**Chapter Four**

**Project preparation /Feasibility studies/**

A feasibility study is an in depth investigation of the factors that affect the future success of a project or the process of project preparation and analysis. The main areas of project feasibility study are;

* Commercial/market
* Technical
* Institutional & organizational
* Financial
* Economic
* Social soundness and
* Environmental

The project feasibility study generally involves two steps namely:

* Pre- feasibility study and
* Feasibility study

1. **Pre-feasibility study**

Pre-feasibility study is an initial assessment of key risks involved in the project, which if they occurred could prevent the achievement of project objective. Pre-feasibility study is expected to identify broad areas of risks such as Technical, social, environmental, institutional, financial, economic, political etc. Prefeasibility study is undertaken if any one of the following is true.

a. When there is serious lack of information on the development problem,

b. When the project proposal is poorly defined

Some of the main components that should be examined during the pre-feasibility study include:

* Availability of adequate market
* Project growth potential
* Investment costs, operational cost and distribution costs
* Demand and supply sectors and
* Social and environmental considerations

1. **Availability of adequate market**

The subjective consideration of the market potential at the pre-feasibility stage includes

* Making judgment on the number of potential customers
* Needs of the customers
* Strength of the competitors
* Availability and access to sales and distribution network and export possibilities.

**B. Project growth potential**

The growth potential is examined by looking at a number of indicators. Some of the indicators include

* Projected increase in the number of customers
* Increase in the rate of acceptance of the products
* the general economic, social and political trends which might influence the growth potential of the project.

1. **Investment costs, operational costs and distribution costs**

* Purchase and transportation costs of raw material and finished products
* labor costs, production costs
* Investment costs are usually considered and should influence the decision of whether or not one should go ahead with the new project idea. If all these costs are very high, the sustainability of the project will be highly doubtful.

1. **Demand and supply factors**

* 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.
* In industrial and commercial projects, capacity is an important consideration.

**E. Social and environmental considerations:**

* A new project should also be evaluated by considering the social and environmental factors.
* There are many important social factors which have been ignored and have led to the failure of many projects.

**2. Feasibility study**

Detailed investigation of the proposed project and recommending whether the implementation is feasible is on this stage. According to Gittinger Feasibility study is “a study of a proposed project to indicate whether the proposal is attractive enough to justify more detailed preparation”.

However in most practical situation it is not uncommon to find a situation where only a few projects are sufficiently analyzed, carefully prepared and optimally selected. This happens because of two major reasons;

* Lack of skilled manpower to carry out a detail analysis and
* Unwillingness of the entity undertaking the project to spend money on this process.

Hence many projects are implemented without any extensive feasibility studies. In the obscene of detailed feasibility studies, project implementing agencies usually use **non- numeric project selection models**. They are;

* 1. **The sacred cow model**

In this model, a project is usually suggested by a senior and powerful individual in an organization and the idea is then passed to the officers below. In many cases, other officers are required to assist the boss to achieve what he/she wants. Although such projects may not pass through vigorous analysis, the boss may persist until he/she is convinced that it can no longer work. Many projects in the public sector of developing countries have been initiated using this approach. Usually, these projects are initiated by powerful politicians such as ministers with the aim to give their home areas the so called ‘accelerated development’.

**2. Operating necessity model**

In this project selection model, projects are initiated because they are required to keep a system in the operation. These are threatening situations such as floods which will simply call for projects to be started without much evaluation. Funding of projects initiated in this manner is usually done without making though and meticulous analysis that goes with projects preparation and identification.

**3. Competitive necessity model**

Projects are usually initiated and given a lot of support if they will help an organization maintain a competitive edge over other organizations. Such projects are considered to be of survival importance to an organization and may not necessarily be required to go through careful numerical analysis.

**4. Product line extension model**

This model is used when a project is intended to develop and distribute a new product or products. Usually, such project if intended to fill a gap or to strengthen a weak link or to take the organization to a new direction, will be judged favorably without careful calculations of the profitability of the project.

**5. Competitive benefit level**

This model is used where a firm has several projects that must be considered and some ranking is given. In actual practice, in this model, the projects are sorted out into three categories; good, fair and poor. This is done according to some development merit list. Such a list may contain doctrine such as if the project is labor intensive, and then it might be given more priority.

However scholars have indicated that the application of the aforementioned models to project selection may be limited to projects which do not involve huge investment of resources. Yet it is believed that this process is wasteful if many projects are appraised but is eventually abandoned. With a lot of care exercised, especially at the feasibility stage the abandonment should seldom happen. Hence for projects which involve huge resources, especially those involving governments and other institutions such as the World Bank and the International Monetary Fund, feasibility studies must be usually carried out before a project is selected for implementation.

**4.2.1 Market and Demand Analysis**

In most circumstances, the first step in project analysis is to estimate the potential size of the market for the product proposed to be manufactured (or service planned to be offered) and get an idea about the market share that is likely to be captured. The task demands an in – depth study and analysis of various factors such as: existing pattern of consumption and growth, consumption of the market, nature of competition, income levels of the society, availability of substitutes, system of distribution channels, etc.

The objectives of market and demand analysis in preparing a project are to:

* Identify potential consumers or buyers.
* Gathering secondary and/or primary data/ information
* Market survey
* Market classification/characterization of the market demand forecasting
* Uncertainties in demand fore casting
* Market planning

1. **Situational Analysis and Specification of Objectives**

The primary purpose of situational analysis is to generate enough data about the market without formal study, which normally demands time and cost. Most often, of course, a formal study of the market and demand is warranted. To conduct such a study, it is necessary to spell out its objective clearly and comprehensively. Often this means that, the intuitive and informal goals that guide situational analysis need to be expanded and articulated with greater clarity.

To get an idea about the proposed product or services and its market share, the project formulators, therefore, need informally, to talk to consumers or customers, competitors, distributors preferences, purchasing power, organizations, or other similar or different producers or services providers. It may be also advantageous to look at experiences of the organizations in dealing with customers and their strategies.

Key steps in Market and Demand Analysis and their Inter – relationships

Market Planning

Demand Forecasting

Characterization of the Market

Conduct of Market

Survey

Collection of secondary information

Collection of secondary information

Demand Forecasting

Situational Analysis and Specification of Objectives

Characterization of the Market

K2

Market Planning

Conduct of Market

Survey

1. **Collection of Secondary Information**

To conduct market demand, study information may be collected from secondary and / or primary sources. Secondary sources are information gathered in some other places or context and are already available. Information for market and demand analysis may be obtained from central statistics office, sample survey reports, planning reports, academic studies, etc. These sources may provide starting point for market and demand analysis. However, their reliability, relevance, and accuracy for intended purpose should be carefully examined. Moreover, it provides leads and clues for gathering primary information required for further analysis.

1. **Conduct Market Survey**

A comprehensive basis for market and demand analysis may be difficult to obtain from secondary information. As such, primary information through a market survey tailored to the specific needs of the project under preparation is necessary. There are two types of survey for this purpose. These are a **census survey** and a **sample survey**.

In a census survey, the whole population is included (covered). Generally they are employed for investment goods and intermediate goods if they are principally used by small number of users or consumers. These types of surveys often tend to be costly and infeasible.

In a sample survey, a sample of population may be drawn. This method is found to be cheaper and easier.

The information sought in a market survey may relate to one or more of the following:

* Total demand and rate of growth of demand,
* Demand in different segments of the market,
* Income and price elasticity of demand,
* Motives of seeking the product or service,
* Unsatisfied needs or demand,
* Purchasing power of customers,
* Satisfaction with the existing product or service,
* Distribution patterns and preferences,
* Attitude towards the product or service,
* Socio – economic conditions of the consumers,

These information need to be collected and analyzed in the context of the proposed project.

1. **Characterization of Market Survey**

Based on the information collected through a sample survey or secondary sources it may be necessary to classify the market for the product or service in the following manner:

* The past and present effective demand,
* Break down of demand
* Consumers or customers,
* Distribution and sales promotion,
* Supply and competition
* Price
* Government policy

**Effective Demand in the Past and Present**

To get the past and present effective demand, it is necessary to estimate apparent consumption (i.e production plus imports less exports and change in stock). In competitive market effective demand and apparent consumption are generally equal. In most developing countries, where competitive markets do not exist for a variety of products due to exchange restrictions and controls on production and distribution, the figure of apparent consumption may have to be adjusted for market imperfections. Moreover, to obtain clear insight into the nature of aggregate market demand it may be necessary to break down demand for different segments of the market. Segmental information is helpful to formulate market strategies that are appropriate to different market segments.

**Breakdown of Demand**

To get an in depth insight to the nature of demand, the aggregate (total) market demand may be broken down into demand for different segments of the market. Market segments may be defined by (i) Nature of product, (ii) Consumer group, and (iii) Geographical division. Segmental information is helpful because the nature of demand tends to vary from one segment to another. The demand from consumers in high income brackets may not be sensitive to price variations and different marketing strategies may be appropriate for different market segments.

**Consumers or Customers**

Customers may be classified based on demographic (age, sex), economic (income), sociological (profession, residence, social background), attitude (preferences, intentions, habits, attitudes, and responses). This is not an exhaustive classification and the formulators may be able to find meaningful groupings or categories based on targeting processes.

**Price**

Along with statistics relating to physical quantities. It may be helpful to distinguish the following types of prices:

(i) Manufacturer’s price quoted as FOB (free on board price or CIF (cost, insurance, and freight) price, (ii) Landed price for imported goods, (iii)Average whole sale price, and (IV) Average retail price.

**Methods of Distribution and Sales Promotion**

The existing methods of distribution and sales promotion has been analyzed. This is essential to identify patterns of consumption and problems encountered in making the proposed product/service.

**Supply and Competition**

It is necessary to know the existing sources of supply and whether they are foreign or domestic. For domestic sources of supply, information along the following lines may be gathered: Location, present production capacity, planned expansion, capacity utilization level, bottlenecks in production, and cost structure.

Competition from substitutes and near – substitutes should be specified because almost any product may be replaced by some other product as a result of relative changes in price, quality, availability, promotional effort, and so on.

**Government Policy**

Government policy may influence the market and the demand for a product/service. Governmental plans, policies, and legislations, which have an influence on the market and demand of the product under examination, should be disclosed. These are reflected in: production targets in national plans, import and export trade controls, import duties, export incentives, excise duties, sales tax, industrial licensing preferential purchases, credit controls, financial regulations, and subsidies /Penalties of various kinds.

1. **Demand Forecasting**

After the completion of information gathering about various aspects of the market and demand from primary and secondary sources, it may be possible to estimate future demand. There are several forecasting methods which are made available to the market analyst. These methods may be classified in three broad categories as shown below:

**Methods of Demand Forecasting**

1. **Qualitative Methods**. These methods depend on essentially on the judgment of experts to translate qualitative information in to quantitative estimates.
2. **II. Time Series Projection Methods**. These methods generate forecasts on the basis of an analysis of the historical time series.

**III. Casual Methods.** This method is more analytical than the preceding methods, casual methods seek to develop forecasts on the basis of cause – effect relationships specified in an explicit, quantitative manner.

1. **Market Planning**

An appropriate marketing plan should be formulated to reach the proposed product/service to a desired level of customers. The prime purpose of the marketing plan is meeting the customer needs better than their competitors. The marketing plan should focus on customer needs, nature of product or service offering, channel function and coverage. In planning the market the detailed information that has been collected and analyzed should be targeted on the following:

* Customer, consider core needs and ancillary needs.
* Distribution, indicate role of distributors, whole sellers and retailers
* Promotion which includes advertising, branding, own sale efforts.
* Pricing, indicate final price to customers, trade margins, duties on the intended price.
* Services, state warranties, after – sale service, training, installation, etc
* Market segmentation, breakdown markets into meaningful groupings or segments giving emphasis on distinguished characteristics, size of segment, accessibility, and degree of competition.

**4.2.2. Technical Analysis**

Technical aspect of the project provides the basis for all other forms of project design and analysis because a technically unfeasible project must be either revised or abandoned, regardless of its performance in other areas.

Analysis of technical and engineering aspect is done continually when a project is being examined and formulated. Other types of analysis are closely interwoven with technical analysis. Technical feasibility must be conducted on the basis of the project’s ability to meet its objectives using a technology and standards, which are appropriate to the circumstances of the country in which the project will be located.

Project formulators or promoters must bear in mind the key word ‘appropriate’ in formulating a project. The project should have to be designed analyzed interms of its appropriateness and relevance with regard to the project’s objective. In line with this perspective, the project objective is the key to technical analysis.

The broad purpose of technical analysis is (a) to ensure that the project is technically feasible in the sense that the inputs required to set up the project are available, and (b) to facilitate the most optimal formulation of the project in terms of technology, size, location, and so on. The following are basic issues pertaining to technical analysis using common sense and economic logic.

* Manufacturing process /technology
* Technical arrangements
* Materials and Inputs
* Plan capacity
* Location and site
* Structures and civil works
* Environmental aspects

1. **Manufacturing Process Technology**

In manufacturing a product or service often two or more alternative technologies are available. For instance, cement can be made either by the dry process or the wet process. Similarly, a soap can be manufactured by the semi – boiled process or the fully – boiled process.

* **Technology Choice**

Selection of appropriate technology and know–how is a critical element in any feasibility study. Such selection should be based on a detailed consideration and evaluation of technological alternatives and the selection of the most suitable alternative in relation to the project to investment strategy chosen and to socio – economic and ecological considerations. Appropriate technology choice is directly related to the conditions of application in particular situations. What may be appropriate in industrialized economies with high labor costs may not necessarily be the optimum for low – age developing countries, with severe constraints on infrastructure and availability of inputs. On the other hand, a plant in a developing country that produces primarily for export to industrialized countries may need to utilize the latest automated and capital – intensive production processes in order to compete in such markets. Competitive production capability in intended markets is one of the most crucial factors for technology choice, and the related plant capacity can be a major determinant of such capability. Generally, technology choice must be directly related to market, resource and environmental conditions and the corporate strategies recommended for a particular project.

It is also necessary to take into account new technological developments and applications and their impact to plant capacity. The choice of technology is influenced by a variety of considerations:

* Plant capacity
* Principal inputs
* Investment outlay and production cost
* Use by other units
* Production mix
* Latest developments
* Ease of absorption

*Plant Capacity.* Often, there is a close relationship between plant capacity and production technology. Perhaps, only a certain production technology may be viable so as to meet a given capacity requirement.

*Principal Inputs*: The chosen technology, in some cases, may be influenced by the raw materials available – for instance, 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.

*Product Mix*: The chosen technology must be judged in terms of the total product – mix generated by it, including saleable by – products.

*Latest Developments*: The technology adopted 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.

* **Appropriateness of Technology**

Appropriateness of technology refers to the methods of production which are suitable to local economic, social, and cultural conditions. Nowadays, advocates of appropriate technology urge that the technology should be evaluated in terms of the following points:

* + Whether the technology utilizes local raw materials?
  + Whether the technology utilizes local manpower?
  + 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?

1. **Technical Arrangements**

To obtain the technical know–how needed for the proposed manufacturing process, suitable arrangements must be made. When collaboration is sought, among other things, the following aspects of the arrangement must be worked out in detail:

* The nature of support to be provided by the collaborators during the designing of the project, selections and procurement of equipment, installation and erection of the plant, operation and maintenance of the plant, and training of the project personnel.
* Process and performance guarantees interms of plant capacity, product quality and consumption of raw materials and utilities.
* The price of technology in terms of one – time licensing fee and periodic royalty fee.
* The continuing benefit of research and development work being done by the collaborator.
* The period of the collaboration agreement.
* The assistance to be provided and the restrictions to be imposed by collaborator with respect to exports.
* The level of equity participation and the manner of sharing management control, especially if the technical collaboration is backed by financial collaboration.
* Assignment of the agreement by either side in case of change of ownership.
* Termination of the agreement or other remedies when either party fails to meet its obligation.
* Approach to be adopted in unexpected situations.

1. **Material Inputs and Utilities**

An important aspect of technical analysis is concerned with defining the materials and utilities required; specifying their properties in is some detail, and setting up their supply programme.

There is a close relationship between the definition of input requirements and other aspects of project formulation, such as the definition of plant capacity, location and selection of technology and equipment, as these inevitably interact with one another.

Material inputs and utilities may be classified into four broad categories: (i) Raw materials, (ii) Processed industrial materials and components, (iii) Auxiliary materials and factory supplies, and (iv) Utilities.

* **Raw Materials**

Raw materials (processed and/or semi – processed) may be classified into four types; (i) Agricultural products, (ii) Mineral products, (iii) Livestock and forest products, and (iv) Marine products.

**Agricultural products:**

If the basic raw material is agricultural products, its quality, present and potential quantities should be identified. In food processing industry, only the marketable surpluses of agricultural products should be viewed as basic raw materials, after meeting the consumption and sowing requirements. If the project requires large quantities the production of agricultural products should be increased by extending area of cultivation (sugar cane) or adding one more crop to estimate availability, the data on the past crop to be collected and also to study their distribution by market segment. Storage and transportation costs to be considered. Future cultivation studies should be based under varied conditions and the quality and suitability to be tested.

**Livestock and forest product:**

Specific surveys are conducted for viability of an industrial project to have a more dependable and precise data base. To assess the potentials of availability, yield and cost of collection, other consideration are, ecological factors, national policies, and bilateral and multilateral agreements, fishing quotas by quantity related licenses and the danger of over fishing.

**Mineral products:**

Information about metallic, non-metallic and clays and their exploitable deposits, proven reserves, viability, open cost or underground mining, location, size, depth, quality of deposits, impurities etc, should be gathered. Deposit from different location may differ in chemical properties. Analysis and test results of ores and mineral should be included in project reports.

**Processed industrial materials and components:**

To defined requirement of base metals, semi processed material part and components and specifications are to be detailed. Their availability and price may be unstable in international market. Substitutes and FOREX constraints should be enquired into. Careful analysis should be conducted regarding source of chemicals and petrochemicals, both on the domestic and foreign markets, their costs and backward linkages.

**Factory Supplies:**

These include auxiliary materials like chemicals, additives, packing materials, paints, varnishes, maintenance materials, oils, grease, cleaning materials, wear and tear parts and tools etc, and estimate of utilities consumption is essential for identifying the existing sources of supply and shortages. The utilities include: **Electricity:** An analysis of energy situation, sources, cost, power demand, load aspect, stand by arrangements, consumption level and rejection of thermal power plants for environmental reasons are certain points to consider in the study. **Fuels:** while using large combustion materials, environmental protection and technologies are to be integrated in the planning. Using of coal is resulting in worldwide carbon dioxide pollution and increased global temperatures. Thus care has to be taken in the choice of use of fuels. **Water:** the requirement of the water estimated should be by considering recycling arrangements, for various purposes. **Packing materials:** packing materials are most important for the commodity; for export markets, special protective packing may be required and in competitive markets attractive packing may be helpful. **Recycled waste:** pollution! In developing countries, dumping of wastes is no longer possible. Proper technology usage and sophisticated recycling methods should be suggested. **Spare Parts:** to avoid break downs of machinery and equipments, essential spare parts and tools should be identified and keep it in stock. They may comprise large number of small items.

**Specification of requirements:**

All requirements of material and supplies should be identified and specified in the study considering all socio-economic, commercial, financial and technical factors. Project characteristics and envisaged technology determines the requirement of materials and supplies. Flow sheets for materials and other inputs indicating quantitative flows should be prepared. The quality of various inputs and their quantities are estimated based on the user demand and market expectations about the products of the project. The ***nominal and feasible plant capacity*** will have to be defined on the basis of varying supply conditions, number of shifts and products, skill of the labor force and marketing strategies. To identify the characteristics of materials and inputs, the analysis should cover physical properties, mechanical properties, chemical properties and electrical and magnetic properties.

**Availability and supply:**

The source of materials availability, their users and price of inputs are to be analyzed. The interdependencies between project, material and input requirements and supply of these items should be considered. The machinery, equipment, production process, capacity etc. may have to be revised if inputs with the specified characteristics and quantities are not available. Data regarding locations of availability, area of supply, whether concentrated or dispersed, transportability, transport costs and alternate usage of such materials need to be collected. If the material has to be imported, the implication of such imports should be assessed. There may be lack of knowledge of alternative external source of inputs. The implications of domestic production of materials that were being imported should be analyzed. If alternative materials are used, the discussion should also include an assessment of the environmental impact of each material.

**Supply program**

Making use of the marketing research information, suppliers to be identified and input quantities should be determined. The objectives of supply marketing are; 1. Cost minimization that will have significant impact on profitability. The 80-20 rule should be followed. 2. Reliability of supplies, quality wise, quantity wise and timing. Late deliveries and lack of quality may have serious consequences for the production process. 3. To cultivate good business relations with suppliers for smooth and mutual trusting transactions. Purchasing prices and condition largely depend on the bargaining power of the project and its management. The systematic observation and analysis of supply market is of central operations depending on the market conditions.

**Costs of raw materials and supplies:**

The costs of materials and other supplies have to be analyzed in detail to determine project economies. In 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 costs of alternative means of transport should also be considered. For imported martial **CIF** prices to be adopted together with loading and unloading, port charges, tariffs, insurance and taxes, cost of internal transport and other cleaning costs.

Estimates of annual operating costs for materials and supplies are to be made explaining the price mechanism and key factors affecting price including price controls by the government. Cost estimates are to be divided in to ***foreign and local currency*** components are specified exchange rates. Some costs may vary with capacity utilization and production levels and others may be fixed. It is advisable to divide cost items to variable and fixed. Cost estimates may be expressed either as the cost per unit produced or in terms of a contain production level to conduct sensitivity analysis. The amounts resulting from environmental protection and pollution control measures should be included in indirect costs element in addition to over head costs at the level of service, administration and sales centers.

1. **Plant Capacity**

The term production capacity can be defined as the volume or number of units that can be produced during a given period. Plant capacity may be seen from two perspectives: ***Feasibility normal capacity*** (FNC) and nominal maximum capacity (NMC). FNC refers to capacity achievable under normal working conditions, taking into account not only the installed equipment and technical conditions of the plant, such as normal stoppages, down time, holidays, maintenance, tool changes, desired shift patterns and indivisibilities of major machines to be combined, but also the management system applied. Hence, the feasible normal capacity is the number of units produced during one year under the above conditions.

***Nominal Maximum Capacity (NMC)*** is the technically feasible capacity, which frequently corresponds to the installed capacity as guaranteed by the supplier of the plant. A higher capacity – nominal maximum capacity – may be achieved, but this would entail overtime, excessive consumption of factory supplies, utilities, spare parts and wear – and tear parts, as well as disproportionate production cost increases.

1. **Location and Site**

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 costal 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.

**Choice of Location**

In a feasibility study, a good starting – point for the final selection of a suitable location is the location of raw materials and factory supplies, or if the project is market oriented – the location of the principal consumption centers in relation to the plant.

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, optional 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 centre 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 can not 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 near by 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 locaitonal study should analyze the cost of alleviating environmental pollution to tolerable levels at alternative locations.

**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.

* + 1. **F. 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.)

1. **Environmental Aspects**

The feasibility study should include, a thorough and realistic analysis of the environmental aspects of the projects. Underestimation of the environment has resulted in negative consequences such as poor human health, social disruption, reduced productivity and ultimately, the undermining of development. When considering environmental aspects a number of issues may be taken into considerations, these may include the following:

* A clear understanding of the meaning of sustainability
* Assessment of the potential environmental impact of the project.
* Formulation of mitigation measure and a plan of action.

**Environmental Sustainability**

The world commission on Environment and Development (WGED) defined sustainable development as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs”. This definition emphasizes the idea of maintaining the economic value of environmental capital stock. Hence, the project formulators must seek to:

* + Maintain if possible increase the value of man made capital.
  + Avoid damage to critical natural capital at all costs.
  + Limit exploitation of renewable natural capital to sustainable level.
  + Internalize the cost of depleting non – renewable resources through some form of compensation measures.

**Environmental Impact Assessment**

Environmental impact assessment is part of the project planning process. Practically 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 wholly or partially. In a broader socio – economic evaluation of the feasibility of a project, environmental effects on the quality of life are considered along with other factors to determine if the overall effect of the project is positive, or to determine what modifications may be necessary to achieve a positive evaluation.

In principle, environmental impacts should be assessed on the basis of legal regulations and emission standards and guidelines established in the country where the project is located. Whereas, in countries, where no or only vague regulations and standards are defined, it may be advisable to anticipate a future serious environmental control measures, especially in the case of long – term projects.

Generally, externalities or side effects may bound to create environmental conflicts that might ultimately lead to compensation claims, substantial costs for purification and equipment, and possibly to the extent of the closure of the plant.

The general objective of environmental impact assessment in project analysis is to ensure whether the development projects are environmentally sound. This implies that the effects of the project over its estimated life do not unacceptably degrade the environment, and that no residual effects are anticipated that would contribute to long – term environmental deterioration. It is well known that the immediate and long – term health and welfare of people are linked to their natural, cultural and socio – economic environment. Because of this reason, and to promote the objective of incorporating the ideas and aspirations of the affected population in the decision process, right from the earliest stages and through out the project development cycle, public participation is desirable.

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 project for each of the alternative project designs.
* To incorporate in the designs 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 impacts qualitatively and quantitatively, as required, for the purpose of determining the overall environmental merit of each alternative.