of estimating (assigning) values for the cost and benefits occurring as a result of implementing the project

Estimating the cost or the benefit of intangibles is somewhat difficult and requires the application of both direct and indirect method. Consider the case of a project that might cause damage on the environment say, waste disposal to the river or air pollution

Let us consider the nature of the cost involved in environmental quality (cost valuation). Cost of environmental problem refers to the waste disposal cost imposed on the society by the production and consumption activities of the project.

Waste Disposal Cost: is the sum of pollution prevention cost and pollution cost (i.e.)

$$\text{Waste Disposal Cost} = \text{Pollution Prevention Cost} + \text{Cost of Pollution}$$

Pollution Prevention Cost: are those costs incurred to prevent the pollution either partly or fully.

These are costs like,

- ✓ Costs incurred by local government (society) to treat its sewage before dumping it into the river.
- ✓ Pollution Cost: these can be either pollution avoidance cost or welfare damage cost.
- ✓ Pollution avoidance costs: are private or public expenditure made to avoid pollution damage once pollution has already occurred. Once the environmental damage has occurred a society can choose either to avoid the damage through some remedial measure or to bear it. The cost of such measure is considered as a best estimate to value the damage (cost of the project).

The economic activities of production and consumption rely up on the environment's role as a resource suppliers and as a waste assimilator. Thus, properly valuing project's effect that brings improvement on natural environment is an important issue in project appraisal.

≡ **Concern for redistribution**

A private firm does not bother how its benefits are distributed across various groups in the society. The society, however, is concerned about the distribution of benefits across different groups.

A birr of benefit going to an economically poor section is considered more valuable than a birr of benefit going to an affluent section.

≡ **Merit wants**

Goals and preferences not expressed in the market place, but believed by policy makers to be in the larger interest, may be referred to as merit wants.

For example, the government may prefer to promote an adult education programme or a balanced nutrition programme for school-going children even though these are not sought by consumers in the market place. While merit wants are not relevant from the private point of view, they are important from the social point of view.

6.2 UNIDO Approach

The UNIDO approach of project appraisal: The UNIDO approach was first anticipated in the guidelines for project evaluation, which provide a comprehensive framework for Social Cost Benefit Analysis (SCBA) in developing countries.

The rigor and length of this work created a demand for a succinct and operational guide for project evaluation in practice. This approach is mainly based on the publication of UNIDO (United Nation Industrial Development Organization) named guide to practical project appraisal in 1978.

Project appraisal is made for both proposed and execute projects. It is the structured process of assessing the viability of a project or proposal. It involves calculating the feasibility of the project before committing resources to it. It often involves making an assessment between various options and this done by making use of any decision techniques or economic evaluation method.

The UNIDO method of project appraisal involves five stages:

1. Calculation of the financial profitability of the project measured at market prices.
2. Obtaining the net benefit of the project measured in terms of economic (efficiency) prices.

3. Adjustment for the impact of the project on savings and investments.
4. Adjustment for the impact of the project on income distribution.
5. Adjustment for the impact of the project on merit goods and demerit goods whose social values differ from their economic values.
 - Each stages of appraisal measures the desirability of the project from different angle.

Financial profitability

Financial profitability is indicated by the Net Present Value (NPV) of the project, which is measured by taking into Account inputs (costs) and outputs (benefits) at market price.

6.3. Net Benefit in Terms of Economic Prices

The commercial profitability analysis (calculated in stage 1) would be sufficient only if the Project is operated in Perfect market. Because, only in a perfect market, market prices can reflect the social value. Benefit/cost (B/C) is defined as a systematic process for calculating and comparing benefits and costs of a project for two purposes:

1. To determine if it is a sound investment (justification/feasibility); and
2. To see how it compares with alternate projects (ranking/priority assignment).

Benefit/cost analysis is also commonly referred to as Cost-Benefit Analysis, CBA, Benefit/cost Analysis, and BCA. The analysis is identical despite the naming differences. Benefit/cost Analysis is one type of economic valuation- an analysis that assesses the relative value of a project monetised that estimates. As the name implies, benefit/cost analysis determines the value of a project by dividing the incremental monetized benefits related to a project by the incremental costs of that project. The result is called the **Benefit/Cost Ratio** and is often the primary output of the analysis process.

If the market is imperfect (most of the cases in reality), net benefit of the Project is determined by assigning shadow Prices to inputs and outputs. Therefore, developing the shadow prices is very much vital.

Shadow pricing:

- Shadow prices reflect the real value of a resource (input or output) to society as opposed to their financial or market value.
- Shadow Prices are also referred as economic prices, accounting prices, economic /accounting efficiency prices etc.
- Use of shadow prices is considered essential particularly due to market

imperfections,

Non-market economy, fiscal policy of the state etc.

Chapter Seven

Project Financing

Project Financing is the financing of long-term infrastructure, industrial projects and public services using **debt** or **equity**. Debt is typically repaid using cash flow generated from the operations of the project.

A feasibility study would serve little purpose if it was not backed by a reasonable assurance that resources were available for a project if the conclusions of the study proved positive and satisfactory. A preliminary assessment of project financing possibilities should already have been made in most cases before a feasibility study is undertaken. This is especially true if a project opportunity or pre-feasibility study has previously been performed, as such studies would indicate the order of magnitude of the required capital outlay.

A feasibility study should only be made if financing prospects to the extent indicated by such studies can be defined fairly clearly. Resource constraints may define the parameters of a project well before an investment decision is made, and at various stages of project formulation. A large steel plant may not be practicable in a small country with extensive iron ore deposits but with very limited financial resources. Such resource constraints may limit the consideration of certain projects or restrict project capacity to the minimum economic levels. Financial constraints could exist at all levels of project sponsorship and occur whether a particular project is under consideration by an individual entrepreneur, a major industrial group (domestic or foreign), or a governmental or semi-governmental agency.

Apart from some instances where resource constraints constitute a major limiting factor in the consideration of project possibilities and project size, it is only when the basic techno-economic parameters of a project are defined that the detailed requirements of financing can be adequately assessed.

Thus, in a feasibility study, the capital outlay of a project can be appropriately determined only after plant capacity and location have been decided, together with estimates of the costs of a developed site, buildings and civil works, technology and equipment.

Defining the financial requirements of a project at the operational stage in terms of working capital is equally necessary, although too often neglected. This can only be determined once estimates are made of production costs, on the one hand, and sales and income, on the other.

These estimates should cover a period of time and be reflected in a cash flow analysis. Unless both estimates are available and unless the available resources are sufficient to meet the fund requirements, both in terms of initial capital investment and working capital needs over a period of time, it would not be prudent to proceed to the financing decision and project implementation.

There are innumerable instances of projects that ran into serious financing problems because of inadequate estimates of fund requirements at the initial investment or operational stages, because investment, production costs and marketing costs were underestimated, or sales and income were overestimated.

7.1 Sources of Project Finance

Project finance may come from a variety of sources. The main source including equity, debt and government grants. Financing from this alternative sources have important implications on projects overall cost, cash flow, ultimate liability and claims to project incomes and assets.

7.1.1. Equity

A generally applied financing pattern for an industrial project is to cover the initial capital investment by **equity** and **long-term loans** to varying extents, and to meet working capital requirements by additional short-and medium term loans from national banking sources. However, as explained before, the minimum net working capital requirements should be financed from long-term capital. In certain projects, equity capital covers not only the **initial capital investment** but also **net working capital** requirements, for the most part. This generally occurs in situations where institutional capital is scarce and available only at high cost.

In other cases, where relatively inexpensive long-or medium-term credit is available, there is a growing tendency to finance projects through such **loans**. In all cases, a **balance** needs to be struck between long-term debt and equity. The higher the proportion of equity the less the debt service obligations and the higher the gross profit before taxation. The higher the proportion of loan finance, the higher the interest payable on liabilities. In every project, therefore, the implications of alternative patterns and forms of financing must be carefully assessed; a financing pattern should be determined that is consistent with both availability of resources and overall economic returns.

Equity can be raised by issuing two types of shares: ordinary shares (common shares in United States terminology); and preference shares. Preference shares usually carry a dividend at least partly independent from profit, without, or with only limited, voting rights. Preference shares can be convertible to common shares, they can be cumulative or non-cumulative in terms of dividends, or they can be redeemable or non-redeemable, with the redemption period varying between 5 and 15 years. Dividends on ordinary shares with full voting rights, however, depend on the profitable operation of the company. There is currently a trend towards more than one class of common shares, involving greater voting rights combined with lower dividends and receipts and fewer privileges, or vice versa.

7.1.2. Loan financing

Since it is relatively easy for a sound project to obtain loans, the process of project financing may well start by identifying the extent to which **loan capital** can be secured, together with the **interest rate** applicable. Such loan capital would need to be separately defined in the following forms: short-and medium term borrowings from commercial banks for working capital purposes, or supplier credits of various forms; and long-term borrowings preferably from national or international development finance institutions.

a) Short-term loans:

Short-term loans from commercial banks and local financial institutions are available against hypothecation, or pledging, of inventories. The limits to which inventories are financed by commercial banks are fixed by the banks, and depend on banking practices in the country, the nature of the project and inventories, and the credit rating of the enterprise and its management. The limits usually vary between 50 and 80 per cent, leaving a margin of from 20 to 50 per cent of inventories to be financed from other sources.

Bank borrowing for working capital can be arranged on a temporary basis. If at any time the cash flow statement suggests that sufficient liquid funds are available, such commercial bank borrowings should be substantially reduced or entirely eliminated, without however jeopardizing the overall liquidity of the project. In some cases, such a cash-flow surplus may be needed for further capacity expansion, so that the enterprise may need to rely on long-term bank credits for some time. Working capital needs should even be partly met out of long-term funds (equity capital and long-term loans), since the largest portion of working capital is permanently tied in inventories (raw materials, work-in progress, finished goods and spare parts).

b) Long-term loans:

Loan financing is usually subject to certain regulations, such as restrictions on the convertibility of shares and declaration of dividends. Apart from these regulations, certain ratios in the capital structure of the company need to be maintained. Investment may also be financed partly by issues of bonds and debentures. The market for bonds and debentures tends to be fairly limited as far as new projects are concerned, but such securities are often issued to finance the expansion of existing enterprises.

An important source of finance is also available at government-to government level for many developing countries. This can take the form of general bilateral credit or tied credit, which may be related to the purchase of machinery and equipment from a particular country or even from a particular source. In addition to share capital and loan finance, an important financial category at the operational stage is the internal cash generated by the project itself. This can take the form of accumulated reserves (retained profits and depreciation).

c) Supplier credits:

Imported machinery and spares can often be financed on deferred credit terms. Machinery suppliers in industrialized countries are generally willing to sell machinery on deferred payment terms with payments spread over 6 to 10 years, and sometimes even longer. This term is available against bank guarantees; this enables such machinery suppliers to obtain refinancing facilities from financial institutions in their own countries.

7.1.3. Leasing

Instead of borrowing financial means it is sometimes possible to lease plant equipment or even complete production units, in other words, productive assets are borrowed. Leasing, as the borrowing of productive assets is called, requires usually a down payment and the payment of an annual rent, the leasing fee. These assets are, however, contained in the balance sheet of the lessor and not in the balance sheet of the borrowing firm, the lessee. Therefore, leasing essentially represents a form of off-balance sheet financing. This aspect may be important in situations in which a firm prefers to maintain a certain debt-equity ratio or is not in a position to further increase its debentures.

Provided that both the lessor and lessee fall under the same tax regulations, purchase equipment under the same conditions and enjoy identical financing conditions, the accumulated leasing costs should not differ significantly from the costs of purchasing and financing of the purchase of the

same assets. Only when lessors enjoy certain advantages, owing, for example, to their position in the capital-goods or financial markets (credit rating), may the leasing costs be lower for the lessee than total costs in case the items are purchased.

In the case of investment projects the problem is basically to decide which alternative should be preferred, leasing or purchasing of capital assets. For the evaluation of the two financing alternatives the discounted cash flow method should be applied. The initial down payment, the current leasing fees and any additional payments under the leasing agreement are then part of the cash outflows, replacing all initial investment costs computed for the purchasing alternative. Since the duration of leasing contracts is in general much shorter than the technical and economic life of an asset, it is necessary to include the residual value (cash inflow) of the leased asset when comparing leasing with loan financing. The inflow for the lessee would usually not be the book value but either the book value or the market value (minus the lessor's cost of selling the used items), whichever is lower.

If the investor has a choice between loan and leasing financing,' he would compare the discounted cash flow for both cash flow arrays to determine which alternative would bring the higher yield (IRR, NPV), bearing in mind, however, the liquidity aspect and risks involved. If tax regulations have different effects on leasing financing, these tax impacts need to be included in the cash flow discounting.

Funds to finance leases may be obtained from independent leasing companies (service or financing leasing companies, lease brokers), banks, insurance companies, pension funds and industrial development agencies. Leasing financing of investment projects in developing countries has been introduced by international financing institutions such as the International Finance Corporation, and may become an interesting financing alternative, especially in cases where leasing has certain advantages over loan financing.

If the investor has a choice between loan and leasing financing,' he would compare the discounted cash flow for both cash flow arrays to determine which alternative would bring the higher yield(IRR, NPV), bearing in mind, however, the liquidity aspect and risks involved. If tax regulations have different effects on leasing financing, these tax impacts need to be included in the cash flow discounting.

7.2. Cost of Capital

Capital for financing of investments may be obtained from private and institutional resources (banks, insurance companies, funds etc.). However, behind these institutions stand again private investors. In all cases private savings are therefore the ultimate source of capital. Basically, all savings are made to provide for future needs, but this alone would not be an incentive to invest or lend money to an investor, because lending would mean a long-, medium- or short-term commitment reducing the liquidity of the lender, and would also imply uncertainty concerning the full return of the funds lent.

To obtain finance, an investor must therefore pay a charge-the cost of capital or of finance-for the funds lent. This charge comprises an interest rate, usually expressed as a percentage per annum, as well as certain fixed charges (commitment fee, charge on capital not drawn, commissions etc.). Interest is usually computed for the outstanding balance of the corresponding liabilities of a firm, for example, interest payable on a bank loan, dividends payable on equity capital (such as preference shares) and interest payable on a current account.

For the investor the cost of capital is determined by the conditions that can be obtained for the project on the capital market. For the amount stemming from own **funds (savings)** investors should charge their **opportunity cost** of capital, that is, the interest they would obtain if they invested in another feasible venture(provided such alternatives exist).

Impact of financing cost on financing policies

The cost of equity capital for the project or firm is basically determined by the minimum accumulated return,' 29 expressed as the NPV of the future income of the shareholders, and the minimum annual rate of return, expressed as the rate of return on equity capital. The acceptable minimum rates depend on the opportunity cost of capital, the expected business risks, and the valuation of any gains or benefits obtained in addition to the payment of dividends. The purpose of the concept of equity is to give the management of the firm more flexibility with regard to the best use of the annual net profits in the interest of the shareholders or owners and the firm. The debt service (interest and amortization) is fixed and legally binding for the firm, and has to be paid even when the generation of cash is insufficient in certain years, whereas payment of dividends is in general linked to a sufficiently high profit and cash generation. The determination of the right (optimal) capital mix is therefore essential when a financing strategy is designed for an investment project.

Different financing institutions impose different financing conditions. A government guarantee is even sometimes required for multilateral financing. It is important that the enterprise is not obliged to start with loan amortization before the start-up of operations. Very often financial costs are capitalized during the implementation period, and debt service starts when sufficient cash is generated through the operation of the new production facilities. It may be possible to combine relatively short-term supplier credits (for instance, a three-year grace period and a four-year amortization period) with longer-term financing from multilateral banks. In this case, supplier credits could be disbursed last and amortized first, while leaving multilateral financing for early disbursement and late amortization. Thus, generally suitable loan terms can be obtained.

In new as well as expansion projects, the kind of debt service will also have to be decided on. The following two systems are possible: periodical debt service with equal amortization instalments (constant principal) plus gradually decreasing interest; and periodical debt service with constant payments (annuities), in which case the sum of the declining amortization and increasing interest payments is constant over the amortization period of the loan. The first system requires less total financing cost but a fairly substantial initial debt service during the start-up of the project. The second system, although it has a higher total financing cost, is preferable for the new enterprise because the initial debt-service burden is smaller than under the first system. The various forms and sources of financing have different implications in terms of impact on different projects and may even affect project formulation. Supplier credits and other forms of medium-term credit, though initially advantageous in terms of coverage of resource gaps at the initial stage, constitute a heavy debt burden during early years of production; their incidence on production costs should be determined and accounted for in the cash flow analysis. National and international institutions that provide loan finance require that projects should be formulated in considerable detail, so that their full implications are adequately highlighted. In some cases, they insist that the feasibility study should be prepared by recognized independent consultants or that management responsibilities for certain major projects be assumed by experienced and acceptable parties.

7.3 Public policy and regulations on financing

The hard core of the entrepreneurial decision in respect of financing is to choose between equity raised through the sale of shares and that raised through payments by the project sponsor. In most cases, the initial equity base is provided only by the project sponsors. The extent of such **initial equity** depends on the anticipated profitability and on availability of funds for this purpose and of

alternative sources of capital participation, all under the prevailing regulations on financing and taxation of income from capital investment.

Where a project is expected to yield a **high rate of profitability**, maximum participation would be sought by the sponsors within an appropriate equity debt pattern and subject to fund constraints. In the case of any resource gap or where the sponsors wish to limit their risks to a particular proportion of equity, outside participation can be invited to provide additional equity or loans. Funds can be mobilized either from national sources (individual or institutional), or through foreign participation.

When a developing country has a reasonably well developed capital market, equity funds can be raised through public issues of shares. Such share issues are usually underwritten by banks and other financial institutions. In some cases, financial institutions, including specialized institutions dealing in industrial financing, participate in share capital to varying extents. Usually such participation is in the form of minority shareholding. In some developing countries, it may be necessary for institutional agencies to acquire majority holdings initially and release them gradually to domestic entrepreneurs as and when domestic entrepreneurship is willing to take over all, or a part of, such holdings.

In considering foreign equity participation, a basic policy question may arise regarding the extent (if any) of foreign influence after such participation. In a number of developing countries, foreign equity participation requires governmental approval. In some countries, such approval is often not granted, particularly to non-priority sectors of investment. In other cases, only minority foreign participation is generally permitted. In certain countries, however, even majority foreign participation is welcomed, particularly in sectors involving large investments or in projects with a great employment potential. Thus, in cases where foreign equity participation is considered, the first need is to assess the policy implications and the reaction of government authorities. Thereafter, the implications of foreign equity participation on the project should be evaluated.

In some cases, where foreign technological assistance and support may be required for a number of years, or where access to improved and new technologies may be required, it may be desirable to have the technology supplier or licensor also participate in capital ownership. Technical management may sometimes have to be entrusted to a foreign company, usually a licensor, in which case foreign capital participation may be desirable. The extent of foreign participation would, however, have to be considered on a case-by-case basis and be determined within the

framework of national policies by such factors as the nature and magnitude of investment outlay, and the technological and management support required, the extent of the resource gap that could otherwise develop, and the relations between a technology licensor and licensee.

7.4. Financing Institutions

Most developing countries have established development financing institutions, usually called industrial finance corporations or industrial development banks. In most developing countries, there is more than one institution available to finance projects. Most countries have established financial institutions at the state and national levels. Some of the national institutions provide foreign currency loans which are financed by international institutions, such as the World Bank and its affiliates.

Various international institutions and funding facilities exist for the financing of industries in developing countries. Some of these, such as the World Bank, including the International Development Association as well as the International Finance Corporation, the Special Fund of the Organization of Petroleum Exporting Countries, the Kuwait Fund for Arab Economic and Social Development, and the International Investment Bank of the Council for Mutual Economic Assistance, operate on a world-wide scale. Even though many of these funds will be used primarily for infrastructure and agricultural development rather than for industry, the provision of funds on soft terms for infrastructure is one of the fundamental prerequisites of successful industrialization.

There are also institutions operating on a regional basis, such as the African Development Bank, the Asian Development Bank, the European Investment Bank and the Inter-American Development Bank. Funds have been set up by the oil-exporting countries, such as the Arab Fund for Economic and Social Development and the Islamic Development Bank. Bilateral institutions have been established in most of the countries of the Organization for Economic Cooperation and Development and, in some oil-exporting countries, including Kuwait, the United Arab Emirates and Venezuela. In this context, the role of the export financing and guaranteeing agencies must be mentioned. The primary task of such agencies is to provide financial support of exports from industrialized countries; only as a secondary task are they designed to help developing countries.

Commercial banks, including those in the Eurocurrency market and the currency markets of the Association of South-East Asian Nations, are becoming increasingly active in industrial development financing. However, they lend to only a few developing countries. A major step

towards easier terms and availability of loans would be achieved with the establishment of a multilateral guarantee system for commercial loans.

In many developing countries, the availability of industrial finance in the form of institutional finance and from other sources has grown to such an extent that new entrepreneurs can start industrial ventures while providing a relatively small share of the total equity required. The situation varies widely, but in some countries, the initial portion of equity to be raised by sponsors of industrial projects can be as low as 10-25 per cent of the total finance needed.

The various aspects discussed above need to be fully assessed before evolving a financing package suitable for a project under consideration. Invariably, the package is determined by identifying the most economic pattern in terms of cost of finance, assessing the feasibility of obtaining capital on such a basis, and ensuring that the pattern is consistent with both public policies and regulations, and the projected cash flows of the proposed enterprises.

