M.B.A IV Semester

Course FM-10

PROJECTS PLANNING, ANALYSIS & MANAGEMENT

LESSONS 1 TO 14

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CHAPTER – 1
INVESTMENT OPPORTUNITIES: THE PRELIMINARY STEPS

STRUCTURE

1.0 Learning objectives:

1. To understand how to identify investment opportunities and select projects.
2. To understand project feasibility analysis

1.1 INTRODUCTION

First step in starting a new venture is the identification of a worthwhile project. Proper direction enables entrepreneurs and businessmen to achieve new heights. Otherwise they may face many obstacles in their entrepreneurial journey. Policies of the government and the appropriate laws of the land may influence the desirability or otherwise of a project. It is therefore, very crucial to the entrepreneur to identify projects which are viable financially, economically, commercially, environmentally, socially and politically. An attempt has been made in this chapter to analyze the various aspects of project identification. Specifically this lesson covers the following aspects of project management.

- ❖ Identification of investment opportunities
- ❖ Government regulatory framework

1.2 IDENTIFICATION OF INVESTMENT OPPORTUNITIES

Investment opportunities are to be explored by the entrepreneurs by studying various aspects of business environment. Theoretically, an entrepreneur has an infinitely wide choice with respect to a project. The important dimensions of choice are: product-services, market, technology and

equipment, scale of production, location, incentives, and time phasing. The task of indentifying a feasible and promising project is somewhat difficult. Moreover it is interrelated with the government policies, infrastructural development and skill of people. Project identification is concerned with collection, compilation and analysis of economic data for the eventual purpose of locating possible opportunities for investment and with the development of such opportunities.

According to Peter F. Drucker, projects can be divided into three categories: additive, complementary and breakthrough. Additive opportunities, which enable the decision-maker to better, utilize the existing resources with out in any way involving a change in the character of business. These opportunities, involve minimum disturbance to the existing state of affairs and hence at the least risk. Complementary opportunities involve the introduction of new ideas and such do lead to a certain amount of change in the existing structure. Breakthrough opportunities, on the other hand involve fundamental change in both the structure and character of business. These opportunities involve minimum disturbance to the existing state of affairs and hence the least risk. The element of risk is greater in the case of complementary opportunities and is greatest in the case of breakthrough opportunities. As the element of risk increases, it becomes more and more important to precisely define the scope and nature of the project objective and to select best possible approach so as to minimize both resource consumption and risk and to optimize the return or gains.

1.3 SOURCES OF PROJECT IDEAS

1. Observation

Observation is the first thing which creates the path to deeper understanding of any subject. Human mind has an infinite capacity to observe and to innovate and deduct. The observant mind continuously comes across situations that can be utilized to develop investment opportunities. The observation may be made during the course of one's routine occupation or otherwise. The dearth of a particular article or services may for instance lead to the development of an industry, which can provide the article or service in short supply. The availability of a specified type of raw material or skill may lead to yet another type of industrial activity. Observation of the existing processes can sometimes lead to new opportunities and financially beneficial project ideas. The process of deductions is on many occasions used to supplement and rationalize project ideas based on pure observation. In innovations units it often becomes necessary to depend upon the deductive process for the development of new approaches to the existing problems.

2. Trade and professional magazines

Tread and professional magazines provide a very fertile source of project ideas. The statistics and information given by these magazines and reports of professional bodies often reveal opportunities, which can be eventually developed into investment proposals. It is very important for every person who is involved in the development of new investment opportunities to remain in touch with the latest development in his own field of specialization. It is also necessary for him to keep in touch with latest developments in other fields which may be horizontally or even vertically liked with his own line of specialization. Study of technical and professional literature also stimulates thinking and help in the process of development of new project ideas.

3. Bulletins of Research Institutes

Bulletins of research institutes are also an important source of information for new project ideas and opportunities. These bulletins generally give the broad outlines of the new processes or products developed by research institution.

4. Documents published by the Government

In most developing countries where planed development has been accepted as an approach towards the removal of poverty, the plan document published by the Government provides a very useful source of project ideas. The plan document generally analyses the existing economic situation in a country and also pinpoints the investment opportunities, which fit into the overall planning effort. Considerable information can therefore, be gathered from the plan document. Departmental publications of various department of Government also provide useful information, which can help in the development of new project ideas.

The project idea is a user-friendly concept of what a project should be like. It is the raw expression of the desire of the project sponsoring body to achieve something. The exact form in which the project idea is expressed is immaterial. In order to avoid unnecessary communications between the project sponsoring body and the project formulation team, the project idea should indicate broad objectives of the sponsor and limit these in time, space function and structure. In case no limitation is envisaged, the sponsoring body should state so and leave the project formulation team in no doubt about it.

1.4 CRITERIA FOR SELECTING A PARTICULAR PROJECT

After gathering a large number of project profiles the entrepreneur should consider the following criteria for selecting a particular project:

1. Investment size

Professional manager, who have worked in multinational companies, should think of starting medium-sized units only. Those who do not possess any prior experience should start with small ventures.

2. Location

A new entrepreneur should locate his project to the extent possible in and around the state headquarters. There are many backward areas around cites. It is necessary to have such a location so to attract competent managers. This will also facilitate liaison with the state electricity Board, State Industrial development Corporation and various other agencies. Tax concession available for locating the plant at a particular place also be taken care of.

3. Technology

The first project should not be a product, which requires high technology, necessitating foreign technical collaboration. It is better to go in for product with a proven technology that is indigenously available. It makes life easier to begin with.

4. Equipment

The entrepreneur should select the best equipment as per advice of experienced technical consultants. He should not compromise on quality of the equipment. Many entrepreneurs enter into some sort of a deal with the equipment manufacturers for a “kick-back” and in the process sacrifice quality.

5. Marketing

It is not advisable to get into a project particularly the first, which would mean survival amidst cut-throat competition involving direct selling to the ultimate consumer. One should go in for products, which have unfulfilled demand.

1.5 SCANNING OF BUSINESS ENVIRONMENTS AND IDENTIFYING A PROJECT

Scanning of business environments is the first step in the process of identifying a project. One major aspect while choosing a project idea should be to ascertain of the marketability of the product proposed to be manufactured, its general use, industries which use it, its end- use and its buyers. You should, therefore, study the demand and supply of the product over the last few years to estimate its future demand based on the past trend. While doing so it would be necessary to take into consideration the anticipated changes in fashions, technology and level of income of the people. The study should take into account the demand and supply of the product.

Although it is difficult to arrive at a prices forecast for demand and supply of a particular product, especially since reliable and up-to-date information is difficult to obtain. On the basis of the available data should be possible to decide on future prospects of the item proposed to be selected by you. Towards this, capacity utilization of the existing units could be taken as a broad indication of market for the product. Similarly, underutilization of the existing capacity could be taken as signal for little or no scope for setting up a new unit.

1.6 IMPORTANCE OF PROJECT IDENTIFICATION

Project identification is often of great importance for the following reasons:

1. They become the catalytic agents of economic development.
2. They initiate the process of development in terms of employment and income generation.
3. They have beneficial consequence, which are long-term in nature.
4. Projects provide the framework of the future pattern of activities and services of the enterprises.
5. Projects usually involve substantial financial outlays.
6. They also initiate development of basic infrastructure and environment.
7. Project commitment cannot be easily reversed.
8. Project identification brings the necessary changes in society in course of time.
9. Project accelerates the process of socio-cultural development.

1.7 THE ENTERPRISES DEVELOPMENT CENTER

The integrated method for facilitating the formation of new enterprises is known as the enterprises development centre. This brings together the key inputs face to face with the new generation entrepreneurs. It comprises of four principle components, viz., (1) the entrepreneurship centre; (2) the venture capital exchange; (3) the innovation centre; and (4) the incubation centre.

The entrepreneurship centre conducts research and an appropriate environment to facilitate the setting up of new enterprises. The venture capital exchange provides the needed seed capital for new enterprise. The innovation centre provides technology evaluation, entrepreneurial assessment, project planning, evaluation, commercial feasibility studies, and the product development assistance to entrepreneurs. The incubation centre provides the needed impetus to new enterprises to succeed and grow.

1.8 PROJECT FEASIBILITY ANALYSIS

A Project feasibility analysis includes market analysis, technical analysis, financial analysis and social profitability analysis. Although every feasibility analysis is different and tailored to suit the product, its goal is to identify the existing strengths and weakness of the project.

The starting point of a project analysis is the establishment of objectives to be attained. The next stage is the pre-selection stage- the advisability of having an in depth study. The analysis stage consists mainly of three factors-markets, technical and financial analysis. A market analysis is a method of screening projects ideas as well as means of evaluating a project's feasibility in terms of the market. A market analysis should cover the following areas:

- A brief market description the market area, methods of transportation, existing rates of transport, channels of distribution, and general trade practices.
- An analysis of past and present demand, determination of quantity value of consumption and identification of the major consumers of the product.
- An analysis of past and present supply, broken down as source (whether imported of domestic), as well as information to assist in determining the competitive position of the product, such as selling prices, quality and marketing practices of competitors.

The technical analysis for a project feasibility study established whether the project is technically feasible or not, and whether it offers basis for the estimation of costs. Moreover, it provides an opportunity for a consideration of the effect of various technical alternatives on employment, ecology, infrastructure demands, capital service, support of other industries, balance of payments and other factors. A technical analysis should review the techniques of processes to be applied and should incorporate:

1) A description of the product, including specification relating to its physical, mechanical and chemical properties, as well as the uses of the product.
2) A description of the selected manufacturing process, showing detailed flowcharts and presenting alternative which may have been considered and the justification for the adoption of the selected process.
3) A determination of the plant size and production schedule, which includes the expected volume for a given time period on the basis of start-up and technical factors.
4) Selection of machinery and equipment, including specifications, equipment to be purchases and its origin, quotations from suppliers, delivery dates, terms of payment, and a comparative analysis of alternatives in term of cost, reliability performance and spare parts availability.
5) Identification of plant's location and as assessment of its desirability in terms of its distance from raw material source and markets. For a new project, this part may include a comparative study of different sites, indicating the advantages and disadvantages of each.
6) A design of the plant layout and an estimate of the cost of the erection of the proposed building and land improvements.
7) A study of the availability of raw materials and utilities including a description of physical and chemical properties, quantities needed, current and prospective costs, terms of payment, location and sources of supply, and continuity of supply.

8) An estimate of labour requirements including a detailed break-down of direct and indirect labour requirements, and the supervision required for the product.
9) A determination of the type and quantity of waste to be disposed of, together with a description of the waste disposal method, its costs, and the necessary clearance from proper authorities.
10) An estimate of the production cost of the project.

In the financial analysis of this feasibility study, the emphasis is on the preparation of financial statements, so that the project may be evaluated in terms of the different measure of commercial profitability followed by the magnitude of financing which requires the assembly of the market and also technical cost estimated in various Performa statements. If it is necessary to have more information on which to base an investment decision, a sensitivity analysis or possibly a risk analysis may be conducted. This financial analysis should include:

a. For projects that involve new companies, statements of totals projects cost, initial capital requirements, and cash flows relative to the project schedule. For all projects financial projection for future time periods, including income statements, cash flows, and balance sheets.
b. For all projects, supporting schedules for financial projection, stating the assumption made as to the collection period of sales inventory levels, payments periods of purchases and expenses, and the element of production cost selling, administrative and financial expenses.
c. For all projects, a financial analysis showing returns on investments, return on equity, break-even volume, and price analysis.
d. For all project, if necessary, a sensitivity analysis to identify items which have a substantial impact on profitability or possibly a risk analysis.

For all small entrepreneurs, the studies conducted during the analysis stage of the project provide the material for an assessment. If positive results are obtained, the entrepreneur, in seeking finance, will want to prepare an investment proposal. The planners or government officials, however, having obtained positive conclusions from the economic feasibility study will want to evaluate the element of social profitability.

The purpose of the investment or loan application is to convince a lender (financial institution) that the project is a desirable investment; that it not only possesses the potential but that the proposed management team has the capability to achieve the potential. The investment proposed normally contains:

1) General information on the product, company, history, the nature of the industry and the reputation and qualification of the exiting or proposed management.
2) A description of the project, which usually consist of extract from economic feasibility studies and includes information on such items as market, production, selected manufacturing methods (with detailed indication of the cost of equipment and operational expenses) and a financial statements.
3) Miscellaneous information, such as the steps taken for the implementation of the project and the qualification of the technical envisaged or selected.

It can thus be said that project identification is an important dimension of a successful entrepreneurship. Also, more important is its classification, which goes towards the emergence of three dimension, inputs and social costs and benefits and finally economic development of the country. Thus having regard to the importance of proper project identification, due care and diligence should be exercised in this function.

1.9 SELF-CHECK EXERCISE

1. According to whom projects can be divided into three categories: additive, complementary and breakthrough?
2. Project commitment can be easily reversed? True OR False.
3. Should person with no prior experience go for bigger projects OR smaller projects.
4. ——————is the first step in the process of identifying a project.
5. Scale of production is an important dimension of choice related to identification of _____

1.10 SUMMARY

Exploring and identifying the investment opportunities is the very first step of starting any business venture. One needs to see from where the project ideas can be procured and assess the feasibility of the proposed project ideas. Examining the business environment and scanning it is crucial for the long term survival of any business. Understanding of the business environment is vital because of its dynamic nature.

1.11 GLOSSARY

Business Environment: The internal and external factors which affect the functioning of a business.

Financial Analysis: Analysing the financial aspects of any business or a project.

Project feasibility: The possibility of success of a project.

1.12 ANSWERS TO SELF-CHECK EXERCISE

1. Peter F. Drucker
2. False
3. Smaller Projects
4. Scanning of business environment
5. Projects

1.13 REFERENCES/SUGGESTED READINGS

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1.14 TERMINAL QUESTIONS

1. Describe briefly the aspects of business environment that need to be monitored as well as the dimensions along which a firm may appraise its strengths and weakness for identifying investment opportunities.
2. Discuss the criteria for selecting a particular project.

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CHAPTER-2
GENERATION OF PROJECT IDEA

STRUCTURE

2.0 LEARNING OBJECTIVES:

1. To understand how project ideas are generated.
2. To learn about the screening of project ideas.

2.1 INTRODUCTION

Proper project idea generation and screening is the utmost importance. So due attention is required while screening alternate projects, this lesson is devoted to the following aspects:

Corporate Appraisal;
Scouting for project ideas;
Preliminary screening; and
Project Rating Index

2.2 CORPORATE APPRAISAL

For the purpose of identification of investment opportunities a reasonable appraisal of the strength and weakness of the company should be made. Following are the broad areas in terms of a company's strength and weaknesses:

Marketing and distribution

Marketing and distribution of the products and services of the prospective project is an important aspect to be given due consideration in order to ensure the success of the project. Following dimension of this project should be specifically considered;

- ❖ Market image
- ❖ Product line
- ❖ Distribution network
- ❖ Brand loyalty

Production and Operation

Like marketing, production and operations of the prospective project should also be properly evaluated. More impartially following aspect of this should be given due consideration;

- ❖ Plant capacity and utilization thereof
- ❖ Degree of vertical integration
- ❖ Location of the plant
- ❖ Different components of cost of production and operation

Research and development

Research and development is the sin qua of the success of project. Specifically the following areas should be given due attention.

- ❖ Research capabilities of the firm
- ❖ Track record of new product developments
- ❖ Laboratories and testing facilities
- ❖ Coordination between research and operation

Corporate resources and personnel

Corporate resources and the human resources of the enterprise should also be considered while examining a project. Specifically the following areas should b given due attention.

- ❖ Corporate image
- ❖ Clout with government and regulatory agencies
- ❖ State of industrial relations

Finance and Accounting

Finance is the lifeblood of a business. Accounting and financial matters should be given due attention in this regard. Specifically the following areas should be given due attention in this respect.

- ❖ Financial leverage and borrowing capacity
- ❖ Cost of capital
- ❖ Tax situation
- ❖ Relations with shareholders and creditors
- ❖ Accounting and control system
- ❖ Cash flows and liquidity

2.3 SCOUTING FOR PROJECT IDEAS

Good project ideas are the key to success. An effort should be made to tap wide variety of source to identify them. Following suggestions can be made in this regard.

Analysis the performance of Existing Industries

For having an insight into good project ideas a study of existing industries in terms of their profitability and capacity utilization is helpful. The analysis of profitability and break-even level of various industries indicates promising investment opportunities. An examination of capacity utilization of version industries provides information about the potential for further investment.

Examination of the inputs and outputs of various industries

An analysis of the inputs required for various industries many throw up project ideas. Opportunities exist when:

1. Materials, components and other supplies are presently being procured from distant sources with attendant time leg and transportation costs, and
2. Several firms produce internally some components/parts, can be supplied at a lower cast by a single manufacturer who can enjoy economic of scale.

   Similarly, a study of the outputs of the existing industries may reveal opportunities for adding value through further processing of main outputs, by-products, as well as waste products.

Review Imports and Exports

A time series analysis of import statistics is helpful in understanding the trend of imports of various good and the potential for import substitution. Likewise, an examination of export statistics is useful in learning about the export possibilities of various products.

Study Plan Outlays and Government Policy for Industries

The study of government policy and the direction of public expenditure can unfold numerous investment opportunities. The geographical areas, which the government as a matter of public policy wants to develop can be source of promising project ideas.

The government plays a very important role in our economic. “Its proposed outlays in different sector provide useful pointers toward investment opportunities. They indicate the potential demand for goods and services required by different sectors.

A very valuable source of information to estimate the scope for further investment is the Guideline to industries published annually by the Department of industrial Development, Government of India. This publication provides information about the structure and location, production performance, licensed and installed capacity, export, and future scope of various industries.

While the governmental projections are often a good starting point; they must be viewed with some caution. Often they are not well grounded. It is helpful to remember the words of Alvin Hanson: “No one reading the plans can fail to be impressed by the frequent unrealism of these assumptions. So much appears to be contingent on the realization of the unrealizable.”

Consideration of the suggestions of Fanatical Institutions and Developmental Agencies

In a bid to promote development of industries in their respective states, state financial corporations, state industrial development corporations, and other developmental bodies conduct studies, prepare feasibility reports, and offer suggestions to potential entrepreneurs. The suggestions of these agencies are helpful in identifying promising projects.

Investigate Local Materials and Resource

A search for project ideas may begin with an investigation into local resources and skills. Various ways of adding value to locally available materials may be examined. Similarly, the skill of local artisans may suggest products that may be profitably produced and marketed.

Analysis of Economic and Social trends

A study of economic and social trends is helpful in projecting demand for various goods and services. Changing economic conditions and consumer preferences provide new business

opportunities. For example, a greater awareness of the value of the time is dawning on the public. Hence, the demand for timesaving products like prepared food items ovens, and powered vehicles has been increasing. Another change can be seen is the incising desire for leisure and recreational activates. This has caused a growth in the market for recreational products and services.

Study New Technological Developments

There is a large network of research in India under the umbrella of the council of scientific and industrial Research and other bodies. New products for new processes and technologies for existing product developed by research laboratories may be examined for profitable commercialization.

Draw Clues Consumption Abroad

Entrepreneurs willing to take higher risk may, identify projects for the manufacture of products or supply of services that are new to the country but extensively used abroad. Automatic vending machines, entertainment parks, pre-fabricated houses, and fast food restaurants are example of projects belonging to this category.

Explore the Possibility of reviving sick Units

Industrial sickness is rampant in the country. There are innumerable units, which have been characterized, as sick. These units are either closed or face the prospect of closure. Significant proportion of sick units, however, can be nursed back to health by sound management, infusion of further capital and provision of complementary inputs. Hence, there is a fairly good scope for investment in this area. Such investments typically have a shorter gestation period because one does not have to begin from scratch. Indeed, in many cases, marginal efforts would suffice to revive such units.

Identify Unfulfilled Psychological Needs

For well-established, multi-brand product groups like bathing soaps, detergents, cosmetics, toothpastes, the question to be asked is not whether there is an opportunity to manufacture something to satisfy an actual physical need but whether there are certain psychological needs of consumer's which are presently unfulfilled. To find out whether such an opportunity exists, the technique of spectrum analysis is useful. This analysis is done in the following manner:

i. Important factors influencing brand choice are identified.
ii. Existing brands in the market are positioned on a continuum in respect of the factors identified step (1).
iii. Identification of Gaps, which exist in relation to consumer psychological, needs.

Attend Trade Fairs

National and international trade fairs provide an excellent opportunity to get to know about new products and developments. These fairs also provide an opportunity to know the changes in the field of technology.

Stimulate creativity for Generating New product Ideas

Thinking along the following lines may generate new product ideas: Modification, rearrangement, Reversal, Magnification, Reduction, Substitution, Adaptation and Combination.

2.4 PRELIMINARY SCREENING

By using the suggestion made in the preceding section, it is possible to develop a long list of project ideas. Some kind of preliminary screening is required to eliminate ideas, which prima facie are not promising. For this purpose, the following aspects may be looked into:

- ❖ Compatibility with the promoter
- ❖ Consistency with governmental priorities.
- ❖ Availability of inputs
- ❖ Adequacy of market
- ❖ Reasonableness of cost
- ❖ Acceptability of risk level

Compatibility with the promoter

The idea must be compatible with the interest, personality, and resources of the entrepreneur. According to Murphy, a real opportunity has three characteristics:

i. It fits the personality of the entrepreneur. It squares with the abilities, training, and productivities.
ii. It is accessible to him and
iii. It offers him the prospect of rapid growth and high return on invested capital.

Consistency with Government priorities

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

Availability of Inputs

The resources and inputs required for the project must be reasonably assured. To assess this, the following questions need to be answered:

- ❖ Are the capital requirements of the project within manageable limits?
- ❖ Is the technical know- how required for the project obtainable?
- ❖ Are the raw materials required for the projects available domestically at a reasonable cost?
- ❖ If raw materials have to be imported, will there be problems?
- ❖ Is the power supply for the project reasonably obtainable from external sources and captive power sources?

It may be noted here that Indian business has been traditionally faced with:

i. Shortages of certain inputs like power, foreign exchange, and important raw materials, and
ii. Fluctuating supplies of agriculture raw materials like cotton, Jute, and oil seeds.

Of course, in recent times of situation has improved in some ways:

I. Power generation has increased significantly.

II. Foreign exchange is now available more easily, and

III. Supplies of certain basic industries raw materials have been augmented substantially.

Adequacy of the market

The size of the present market must offer the prospect of adequacy sales volume. Further, there should be a potential for growth and a reasonable return on investment. To judge the adequacy of the market the following factors have to be examined.

- ❖ Total present domestic market
- ❖ Competitors and their market shares
- ❖ Export markets
- ❖ Quality-price profile of the product vis-a-vis competitive products
- ❖ Seles and distribution system
- ❖ Projected increases in consumption
- ❖ Barriers to the entry of new units
- ❖ Economic, social, and demographic and trends favourable to increased consumption
- ❖ Patent protection

It may be emphasized there that barring reversionary aberrations, the demand for most of the products in India has been growing secularly. This trend would continue because of the low levels of per capita consumption in India. Fortunately, from the point of view of entrepreneurs, the Indian economy unlike most developed, western economics is not a share shift economy wherein the growth in demand for a product is likely to be at the expense of the demand for others.

Reasonableness of cost

The cost structure of the proposed project must enable it to realize an acceptable profit with a competitive price. The following should be examined in this regard.

- ❖ Costs of material inputs
- ❖ Labour costs
- ❖ Factory overheads
- ❖ General administration expense
- ❖ Selling and distribution costs
- ❖ Service costs Economies of scale

Acceptability of Risk Level

The desirability of a project is critically dependent on the risk characterizing it. In the assessment of risk a difficult task, indeed-the following factors should be considered:

- ❖ Vulnerability to business cycles
- ❖ Technological changes

- ❖ Competition from substitutes
- ❖ Competition from imports
- ❖ Governmental control over price and distribution

2.5 PROJECT RATING INDEX

When a firm is evaluating a large number of project ideas regularly, it may be helpful to streamline the process of preliminary screening. For this purpose, a preliminary evaluation may be translated in to a project-rating index. The steps involved in determining the project-rating index are as follows:-

1. Identify factors relevant for project rating.
2. Assigning weights to these factors (the weights are supposed to reflect their relative importance).
3. Rate the project proposal on various factors, using a suitable rating scale.
4. For each factor multiply the factor rating with the factor weight to get the factor score.
5. Add all the factor score to get the overall project-rating index.

Once the project-rating index is determined, it is compared with a pre-determined hurdle value to judge whether the project is prima facie worthwhile or not.

2.6 ELF CHECK EXERCISE

1. Marketing and _____is a key area of a company to be appraised for finding its strength and weaknesses.
2. _____is the lifeblood of a business.
3. To identify unfulfilled psychological needs of consumers _____technique is used.

2.7 SUMMARY

It is imperative to give due attention to proper screening of project ideas. Effort should be made to identify those projects which appear to be prima-facie viable and promising. Once such projects have been identified, they should be subjected to rigorous screening. It is often taken for granted that there is an abundance of good and worthwhile projects, which can be identified rather easily. However, note that choosing good projects is akin to selecting under-valued securities using fundamental analysis. For this purpose the effect of various affecting the viability of the project should be studied and evaluated.

2.8 GLOSSARY

Corporate Appraisal: Overall assessment of a company's operations

Brand loyalty: Positive image towards a brand and dedication to purchase it repeatedly

Import substitution: Replacing foreign imports with domestic production

2.9 ANSWERS TO SELF-CHECK EXERCISE

1. Distribution
2. Finance
3. Spectrum analysis

2.10 REFERENCES/SUGGESTED READINGS

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2.11 TERMINAL QUESTIONS

1 What suggestion helpful in scouting for project ideas?

2 What key issue would you examine in a preliminary screening exercise?

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CHAPTER – 3
MARKET AND DEMAND ANALYSIS

STRUCTURE

3.0 LEARNING OBJECTIVES:

1. To understand the collection of secondary information.
2. To understand how a market survey is done.
3. To study the features of market.

3.1 INTRODUCTION

In almost all cases, the first step in project analysis is to estimate the potential, size of the market for the product proposed to be manufactured (or service planed to be offered) get an idea about the marker share that is likely to be captured. Put differently, market and demand analysis is concerned with answering two broad questions. What is the likely aggregate demand for the product/service? What share of the market will the proposed project enjoy?

These are very important, yet difficult, in project analysis Intelligent and meaningful answers to them call for an in-depth study and assessment of various factors like patterns of consumption growth , income and price elasticity of demand, composition of the market, nature of competition, availability of substitutes, reach of distribution channels, so on and so forth.

Given the importance of market and demand analysis, it should be carried out in a orderly and systematic manner. This lesson is devoted to the following aspects of market and demand analysis.

- ❖ Situational analysis and specification of objectives of market and demand analysis.
- ❖ Collection of secondary information
- ❖ Conduct of market survey
- ❖ Features of the market

3.2 SITUATIONAL ANALYSIS AND SPECIFICATION OF OBJECTIVES OF MARKET AND DEMAND ANALYSIS

In order to get a "feel" for the relationship between the product and its market, the project analyst may informally talk to customer, competitors, middleman, and others in the industry. Wherever-possible, he may look at the experience of the company to the learn about the performance and purchasing power of customers, actions, land strategies of competitors, and practices of the middleman.

If such a situational analysis generates enough data to measure the market and get a reliable handle over projected demand and revenues a formal study need not be carried out, particularly when cost and time consideration so suggest. In most cases, of course, a formal study of market and demand is warranted. To carry out such a study, it is necessary to spell out its objectives clearly and comprehensively. Often this means that the intuitive and informal goals that guide situational analysis need to be expended and articulated with greater clarity. A helpful approach to spell out objectives is to structure them in the form of questions. Of course, in doing so, always bear in mind how the information generated will be relevant in forecasting the overall market demand and assessing the share of the market the project will capture. This will ensure that questions not relevant to market and demand analysis will not be asked unnecessarily:

3.3 COLLECTION OF SECONDARY INFORMATION

In order to answer the questions listed while delineating the objectives of the market study, 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 market and demand analysis. It indicates what is known and often provides leads and clues for gathering primary information required for further analysis. This section looks at the secondary information and the following at the information.

General Sources of Secondary information

The importance sources of secondary information useful for market and demand analysis in India include, Census of India, National sample survey plan Reports, Statistical abstract of the Indian Union, Industries, and Annual Reports of the Development wing. Ministry of Commerce and Industry, Annual Bulletin of statistics Exports and Imports, Techno-Economic Surveys, Industry potential Surveys, The stock exchange Directory, Monthly studies of production of selected industries, Monthly Bulletin of Reserve Bank of India and the publications of Advertising Agencies.

Evaluation of Secondary Information

While secondary information is available economically and readily (Provided the market analyst is able to locate it), The market analyst should seek to know:

- What was the objective for collecting the information?
- Who gathered the information?
- When was the information gathered?
- When was it published?

- How representative was the period for which the information was gathered?
- What was the target population?
- How was the sample chosen?
- How representative was the sample?
- How satisfactory was the process of information gathering?
- What was the degree of sampling bias and non-response bias in the information gathered?
- What was the degree of misrepresentation by respondents?
- How accurately was the information edited, tabulated, and analyzed?
- Was statistical analysis properly applied?

3.4 CONDUCT OF MARKET SURVEY

Secondary information, though useful, often does not provide a comprehensive basis for market and demand analysis. It must be supplemented with primary information gathered through a market survey, specific to the project being appraised.

The market survey may be a census survey or a sample survey. In a census survey the entire populations covered. Census surveys are employed principally or intermediate goods and investment goods when such goods are used by a small number of firms. In other cases, a census survey is prohibitively costly and may sample survey. In such a survey a sample of the population is connected/ observed and relevant information is gathered. On the basis of such information, inferences about the population may be drawn.

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

- Total demand for the product and rate of growth of demand
- Demand in different segment of the market
- Motives for buying.
- Attitudes toward various products
- Socio-economic characteristics of buyers
- Income and price elasticity of demand
- Purchasing plans and intentions
- Satisfaction with existing products
- Unsatisfied needs
- Distributive trade practices

Steps in a sample survey

A sample survey involves the following steps;

1. Definition of 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 characteristic. For example, all television owners may be divided into three to four income brackets.

2. Selection of 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 advantages and limitations The sample size, other things being equal, has a bearing on the reliability of the estimates. The larger- the sample size, the greater the reliability.

3. Development of questionnaire for collection of information

The questionnaire is the principal instrument for eliciting information from the sample of the respondents. The effectiveness of the questionnaire as a device for electing the desired information depends on its length, the type of questions, and the wording of questions. Developing the questionnaire requires a thorough understanding of the product/service and its usage, imagination, insights into human behaviour, appreciation of subtle linguistic nuances, and familiarity with the tools of descriptive and inferential statistic to be used later for analysis.

4. Recruit and Train the Filed Investigators

Recruiting and training of filed investigators must be planned well since 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. Investigators involved in industry and tread market survey need intimate knowledge of the product and technical background particularly of products bases on sophisticated technologies.

5. Collection of Information from the sample of Respondent

Respondents may be interviewed personally, telephonically or by mail or obtaining information. Personal interviews ensure a high rate of response. They are, however, expensive and likely to result in biased responses because of the presence of the interviewer. Mail survey economical and evoke fairly candid responses. The response rate however, is often low. Telephonic interviews, common in western countries, have very limited applicability in India because telephone tariffs are high and telephone connections few.

6. Scrutinize the Information Gathered

Information gathered should be thoroughly scrutinized to eliminate data which is internally inconsistent and which is of dubious validity.

7. Analyze and Interpret the Information

Information gathered in the survey needs to be analyzed and interpreted with dew care. After tabulating it as per a plan of analysis, statistical Investigation may be conducted, wherever possible and necessary.

Result of data bases on sample survey will have to be extrapolated to the target population. For this purpose, appropriate inflationary factors, bases on the ratio of the size of the target population to the size of the sample studied, will have to be used.

It may be brought into notice that the results of the market survey can be vitiated by:

- Non-representativeness of the sample
- Imprecision and inadequacies in the questions,
- Failure of the respondents to comprehend the questions,

- Deliberate distraction in the answer s given by the respondents,
- Inept handling of the interviews by the investigators,
- Cheating on the part of the investigators,
- Slip-shod scrutiny of data, and
- Incorrect and inappropriate analysis and interpretation of data.

Some problems

In a country like India a market researcher has to confront the following problems at the time of conducting the survey.

Heterogeneity of the country- Since it is not possible to cover all the states in a all-India survey, the country has to be divided into broad territories going, beyond the state boundaries. However, the heterogeneity of the country makes this task difficult. Presently the research agencies seem to divide the country the way they think it is appropriate. This causes problems in comparing the finding of different research agencies.

Multiplicity of Languages- Related to the above difficulty is the problem of multiplicity of languages comforted by a research agency interested in conducting an all-India survey.

Design of questionnaire- Scaling techniques, commonly recommended in marketing research literature; involve a 5-point scale or a 7-point scale. Such refunded scales are not easily amenable to translation in regional languages. More important, they are often not comprehensible to a vast majority of respondents who may lack the education and sophistication to understand them. Hence when refined scaling techniques are used, answers tend to be erratic and inconsistent. It is perhaps desirable to rely more on open-ended questions and less on pre-coded questions on definite scales.

3.5 FEATURES OF THE MARKET

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

- ❖ Effective demand in the past and present
- ❖ Breakdown of demand
- ❖ Price
- ❖ Methods of distribution and sales promotion
- ❖ Consumers
- ❖ Supply and compaction
- ❖ Government policy

To assertion the effective demand in the past and present, the starting point typically is apparent consumption, which is defined as:

Production + Imports-Exports-changes in stock level

The figure of apparent consumption has to be a adjusted for consumption of the product by the products are the effect of abnormal factors. The consumption series, after such adjustments, may be obtained for several years.

In a competitive market, effective demand and apparent consumption are equal. However, in most of the 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. Admittedly, this is often a difficult task.

Breakdown of Demand

To get a deeper insight into the nature of demand, the aggregate (total) market demand may be defined by

I. Nature of product

II. Consumer group, and

III. Geographical division

Nature of product: One generic name often subsumes many different products: steels covers sections, rolled products, and various semi-finished products; commercial vehicle cover, trucks and buses of various capacities; so on a so forth.

Consumer Groups: Consumer of a product may be divided into industrial consumers and domestic consumers. Industrial consumers may be sub-divided industry wise. Domestic consumers may be further divided into different income groups.

Geographical Division: A geographical breakdown of consumers, particularly for products, which have a small value-to-weight relationship, and products, which require regular, efficient after-sales service, is helpful.

Why segmental analysis reburies? Segmental information is helpful because the nature of demand teds to vary from one segment to another (the demand from consumers in high income brackets may not be sensitive to price variations whereas the demand from consumers in low income brackets may be very sensitive to price variations) and deferent marketing strategies may be appropriate to different market segment.

Price

Price statistics must be gathered along with statistics pertaining to physical questions. It may be helpful to distinguish the following types of prices: (1) Manufacture's price quoted as FOB (free on board) price or CIF (cost, insurance, and freight) price, (2) Landed price for imported goods. (3) Average wholesale price and (4) average retail price.

Method of Distribution and Sales Promotion;-

The method of distribution may vary with the nature of product. Capital goods, industrial raw materials or intermediates, and consumer products tend to have differing distribution channels. Further, for a given a product, distribution methods may vary. Likewise, methods used for sales promotion (advertising, discounts, gift schemes, etc.) may vary from product to product.

The methods of distribution and sales promotion employed presently and their rationale must be specified. Such a study may explain certain patterns of consumption and highlight the difficulties that may be encountered in marketing the proposed products.

Consumers

Consumers may be studied along two dimensions namely (1) demographic and sociological and (2) attitudinal as follows:

(1) Demographic and sociological

The consumers of a company should be categorized into the following classes on the basis of demographical and sociological considerations:

1. Age
2. Sex
3. Income
4. Profession
5. Residence
6. Social background

(2) Attitudinal

On the basis of attitude the consumers of a company must be classified into following categories

1. Performances
2. Intentions
3. Habits
4. Attitudes
5. Responses

Supply and Competition

It is necessary to know the existing sources of supply and weather they are foreign or domestic. Computation from substitutes and near-substitutes should also 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

The role of government in influencing the demand and market for a product may be significant. Governmental plans, polices, legislations, and orders, which have a bearing on the market and demand of the product under examination, should be spelt out. 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 subsides/penalties of various kinds.

3.6 SELF-CHECK EXERCISE

1. Census of India is a general source of Primary information or Secondary Information?
2. Can the market survey be a sample survey or census survey?
3. _____is the principal instrument for eliciting information from the respondents.

3.7 SUMMARY

Considering the important of market and demand analysis, it should be carried out in a orderly and systematic manner. The key step in such analysis are (1) situational analysis and specification of objectives. (2) Collection of secondary information. (3) Conduct of market survey, and (4) stipulation of the features of the market. The project analyst may do an informal situational analysis, which in turn may provide the basis for a formal study. For propose of market study,

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. While secondary information is available economically, its reliability, accuracy, and relevance for the porous under consideration must be carefully examined. Secondary information, though useful, often does not provide a comprehensive basis for market and demand analysis. Therefore effort should be made to collect primary information if possible.

3.8 GLOSSARY

Situation Analysis: assessment of an organization's current and future strengths, weaknesses, opportunities and threats.

Effective Demand: where demand and supply are equal

3.9 ANSWERS TO SELF-CHECK EXERCISE

1. Secondary information
2. Sample survey
3. Questionnaire

3.10 REFERENCES/SUGGESTED READINGS

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3.11 TERMINAL QUESTIONS

1. How would you evaluate secondary information?
2. Discuss the key steps in a sample survey.

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CHAPTER-4
DEMAND FORECASTING

STRUCTURE

4.0 LEARNING OBJECTIVES

1. To get familiar with demand forecasting.
2. To learn different methods of demand estimation.

4.1 INTRODUCTION

One of the most important tasks of firms is to study the demand for their products and services. Knowing the demand for its product is significant activity for the firm. The firm must know what will be the demand for its product so that its product so that it plans proper capacity creation and avoid overproduction or underproduction. Such information will enable the firm not only to avoid overproduction or underproduction, but also to determine its price policy, promotional policy, etc. Then only it can secure optimum sales, or optimal revenue of maximum profit. Such information

about the current demand for a firm's product is called Demand Estimation. Here demand data is collected for a short period, usually a year or less. Demand estimation may be defined as the process of finding current value of demand of various values of prices and other determining variable. Demand estimation for the firm's product is for a short period.

4.2 DEMAND FORECASTING (LONG PERIOD)

The firm may not be much interested in short-term demand estimation. It may be interested in production planning, new product development, investment for expansion or in new schemes, etc. It may desire to plan for long-term financial investment and for long-term manpower equipments. Here, the decisions have effects over a long period of time. It takes time for a firm to be erected. The actual production starts after a considerable period of time, say, two years or in some cases even ten years, e.g. large steel plants require ten to fifteen years for construction. It is, therefore, necessary to forecast demand five years hence and so on. This is called demand forecasting. Demand forecasting may be defined as the process of finding value of demand in future time periods. Demand forecasting is for a long period.

4.3 OBJECTIVES OF DEMAND FORECASTING (LONG PERIOD)

Demand forecasting, which is for a long period, has the following objectives:

1. Long period demand forecasting is necessary for ascertaining future demand for the product so that the firm can plan for new units, new projects, new plants, expansion of existing scale of operation. Knowledge of growth trends in the economy related to income and other variables essential. Their likely impact on the aggregate demand and the demand for the firm's products can be ascertained. In the case of firm's producing inputs or intermediate products demand forecasting of the consumers' final products in the production of which its inputs are used, is very much essential. It can find out the problem increase in the demand for such inputs.
2. Demand forecasting will be advantageous for finding out the lines of profitable investments before taking the risk of new investments, particularly for large firms.
3. Demand forecasting is also necessary to prepare plans for long-term financial requirements. Then only can the firm proceed to arrange for the same through equality and debenture issues and long-term loans.
4. Long-term sale forecasts help the firm in planning for trained manpower. It can start training schemes well in time for future expansion programmes and also for adapting itself to new products likely to come up in the market.
5. Long-term demand forecasting also helps in developing different processes and departments under the same roof, it there is going to be a heavy in the demand for the product.

4.4 PROBABILITY OF ERROR IN FORECASTING

There is a greater probability of error in the long-term demand forecasting than in the short-term demand estimation. Conditions in the short-term period are less likely to fluctuate and confiscations of the independent variables can be ascertained with greater accuracy on the basis of the past results.

Over long period, however, not only is the firm required to estimate the coefficients, that is, elasticises of the independent variable, affecting the dependent variables, but also to find out the changes in the independent variables. Such changes are likely to be more volatile over a long period. Future events such as war, depression, prosperity, international developments, technology changes, innovations, government policy etc. cannot be predicted with any degree of certainty. Hence demand forecasting for a long period cannot be as certain as demand estimation for the short period. It is, therefore, necessary that long period decision like expansion of plants or new investments should be taken very carefully and diligently. Long-period forecasting will be just a guide only and not an absolute leading factor in taking such decision. It must be remembered that a high degree of risk is involved in such cases.

4.5 DIRECT AND INDIRECT METHODS OF DEMAND ESTIMATION

In the case of demand estimation, to find out current demand over a short period, the value of the independent variables can be known or ascertained from the recent past.

4.5 (1) Direct Methods

In direct methods, firstly consumers are directly questioned and interviewed (consumer surveys) to find out their intentions and response to price changes; changes in quantity, changes in advertising and other promotional campaigns, consumers rating of the product against its substitutes, etc. Secondly, expert opinions are obtained on these aspects. Thirdly, market experiments are conducted to obtain the necessary information. The following are the direct methods of demand estimation (short period):

1. Consumer‘s surveys
2. Expert’s opinion
3. Simulated market situation.
4. Controlled market experiments.

4.5 (1) (a) Consumer’s Surveys

Intentions of buyers or potential buyers are recorded through personal interviews, mail or post survey and telephone interviews. Questionnaires are prepared to find out buyers’ intentions with regard to their reaction to a price change or a change in some other variable, such as advertising, quality, packing, etc. The work of consumer’s survey should be given to trained, reliable and experienced investigators. Questionnaires should not be complicated.

In personal interview method, house-to-house survey is made. One advantage of personal interview is that the interviewer can explain questions to person who may not follow them initially. But this method is expensive and time-consuming.

In case of post or mail survey, the cost is much less and a large coverage is possible in a short period. However, since there is no personal meeting, explanation of questions is not possible and therefore, there is a great possibility of receiving useless answers.

Telephone interviews have the advantage of personal touch and are time and money saving. However, in less developed countries, telephone facility, are not available to all customers. Besides, long interviews cannot be conducted on telephones. Telephone survey is preferable only when quick information from consumers is desired, that too, on one or two matters related to the product. In recent times internet has facilitated conducting of these surveys on a large scale.

Dangers in consumes' survey

Result of the survey should be interpreted with reasoned analysis. While relying on the responses of the consumers to questions asked, certain dangers must be taken into account.

- Since the buyer is asked a hypothetical question, his answer are also hypothetical.
- The buyer may feel that the interviewer wants a particular type of response.
- Instead of revealing his intention, he may replay what he feels is expected by the interviewer.
- He may replay to please the interviewer.
- Even if the buyer reveals his true intentions, he may change his intention while making the actual purchases.

Type of Consumers' Survey

There are two types of consumers' survey: Complete Enumeration method and sample survey method.

1. Complete Enumeration Method

In the complete enumeration method all potential buyers of the product are surveyed. The survey covers all the potential consumers in the market and their interviews are conducted to find out the probable demand. Once individual demands for the product are ascertained by the complete enumeration method, these are added together to find out the probable total demand for the firm's product.

Advantages of complete enumeration method: Since all potential consumers are contacted, there is a greater degree of accuracy in this method. This depends on whether the consumers have expressed their true intentions.

This method is more useful when new products are to be introduced. This method is more useful when new products are to be introduced. This method may prove beneficial for products for which the number of potential consumers is small, e.g. for bulky and costly products, such as cars, big machines, refrigerators, etc.

Disadvantages or Limitations of Complete Enumeration Method

1. This method is expensive, as the survey covers the entire of enumerators.
2. It is time- consuming. A great deal of time is consumed, since all consumers are interviewed.
3. The method is of no use where the consumers are spread over a wide area and cannot be contacted easily.
4. In the absence of a large number of qualified and competent investigators, this method will not work effectively and hence is less reliable.

2. Sample Survey Method

Due to the limitations of the complete enumerations method, simple survey method has become more popular for demand estimation. In this method, only a few consumers selected from the total potential consumers are interviewed and then the average demand is calculated on the basis of the consumers interviewed. By multiplying the total number of consumers by this average demand, the aggregate demand for the product is estimated.

The sampling method of the consumer survey is based on two principles.

a. Principle of statistical regularity and

b. Principle of inertia of large number.

The first principle is based on the mathematical theory of probability and implies that a moderately large number of items chosen at random from a large group are almost sure, on the average, to possess the characteristics of the large group. The second principle of inertia of large numbers implies that other conditions being equal, large the size of the sample more accurate the inference or result is likely to be. The variation in the aggregate tends to be very small or insignificant, if the number in the sample is very large.

Methods of Sample Surveys

There are two type of sampling methods; (1) Random or probability sampling and (2) Non-random or non-probability sampling

Random Sampling

In the case of probability or random sampling method, the law of probability can be applied. In this method, each consumer or group of consumers is given an equal chance of being selected for the sample. Selection is made the help of a table of random numbers. There are five random sampling methods: (1) Simple random sampling, (2) Stratified sampling (3) Systematic Sampling, (4) Multi-stage sampling or cluster sampling and (5) multi-phase sampling.

(a) Simple random sampling: In the simple random sampling each consumer gets an equal chance of being selected in the sample. There are two methods of simple random sampling.

Lottery method: Where the consumers are given numbers, which are written or paper sips, and then the required number of slips is lifted blindfolded.

Table of random numbers: These random number tables are available, viz.. (a) Tipett's table of random numbers, (b) Fisher and yete's table and (c) Kendall and Babington table. The number of consumers in the sample is selected on the bases of these numbers.

(b) Stratified sampling: In the stratified sampling method, the potential buyers are divided into homogenous groups or classes called "Stratas". Then by applying the simple random method, a sample is selected from each group. Stratified sampling ensures greater accuracy.

(c) Systematic sampling: In the systematic sampling, we pick up every Kth consumer in the total number of consumers. K will be decided by divided total number of consumers by the total number in the sample.

(d) Multi-stage of cluster sampling: In the multistage or cluster sampling method, the whole class of consumers is divided into further groups and again these groups are subdivided and then if necessary, there may be further subdivisions of consumers. At every stage, random sampling is applied to find out the next subdivisions. Suppose we want to take a sample survey of consumers of a particular state in India. First the state is divided into a number of villages. Again at this stage, a sample of villages is chosen at random. The total number of households in each village in the sample is counted. Then a sample of households from each village in the village sample is prepared for interview purpose. This method introduces an element of flexibility and enables the firm to cover a very big aria.

(e) Multi-phase Sampling: In multi-phased sampling method, we use the multi-stage sampling at various stages for the purpose of different objectives. Thus, the sample of district selected may be used to find out the incomes of the people; then in the second stage, the sample of villages for each district in the district sample may be used for some additional characteristics, such as consumers' testes, fashion, etc., and still further, the household sample from the village sample may be used for still additional characteristics, such as the actual questions of the product the consumers would buy.

Non-Random sampling

Random sampling as explained above has a number of advantages. The main advantage is that it is suitable for large surveys and the principle of probability is applied to get the rustles. However, for certain purposes, non-random sampling methods are used. There are three important type of non-random or non-probability sample: (a) Judgement Sampling, (b) Quota Sampling, and (c) convenience sampling.

(a) Judgement Sampling: The investigator uses his discretion or judgement in choosing sample items. He prefers those items for sample, which according to his judgement, are representative of the universe. Suppose, the firm wants to survey ten households in a locality as a sample, the expert investigator may choose ten households on the basis on his personal judgement. He will select those households, which, he think, represent the locality. Certain managerial decisions may be taken with the help of judgement sampling, where the time in short. However, this type of sampling is not scientific because there is a great degree of subjective element. If the investigator is an expert in the field, then only the judgement sampling can be truly of representative charter.

(b) Quota Sampling: Where quota are allocated for the purpose of judgement sampling, it is known as quota sampling. The investigator is asked to choose the item of the sample according to quotas for different categories of items. For example, if one hundred consumers are to be chosen by the expert investigator, he may be asked to choose 50 from person above the age of 50, 25 between the age of 31 and 50; 15 between the age of 25 and 30 and 10 between the age of 15 and 24.

(c) Convenience Sampling: It is also known as chunk sampling. In this type, a chunk or fraction of the universe is chosen for the investigation of survey on the basis of convenience. The sample or the chunk is selected by convenience, e. g. The sample may be readily available from a printed list, e. g. The list of telephone subscribers from a telephone directory, or from the list of members from various clubs, institutions, etc. Interviews may be conducted at the bus stops, railway stations, or on busy market roads, to find out responses for a product. Since Convenience sampling cannot be representative of the universe, its results are not satisfactory or reliable.

Merits of sampling Techniques

1) Less Costly: As compared to complete enumeration method, sampling method is less costly. Only a small number of consumers are interviewed and hence total cost of the survey tends to be small.
2) Less time-consuming: Sample survey techniques are also less time-consuming. Time is saved in both collecting data and processing it.
3) More reliable: The inferences from sampling techniques are more reliable than complete enumeration method, though in the former, there are chances of errors. First, the extent of sampling error can be determined. Secondly, the possibility of inaccuracy is more in the

case of complete enumeration method then in the sampling case. This is because greater precaution can be taken when a smaller number of consumers are interviewed, and services of experts can be put into service. This is not possible in the complete enumeration method. Thirdly, follow up work is easier and more effectively done in the case of sampling method in the case of complete enumeration method.

Limitations of Sample Survey

1. Necessity of qualified and expert investigators: The efficiency and accuracy of the sample survey result depend much upon the competence of the field investigators and experts. In developing countries, there is a shortage of qualified and experienced investigators.
2. Careful planning necessary: In the absence of careful planning and proper procedure (e.g. selection of sample) sample survey method may lead to inaccurate and misleading result.
3. Chances of errors: Unless sample size is reasonably large, the chances of errors increase. Again in the case of large sample, there are complications, when weighted procedure, classifications, etc., are introduced.

4.5 (b) Experts' Opinion Survey

Besides the consumer survey method, the firm may conduct experts' opinion survey. It is also called sales force polling. There are certain categories of people who are in the know of the market. They know the consumer's responses to the product. These are salesmen, market consultants and professional experts. These people are dealing in the products are have studied market trends and consumers' behaviour for years; they know the future plans of the consumers, their reactions of new products demand for rival products, etc.

A firm having a large band of salesmen in various, may ask them to undertake surveys in their region regarding the expected future demand for the product and to collect allied information such as their responses to adverting quality change, price change, etc.

The data, thus, collected may be consolidated, tabulated, and inferences about the demand in the short period are drawn. Allowances are made and weights are used to eliminate too much optimism and too much pessimism, on the part of certain salesmen. Than taking into consecration the changes in other variable, such as income of the consumer, income distribution, population, employments and effects of promotional efforts; advertising campaign, exhibition display, door to door canvassing of the product etc, degree of competition from rival firms the firm comes to the final sales estimation for the product.

Aid of marketing managers, managerial economist, production managers, sales managers and other top executive may be taken to conduct expert opinion surveys. This method is also called" Collective opinion" method because its forecast is based on the aggregate opinion of the experts in the field. It is also called 'Hunch' method, as it gives fore casting based on the hunches of experts.

Advantages of Experts Opinion Survey

I. This method is simple and less costly. It requires minimum of statistical work.
II. It enables the firm to estimate current demand in the short period, very quickly. This method is thus timesaving.

III. This method is more useful for new products introduces in the market, where no data is available. The salesman, sales officers, sales representation etc. can better judge the market responses to the product.

IV. Since the opinions about sales estimation come from experts in the field, they are likely to be more accurate and reliable.

V. The firm gets different points of views, which are then balanced in the process.

Limitations of Experts Opinion Survey:

1. Opinions of the firm's own sales representatives may be biased. In order to safeguard their own jobs, they may be induced to give highly optimistic figures.
2. These opinions are subjective and may not be fully reliable, unless the salesmen are well experienced.
3. While expressing their opinions about the probable sales in the short period, the salesman may not consider the effect of changes in other independent variables, such as income, advertising etc. The opinion survey may be influenced by the narrow views of the market.

It may be noted that no firm can just rely on experts opinion survey to estimate demand for the short period. This may be used as supplementary information in addition to other methods.

4.5 (c) Simulated Market Situation

Under this method an artificial market situation is created and participants are selected. These are called consumer clinics. Selected participants are given a certain sum of money and asked to spend it in an artificial department store. Different prices are set up or different promotional efforts are put up for different groups of participations. They are asked to spend money on competing products. The responses of the participants to price changes of varied amount and to different promotional efforts are observed. Accordingly necessary decisions about price and promotional efforts are undertaken.

Such kind of simulated market situations have many limitations.

1. This method is time-consuming.
2. Selections of participations is again a difficult job.
3. Participations in order to show that they are thrifty may buy products whose prices are reduced.
4. Fourthly, when a person buys with someone else's money, he may behave differently from when he buys with his own money.
5. Such consumer clinics are an expensive method of obtaining data.
6. Lastly, the rustles obtained may not be fully representative of the actual market.

4.5 (d) Controlled Market Experiment

A firm may conduct the same experiment of simulated market situation as described above in the actual market.

A firm may reduce the price in the actual market and observe buyers' reactions and compare the sales resulting from price reduction, with the sales in the past. It may fix up different prices in different markets and observe the price responses of buyers. The firm may make an experiment in

one of the markets regarding new advertising campaign or other sales promotion schemes. It first finds out buyers' responses. If these responses are positive and satisfactory results are obtained, then it may take the risk of spending huge amounts on such campaigns on a nationwide basis.

Precautions to be taken: While selecting markets for controlled experiments, areas selected should have the same characteristics such as income levels, population, social background, tastes and preferences, occupational pattern, etc. Secondly, such experiments should be conducted over an extended period of time to observe more than just initial or impact effect of price change or change in some other variable, such as advertising, packaging, quality, etc. It is quite likely that any change in sales due to changing price or other controlled variable may be a result of changes in uncontrollable factors, such as increase or decrease in income levels, changes in income distribution, changes in fashion, etc. To know whether the changes are due to uncontrollable factors, 'controlled market experiments' may be conducted and effects of such uncontrollable factors may be separated in order to know the net effect of controllable variables.

Benefits of controlled market experiments:

(1) The major benefit of controlled market experiments is that the firm knows the actual responses of the buyers to variation in controlled factors such as price of the product, sales promotion campaigns. Etc. Before taking a general decision of a price cut or price increase, the firm gets on opportunity to conduct the experiment in one or a few markets. Similarly instead of spending large amount on nationwide advertisement, it can conduct a test by introducing its new campaign in smaller areas to find out buyers' reactions. If the results are positive and encouraging it may introduce advertising campaign on a national scale.

(2) Such experiments are advantageous to large-scale firms, which supply their products throughout the country. If the experiments are conducted with great care, the firm may be saved from the dangers of under pricing, overpricing or unnecessary spending of money on wasteful advertisements. If positive and encouraging results are obtained, the firm can safely go ahead with its price-decisions or additional campaigns as planned.

Limitations of controlled market experiments: For large firms, controlled market experiments provide a fund of valuable information. However, there are some major pitfalls. If such pitfalls are not anticipated and eliminated during the experiments, they may lead to unreliable results. The cost of the experiments may prove to be greater than the value of the limitations or pitfalls:

1) It may happen that changes in sales in the controlled market may not be due to change in the controlled variable. They may be the result of changes in the uncontrolled factors, such as income, income distribution, occupational patterns, tastes, fashion, etc. This is a great pitfall. Care must be taken to find out such a pitfall. Effects of uncontrollable factors should be separated to get the net effect of the controlled factors. Otherwise the results would be misleading. The firm's decision would go wrong. It will have to pay a high cost in term of losses.

2) If the experiment is conducted over a very short period, the result obtained may not be reliable. They may be due to the initial effect of buyer's emotional behaviour. The experiment must be conducted over a prolonged period to establish a definite relationship between the controlled factor and the sales.

3) Market experiments become a expletive exercise in many other way also: If the price is raised in the controlled market to test the buyer's responses are negative, than restoring the price to earlier lower level will not bring back the original higher sales level. This is because the buyers would have taken a liking for substitutes during the experiment period and may continue with substitutes. The firm loses the market or a great deal of it permanently.

4) If the new promotion campaign fails in its experiment, it may do a long-term damage to the firm's image and to its sales level.

5) While the firm introduces a price change or change in the promotional efforts like new advertising campaign in its market experiment, it is quite likely that the rival firms may nullify such experiment. They may introduce counterchanges in their price s or promotional campaigns and the entire efforts of the firm in conducting such an experiment may be wasted.

4.5 (2) Indirect Methods

Indirect methods of demand estimation over demand forecasting for the short period cosiest of trend projections and regression analysis.

Many statistical tools over techniques are now available for estimating 'demand for the product. We first write down the demand function for the product and then with the help of regression analysis and the past data, find out coefficient of independent variable. We can also estimate demand with the method of trend projections.

4.5 (2) (a) Trend projections (Extrapolation method)

In the trend projections method, past data about the dependent variable and other independent variables is used to project the sales in the coming year or years. This method is also called time series analysis method. Here we use the pairs of observations recorded over time in a particular situation. For example, we collect data about the sale of the product in the past five years. The resulting trend is then extrapolated into future periods. The result and indicated sales levels are used as the basis for the demand estimation.

Moving Average Method

This method is also used to find out the future sales. First the past data (say for the past five years) about the sales is collected. Then the average of the past sales is calculated. This average is taken as demand estimation for the next year, assuming that the future sales will be equal to the average of the past sales.

Smoothing Techniques

Smoothing techniques models of forecasting are based on the assumption that an underlying pattern can be found in the historical value of a variable for which forecasting is being prepared? Besides representing the underlying pattern, these historical observations also represent random variations. In smoothing techniques, we take some form of an average of past observations. Thereby distortions from random variation in the series are eliminated. The forecast is based on a smooth average of several past observations.

Smoothing techniques can be used beneficially when changes in the data series are slow from one period to the next period, and there are no frequent changes in the direction of the underlying pattern. Smoothing techniques are less expensive to store the data and chapter for developing a forecast. They are also inexpensive to operate.

4.5 (2)(b) Regression Analysis

Regression analysis is one of the statistical techniques, which are widely used, in different scientific disciplines. It is a tool to measure or estimate the unknown value of one variable from the known value of another variable. In demand estimation (short period) and demand forecasting (long period), it is a very useful technique to find out the change in the quantities of the product demanded, when other independent variables, such a price, income, tastes, advertising, etc., change. Suppose, two variables X (say advertising expenditure) and Y (sales) are closely related, we can find out with the help of regression question the probable value of Y (sales) for a given value of X (advertising expenditure). When the price of the product and its quantity demanded have a functional relationship, we can find out change in the value of Y (quantity of the product demanded) for a given change in the value of X (price). The study of regression is of immense help for economists, producers and business people.

Simple Regression and Multiple Regressions

When we consider the relationship between two variables, one dependent variable, (e.g. sales) and another independent variable, (e.g. price), the relationship is called simple regression. Where the relationship is between the dependent variable and a number of independent variables, It is known as multiple regression.

Solving regression equations and finding out of value is very complex and requires time. However, with the aid of computer programmes; simple and multiple regression can be estimated quickly and easily.

First, it is necessary to specify the form of dependence of y on the x variable. This dependence may be expressed in linear form in which we show additive influence of the independent variable (X, X, X, X,...Xn) on the dependent variable Y as under.

$$Y = a + b_1 X_1 + b_2 X_2 + \ldots\ldots + bn\ Xn + e$$

Here y (sales) is the dependent variable, $b_1 \ldots b_2 \ldots$ bn are the coefficients of independent variables. $X_1\ X_2$ ....Xn. 'a' is the intercept or the constant value of y irrespective of the influence of X variables, 'e' the error or residual value which will arise as the difference between the actual value of each Y observed in association with each set of X value and the estimated value of each Y that is associated with the set of X variables in the regression equation.

The dependence of Y (sales) on X variable (price) may be expressed in non-liner form. The most commonly used non-linear form of regression equation shows a multiplicative influence of independent variables on the dependent variable Y. Here not only the effect of each variable on Y is considered, out the effect of changes in each independent variable on other independent variables is also considered.

$$Y = a\ X_1\ b_1\ X_2\ b_2\ e$$

A is intercept: $X_1\ X_2$ are independent variables, $b_1 \ldots b_2$ are coefficients 'e' the error term. This equation can be converted into an addictive from with the help of logarithms as under:

$$Y = \log a + b_1 \log X_1 + b_2 \log X_2 + \log e.$$

4.6 Demand Forecasting for New Products

Where a firm desires to produce a new product and is interested in estimating demand for it, the main difficulty is that there is no past data. Hence, it is difficult to project sales. Complete enumeration method (potential consumers' survey) and experts' opinion survey method survey method can be used to find out probable sales for new products.

Intelligent projection of demand for new product requires an intensive study of their qualitative and competitive features.

The following approaches are recommended by TJ. Hailstones and j. C. Rothwell of Xavier University, America

1) Evolutionary approach

2) Substitute approach

3) Growth curve approach

4) Sales experience approach

5) Opinion sampling approach (complete enumeration method and sampling survey) and

6) Vicarious approach

1. Evolutionary approach: The new product may be an improvement over the existing product. It may ultimately replace the existing product. In such cases, past data about the sales of existing product may be relied upon for projection sales of the new product. It may be assumed that the new product will have the same experience.
2. Substitute approach: The new product may be substitutes for some existing product. Than the share of the total market sales for the new product can be calculated by this approach. For example, when a new textbook on business economics is to be introduced, it is necessary to collect information about the market for the existing textbook on the same subject. From the total sales of the existing textbook, probable sales for the new textbook can be estimated.
3. Growth curve approach: The growth rate and the ultimate sales for the new product can be estimated on the basis of the path of growth of established product of similar nature. Demand for new product like household furniture of new design can be estimated by analyzing the growth curves of existing household furniture of other designs.
4. Flexibility: Functional relationship in the demand function should be flexible. Variables in the demand function should be such that coefficient can be adjusted from time to time for meeting changing conditions. Flexibility ensures that effects of uncontrollable variables can be separated from those of controllable variables.
5. Availability and simplicity: Data regarding variables in the demand function should be immediately and readily available. Instead of waiting for the annual or biennial reports, reliance can be places on weekly or monthly reports regarding wholesale price index, production index, etc. In India these are available in Reserve Bank's monthly Bulletin and reports of manufactures' organizations. Vital statistical and other information is also available from specific industrial newspapers and magazines, such as the economic times, The Financial Express, Business India, Economic and Political Weekly, India Today Fortune India, Capital, Commerce, etc. Instead of going for a complicated method, simple method is better.

4.8 SELF CHECK EXERCISE

1. Firms are interested in doing short-term or long-term demand forecasting.
2. Experts opinion survey is also known as _____ .
3. Extrapolation Method is also known as _____ .

4.9 SUMMARY

Demand forecasting is very necessary to know where a project is viable or not. After gathering information about various aspects of the market and demand from primary and secondary sources an attempt may be made to estimate future demand. A wide range of forecasting methods is available to the market analyst. These may be divided into three board categories, viz. Qualitative methods, time series projection methods, and casual methods. To enable the product to reach a desired level of market penetration, a suitable marketing plan, covering pricing, distribution, promotion, and services, needs to be developed.

4.10 GLOSSARY

- **Demand forecasting:** The process of finding value of demand in future time periods.
- **Survey:** It is a research method used for collecting data from a predefined group of respondents.

4.11 Answers to self check exercise:

1. Long term/period demand forecasting
2. Sales Force Polling
3. Trend Projections/Time Series Analysis Method

4.12 TERMINAL QUESTIONS

1. Describe the methods available for demand forecasting.
2. Discuss the criteria for selecting good forecasting method.

4.13 REFERENCES/SUGGESTED READINGS

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CHAPTER – 5
PROJECT TECHNICAL ANALYSIS

STRUCTURE

5.0 LEARNING OBJECTIVES

1. To understand manufacturing process/technology.
2. To know about project charts and layouts.

5.1 INTRODUCTION

Analysis and technical and engineering aspects of a project is an important aspect of project management. Other types of analyses are dependent and closely intertwined with technical analysis. The important aspects of technical analysis include the followings:

- ❖ Material inputs and utilities
- ❖ Manufacturing process/technology
- ❖ Product mix
- ❖ Plant capacity
- ❖ Location and site
- ❖ Machineries and equipments
- ❖ Structures and civil works
- ❖ Project charts and layouts
- ❖ Work schedule

This lesion is devoted to the study of above mentioned aspects of technical analysis.

5.2 MATERIAL INPUTS AND UTILITIES

An important aspect of technical analysis is concerned with the identification of the materials and utilities required, specifying their properties in some detail, and setting up their supply programme. There is an intimate relationship between the study of materials and utilities and other aspects of project formulation, particularly those concerned with location, technology, and equipments.

Material inputs and utilities may be classified into fore board categories: (i) raw materials, (ii) processed industrial materials and components, (iii) auxiliary materials and factory supplies, and (iv) utilities.

Raw Materials

Raw material (processed and/or semi-processed) may be classified into four types: (i) agriculture products. (ii) Mineral products, (iii) livestock and forest products, and (iv) marine products.

Agriculture products: In studying agriculture products the quality must first be examined. Then, a assessment of quantities available, currently and potentially, is require.

Mineral products: In assessing mineral raw materials, information is required on the quantum of exploitable deposit and the properties of raw materials. The study should provide details of the location, size and depth of deposits and the variability of opencast or underground mining.

Livestock and forest products: Secondary sources of data on livestock and forest products often do not provide a dependable basis for estimation. Hence, in general, a specific survey may be required to obtain more reliable data on the quantum of livestock produce and forest products.

Marine Products: Assessing the potential availability of marine products and the cost of collection is somewhat difficult. Preliminary marine operations, essential for this purpose, have to be provided for in the feasibility study.

Processed Industrial Materials and Components

Processed industrial materials and components (base materials, semi-processed materials, manufactured parts, components, and sub-assemblies) represent important inputs for a number of industries. In studying them the following question need to be answered: In the case of industrial materials, what are their properties? What is the total requirement of the project? What quantity would be available from domestic sources? What quantity can be procured from foreign sources? How dependable there are supplies? What has been the past trend in prices? What is the likely future behaviour of prices?

Auxiliary Materials and Factory Supplies

In addition to the basic raw materials and processed industrial and components, a manufacturing project requires auxiliary materials a factory supplies like chemicals, additives, packaging materials, plants, varnishes, oils, grease, cleaning materials, etc. The requirement of such auxiliary and supplies should be taken into account in the feasibility study.

Utilities

A broad assessment of utilities (power, water, steam, fuel, etc.) may be made at the time of input study though a detailed assessment can be made only after formulating the project with respect to location, technology, and plant capacity.

5.3 MANUFACTURING PROCESS/TECHNOLOGY

For manufacturing a product/service often two or more alternative technology are available. The choice of the manufacturing technology should be made with due care.

Choice of Technology

The choice of technology is influenced by a variety of consideration. These are discussed below:

i) 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.

ii) Principal Inputs: The choice of technology depends on the principal inputs available for the project. In some cases, the new materials available influence the technology chosen. Technology based on indigenous inputs may be preferable to one based on imported inputs because of uncertainties characterizing imports.

iii) 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.

iv) Use by Other Units: The technology adopted must be proven by successful use by other units, product mix. The technology chosen must be judged in terms of the total product-mix generated by it, including saleable by products.

v) Latest Development: the technology adopted must be based on latest developments in order to ensure that the likelihood of technological obsolescence is eliminated.

vi) 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.

Acquiring Technology

The acquiring of technology from some other enterprise may be way of (i) technology licensing, (ii) outright purchase, or (iii) joint venture arrangement. The pros and cons of these methods of acquiring technology are discussed below:

Technology Licensing: A popular method of acquiring technology, the technology license givens the licenses the right to use patented technology and get related known-how on a mutually agreed basis. Often suppliers of technology tend to provide a technology package, which may consist of some elements, which are not essential. Hence the technology package should be disaggregated into its components parts like the technology proper, engineering service, supply of intermediate products, supply of equipment by the licensor, use of a trade name, etc. Effects should be made to acquire only the essential components of the technology package offered by the licensor.

Purchase of Technology: This mode of acquiring technology is appropriate when (i) there is no possibility of significant improvement in technology in the foreseeable future, and (ii) there is hardly any need for technological support from the seller of technology.

Joint Venture Arrangement: 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 is argued that financial participation may strengthen the motivation of technology supplier to transfer improvements promptly.

Appropriateness of technology

Appropriate technology refers to those methods of production, which are suitable to local economic, social, and cultural conditions. The advocates of appropriate technology urge that the technology should be evaluated in terms of the following questions: weather the technology utilizes

local raw materials? Weather the technology utilizes local manpower? Weather and goods and services produced cater to the basic needs? Weather the technology protects ecological balance? And weather the technology is harmonious with social and cultural conditions?

5.4 PRODUCT MIX

The choice of product mix is guided by market requirements. In the production of most of the items, variations in size and quality are aimed at satisfying a broad range of customers. While planning the production facilities of the firm to alter its product mix in response to changing market conditions and enhances the power of the firm to survive and grow under different situations. The degree of flexibility chosen may be based on a careful analysis of the additional investment requirement for different degrees of flexibility.

5.5 PLANT CAPACITY

Plan capacity refers to the volume or number of units that can be manufactured during a given period. Following factors have a bearing on the capacity decision. Technology requirement, input constraints, Investment cost, Market conditions, Resources of the firm and the government policy.

Technology requirement

For many industrial projects, particularly in process type industries, there is a certain minimum economic size determined by the technology factor. This factor has to be given due consideration in the selection of plant capacity.

Input Constraints

In a developing country like India, there may be constraints on the availability of certain inputs. These constraints should be borne in mind while choosing the plant capacity.

Investment Cost

In a situation in which input constraints do not exist, the relationship between capacity and investment cost should be given due consideration.

Market Conditions

The anticipated market for the product/service has an important bearing on 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.

Resources of the Firm

The resources, 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. This policy should be given due consideration.

5.6 LOCATION AND SITE

The choice of location and site follows an assessment of demand, size, and input requirement. Though often used synonymously, the terms, ‘location’ and ‘site’ should be distinguished. Location refers to a fairly 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 choice of location is influenced by a variety of considerations: proximity to raw materials and markets, availability to infrastructure, governmental policies, and other factor.

Proximity to raw materials and markets

An important consideration for location is the proximity to sources of raw materials and nearness to the market for final products. In terms of a basic location model, the optimal location is one where the total cost (raw material transportation cost plus production cost plus distribution cost for the final product) is minimized.

Availability of Infrastructure

Availability of power transportation, water, and communications should be carefully assessed before a location decision is made.

Adequate supply of power is a power is a very important condition for location. Insufficient power can be a major constraint. For transporting the inputs of the project and distributing the outputs of the project, adequate transport connection-whether by rail, road, sea, inland water, or air-are required'. The availability, reliability, and cost of transportation for various alternative locations should be assessed.

Given the plant capacity and the type of technology, the water requirement for the project can be assessed. Once the required quantity is estimated, the amount to be drawn from the public utility system and the amount to be provided by the projected by the project from surface or sub-surface source may be determined. For doing this the following factors may be examined: relative costs, relative dependability, and relative qualities.

Government Policies

Government policies have bearing on location. In the case of public sector projects, the government directly decides location. It may be based on a wider policy for regional dispersion of industries.

In the case of private sector projects, location is influenced by certain governmental restrictions and inducements. The government may prohibit the setting up of industrial projects in certain areas, which suffer from urban congestion. More positively, the government offers inducements for establishing industries in backward areas. These inducements consist of subsidies, finance on easy terms, tax relief, and other benefits.

Other Factors

Several other factors have to be assessed before reaching a location decision: ease in coping with environmental pollution, labour situation, climatic conditions, and general living conditions.

Site Selection

Once the board location is chosen, attention needs to be focused on the selection of a specific site. Two or three alternative sites must be considered and evaluated with respect to cost of land and cost of site preparation and development.

The cost of land tends to differ from one site to another in the same broad location. Sites close to city cost more whereas sites away from the city cost less. Sites in an industrial area developed by a governmental agency may be available at a cheaper rate.

The cost of site preparations 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. The last element, viz., the work involved in obtaining utility connections and the cost associated with it should be carefully looked into. It may be noted in this context that the cost of the following may vary significantly from site to site: power transmission lines from the main grid, railway siding from the nearest railroad, feeder rode connection with the main road; transport of water, and disposal of effluents.

5.7 MACHINERIES AND EQUIPMENTS

The requirement of machineries and equipments is dependent on production technology and plant capacity. The type of project also influences it. The choice of machineries and equipments for a manufacturing industry is somewhat wider as various machines can perform the same function with varying degrees of accuracy. To the kinds of determine machinery and equipment required for a manufacturing industry, the following procedure may be followed: (i) Estimate the likely levels of production over time. (ii)Define the various machining and other operations. (iii) Calculate the machine hours required for each type of operation. (iv) Select machineries and equipments required for each function.

In addition to the machineries and equipments, a list should be prepared of spare parts and tools required. This may be divided into (i) spare parts and tools to be purchased with the original equipment, and (ii) spare parts and tools required for operational wear and tear.

Constraints in Selecting Machineries and Equipments

In selecting the machineries and equipments certain constraints should be borne in mind: (i) there may be a limited availability of power to set up an electricity-intensive plant like, for example, a large electric furnace; (ii) there may be difficulty in transporting a heavy equipment to a remote location; (iii) workers may not be able to operate, at least in the initial period; certain sophisticated equipments such as numerically controlled machines; (iv) the import policy of the government may preclude the import of certain machineries and equipments.

Procurement of plant and Machinery

For procuring plant and machinery, orders different item of plant and machinery may be placed with the different suppliers or a turnkey contract may be given for the entire plant and machinery to a single supplier. The factors to be considered in selecting the supplier/s of plant and machinery are the desired quality of machinery, the level of technological sophistication, the relative reputation of various suppliers; the expected delivery schedules, the preferred payment terms, and the required performance guarantees. If in-house technical expertise is inadequate, external consultant/s may be employed to select plant and machinery and supervise the installation of the same.

5.8 STRUCTURES AND CIVIL WORKS

Structure and civil works may be divided into three categories: (i) sit preparation and development, (ii) buildings and structures, and (iii) outdoor works.

Site Preparation and Development

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

Building and Structures

Building and structures may be divided into: (i) factory or process buildings; (ii) ancillary building required for stores, warehouses, laboratories, utility supply centres, maintenance service and others; (iii) administrative building; (iv) staff welfare buildings, cafeteria, and medical service buildings; and (v) residential building.

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 effluent; (iii) transportation and traffic arrangements (roads, railway tracks, paths, parking areas, sheds, garages, traffic signals, etc.); (iv) outdoor lighting; (v) landscaping; and (vi) enclosure and supervision (boundary wall, fencing, barriers, gates, doors, security posts, etc.)

5.9 PROJECT CHARTS AND LAYOUTS

Once data is available on the principal dimensions of the project-market size, plant capacity, production technology, machineries and equipments, buildings, and civil works, conditions obtaining at plant site, and supply of input to the project-project charts and layouts may be prepared. These define the scope of the project and provide the basis for detailed project engineering and estimation of investment and production costs.

The important charts and layouts drawings are briefly described below.

1. General functional Layout

This shows the general relationship between equipments; buildings, and civil works. In preparing this layout, the primary consideration is to facilitate smooth and economical movement of raw materials, work-in-process, and finished goods. This means that:

(a) The layout should seek to allow traffic flow in one direction to the extent possible, with a minimum of crossing.

(b Stores, workshops, and other service must be functionally situated with respect to the main factory buildings.

2. Materials Flow Diagrams

This shows the flow of materials, utilities, intermediate products, final product, by-products, and emissions. Along with material flow diagram, a quantity flow diagram showing the quantities of flow may be prepared.

3. Production Line Diagrams

These show how the production would progress along with the key information for main equipment.

4. Transport layout

This shows the distance and means of transport outside the production line.

5. Utility Consumption Layout

This shows the principal consumption points of utilities (power, water, gas, compressed air, etc.) and their required quantities and qualities. These layouts provide the basis for developing specification for utility supply installations.

6. Communication Layout

This shows the various parts of the project will be connected with telephone, telex, intercom, etc.

7. Organizational Layout:

This shows the organizational set-up of the project along with information on personnel required of various departments and their inter-relationship.

Plan Layout- The plan layout is concerned with the physical layout of the factory. In certain industries, particularly process industries, the production process adopted dictates the plant layout. In manufacturing industries, however, there is much greater flexibility in defining the plant layout.

5.10 WORK SCHEDULE

The work schedule, as its name suggests, reflects the plan of works concerning installation as well as initial operation. The purpose of the work schedule is: to anticipate problems likely to arise during the installation phase and suggest possible means for coping with them. To establish the phasing of investments taking into account the availability of finances. To develop a plan of operations covering the initial period.

Need for Considering Alternatives

The need for considering alternatives has been touched upon earlier. This point, however, needs to be emphasized. There are alternative ways of transforming an idea into a concrete project. These alternatives may differ in one or more of the following aspects:

Nature of Project

The project may envisage the manufacture of all the parts and components in a vertically integrated unite or it may consist of an assembly type unite, which obtains the bulk of the parts and components from outside suppliers. The project may consist of processing up to the finished stager may stop at semi-finished stage. These alternatives are available with respect to the nature of the project.

Production Process

There may be several alternatives with respect to the production process. The availability and characteristics of raw materials, the cost structure, and the nature of markets served as factors that have to be borne in mind while deciding about the process.

Product Quality

Barring a-few like clinic thermometers where a certain standard has to be maintained, the choice with respect to quality is fairly wide. This particularly true in the case of consumer products like textiles, footwear, etc. the quality and product range decisions would depend on the characteristics of the market, the elasticity of demand, consumer preferences, and the nature of competition.

Scale of Operation and Time Phasing

In many cases several scales of operation are feasible technically and financially. The choice of a particular scale would depend on the financial resources available, the nature of competition, the nature of demand, and the economics of scale.

Further, a given capacity may be installed in one stage or in phases. The capital cost or capacity installation is usually lower when it is done in one stage. The cost of idle capacity, however, is higher when it is built in a single stage. The trade-off between these costs would determine the optimal pattern of time phasing.

Location

Location and size are closely interrelated. Perhaps the same demand could be satisfied by: (i) a signal plant for the entire market; or (ii) one large plant for the bulk of the market with a few smaller plants for a remaining market; (iii) several plants of similar size speared over the market areas. The choice would depend mainly on the tread-off between economies of scale in manufacturing and economies of distribution.

5.11 SELF-CHECK EXERCISE

1. In a manufacturing project, the following items like chemicals, additives, packaging materials, plants, varnishes, oils, grease, cleaning materials etc. come under which category?

2. Government policies affect decision related to location and site of a plant? True OR False
3. The plan layout is concerned with the _____layout of the factory.

5.12 SUMMARY

Technical analysis of a project is concerned primarily with material inputs, production technology, plant capacity, location and site, machineries and equipments, structures and civil works, project charts and layouts, and work scheduled. The successful implantation of project depends upon among other thing the accuracy of its technical appraisal. Therefore due care should be exercised at the time of conducting the technical analysis of a project.

5.13 GLOSSARY

Plant capacity: volume of products that can be generated by a production plant with given resources in a specific period of time.

Production cost: costs related to making goods and services that directly generates revenue for a firm.

5.14 ANSWERS TO SELF-CHECK EXERCISE

1. Auxillary materials and factory supplies
2. True
3. Physical layout

5.15 REFERENCES/SUGGESTED READINGS

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5.16 TERMINAL QUESTIONS

1. What aspects are considered in technical analysis?
2. What factors have a bearing on choice of technology?

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CHAPTER-6
FINANCIAL ANALYSIS OF THE PROJECT

STRUCTURE

6.0 LEARNING OBJECTIVES

1. To understand the costs related to a project.
2. To understand the means of financing.

6.1 INTRODUCTION

A project must be thoroughly evaluated from financial angle. To judge a project from the financial angle, we need information about the following:

- ❖ Cost of project
- ❖ Means of financing
- ❖ Appropriate capital structure
- ❖ Estimates of sales and production
- ❖ Cost of production
- ❖ Working capital requirement and its financing
- ❖ Estimates of working results
- ❖ Break-even point
- ❖ Projected cash flow statements
- ❖ Projected balance sheets

This lesson is devoted to the study of cost of the project and the means of financing. The remaining aspects of the financial analysis would be discussed in the forthcoming lessons.

6.2 COST OF PROJECT

Conceptually, the cost of project represents the total of all items of outlay associated with a project, which are supported by long-term funds. It is the sum of the outlays on the following:

- ❖ Land and site development
- ❖ Building and civil works.
- ❖ Plant and machinery
- ❖ Technical know-how and engineering fees
- ❖ Expenses on foreign technicians and treating of Indian technicians abroad
- ❖ Miscellaneous fixed assets
- ❖ Preliminary and capital issue expenses
- ❖ Pre-operative expense
- ❖ Provision for contingencies
- ❖ Margin money for working capital
- ❖ Initial cash losses

6.2 (1) Land and site Development

The cost of land and site development is the sum of the following:

- ❖ Basic cost of land including conveyance and other allied changes
- ❖ Cost of laying approach road and internal roads
- ❖ Cost of levelling and development
- ❖ Cast of gates
- ❖ Cost of tube wells

The cost of land varies considerably from one location to another. While it is very high in urban and even semi-urban locations, it is relatively low in rural locations. The expenditure on site development, too, varies widely depending on the location and topography of the land.

6.2 (2) Building and Civil Works

Building and civil works cover the following:

- ❖ Building for the main plant and equipment
- ❖ Buildings for auxiliary service like steam supply, workshop, and laboratory, water supply, etc.
- ❖ Warehouses, and open yard facilities
- ❖ Non-factory buildings like canteen, guesthouse, time office, excise house, etc.
- ❖ Quarters for essential staff
- ❖ Tanks, well, chests, basins, cisterns, bins, and other structures necessary for installation of plant and equipment
- ❖ Garages
- ❖ Sewers, drainage, etc.
- ❖ Other civil engineering works.

The cost of building and civil works depends on the kinds of structures required which in turn, are dictated largely by the requirements of the manufacturing process. One the kinds of structures required are specified, cost estimates are based on plinth area and rates for various types of structures. These rates, of course, vary with the location to some extent.

6.3 (3) Plant and Machinery

The cost of plant and machinery, typically the most significant component of project cost, consists of the following:

Cost of imported machinery: This is the sum of FOB (free on board) value, shipping, freight, and insurance cost, import duty, and clearing, loading, unloading, and transportation charges.

Cost of indigenous machinery: This consists of FOR (free on rail) cost, sales, tax, and other taxes, if any, and railway freight and transport charges to site.

Cost of stores and spares; this consists of input necessary for the project.

Foundation and installation charges; these are the charges necessary to set up the foundations of the building.

The cost of plant and machinery is based on the latest available quotation adjusted for possible escalation. Generally, the provision for escalation is equal to the following product: (latest rate of annual inflation applicable to the plant and machinery) x (length of the delivery period).

6.2 (4) Technical Know-how and Engineering fees

Often it is necessary to engage technical consultants or collaborators from India and/or abroad for advice and help in various technical matters like preparation of project report, choice of technology, selection of plant and machinery, detailed engineering, and so on. While the amount payable for obtaining technical know-how and engineering services for setting up the project is a component of project cost, the royalty payable annually, which is typically a percentage of sales, is an operating expense taken into account in the preparation of the projected profitability statements.

6.2 (5) Expenses on Foreign technicians and Training of Indian Technicians Abroad

Service of foreign technicians may be required in India for setting up the project and supervising the trial runs. Expenses on their travel, boarding, and lodging, along with their salaries and allowances must be shown here. Likewise, expenses on Indian technicians who require training abroad must also be included here.

6.2 (6) Miscellaneous Fixed Assets

Fixed assets and machinery that are not part of the direct manufacturing process may be referred to as miscellaneous fixed assets. They include items like furniture , office machinery and equipment, tools, vehicles, railway siding, diesel generating sets, transformers, boilers, piping systems, laboratory equipments, workshop equipments, effluent treatment plants, fire fighting equipments and so on. Expenses incurred for procurement or use of patents, licences, trademarks, copyrights etc. and deposits made with the electricity board may also be included here.

6.2(7) Preliminary and Capital Issue Expenses

Expenses incurred for identifying the project, conducting the market survey, preparing the feasibility report, drafting the memorandum and articles, of associations, and incorporating commission, breakage, fees to managers and registrars, printing and postage expenses, advertising and publicity expenses listing fees, and stamp duty.

Expenses borne in connection with the raising of capital from the public are referred to as capital issue expenses. The major components of capital issue expenses are: underwriting commission, brokerage, fees to managers and registers, printing and postage expenses, advertising and publicity expenses, listing fees, and stamp duty.

6.2 (8) Pre-operative Expenses

Expenses of the following types incurred till the commencement of commercial production are referred to as pre-operative expenses: (i) establishment expenses (ii) rent, rates, and taxes, (iii) travelling expenses, (iv) interest and commitment charges on borrowing, (v) insurance charges, (vi) mortgage expenses, (vii) interest on deferred payments, (viii) start-up expenses, and (ix) miscellaneous expenses.

Pre-operative expenses are directly related to the project implementation schedule. So delays in project implementation, which are fairly common, tend to push up these expenses.

Appreciative of this, financial institution allow for some delay (20 to 25 per cent) in the project implementation schedule and accordingly permit a in the estimate for pre-operative expenses.

Pre-operative expenses incurred up to the point of time the plant and machinery are set up may be capitalized by apportioning them to fixed-assets on some acceptable basis. Pre-operative expenses incurred from the point of time the plant and machinery are set up treated as revenue expenditure. The firm may, however, treat them as deferred revenue expenditure and write them off over a period of time.

6.2 (9) Provision of Contingencies

A provision for contingencies is made to provide for certain unforeseen expenses and price increases over and above the normal inflation rate, which is already incorporated in cost estimates. To estimate the provision for contingencies the following procedure may be followed: (i) Divide the

project cost items into categories, viz.. 'firm' cost items and 'non-firm' cost items (firm cost items are those which have already been acquired or, for which definite arrangement have been made). (ii) set the provision for contingencies at 5to 10 per cent of the estimated cost of non-firm cost items. Alternatively, make a provision of 10 per cent for all items (including the margin money for working capital) if the implementation period is one year or less. For every additional one-year, make an additional provision of 5 per cent.

6.2 (10) Margin Money for Working Capital

Commercial banks and trade creditors provide the principal support for working capital. However, a certain part of working capital requirement has to come from long-term sources of finance. Referred to as the 'margin' money for working capital, this is an important element of project cost.

The margin money for working capital is sometimes utilized for meeting over-runs in capital cost. This leads to a working capital problem (and sometimes a crisis) when the project is commissioned to mitigate this problem, financial institutions stipulate that is portion of the loan amount, equal to the margin money or working capital be blocked initially so that is can be released when the project is completed.

Working Capital Requirement and Its Financing

In estimating the working capital requirement and planning for its financing, the following points have to be borne in mind:

1. The working capital requirement consists of the following: (i) raw materials and components (indigenous as well as imported), (ii) stocks of goods-in-process (also referred to as work in-process), (iii) stocks of finished goods. (iv) debtors, and (v) operating expenses.
2. The principal sources of working capital finance are: (i) working capital advances provided by commercial banks, (ii) tread credit, (iii) accruals and provision, and (iv) long term sources of financing.
3. There are limits to obtaining working capital advance from commercial banks. They are in two forms: (i) the aggregate permissible bank finance is specified as per the norms of leading, prescribed by the tendon committee, (ii) against each current asset a certain amount of margin money has to be provided by the firm.
4. The tendon committee has suggested three methods for determining the maximum permissible amount of bank finance for working capital. The method that is generally employed how is the second method. According to his method, the maximum permissible bank finance is calculated as follows:

   Current assets as per the norms laid down by the tendon committee (0.75) (minus) No-bank current liabilities like tread credit and provision.
5. The margin requirement various with the type of current asset. While there no fixed formula for determining the margin amount, the ranges within margin requirement for various current asset lie are as follows:

Current Assets	Margin
Raw Material	10-25 per cent
Work in Progress	20-40 per cent
Finished goods	30-50 per cent
Debtors	30-50 per cent

6.2 (11) Initial Cash Losses

Most of the projects incur cash losses in the initial years. Yet, promoters typically do not disclose the initial cash Losses because they want the project to attractive to the financial institutions and the investing public. Failure to make provision for such cash losses in the project cost generally affects the liquidity position and impairs the operations. Hence prudence calls for making a provision, overt of covert, for the estimated initial cash losses.

6.3 MEANS OF FINANCING

Long term funds are required by a business to create production facilities through the purchase of various fixed assets like plant, machinery, land, building etc. investment in the fixed assets is required to be arranged from permanent or long-term sources of finance. We discuss below, therefore, the long-term sources of finance used by a business enterprise. The major sources long-term finance include:

1. Equity share Capital
2. Preference Share Capital
3. Retained Earnings
4. Debentures
5. Terms longs for Financial Institutions
6. Lease Financing

The main features of these sources of finance along with their evaluation from the point of view of the business enterprise as well as the investor are being discussed below.

6.3 (1) Equity Share Capital

Equity share capital also known as ordinary capital represents ownership capital. The holders of equity shares are the legal owners of the company. They are enticed for the dividends on the capital contributed by them. The rate of dividend is not fixed and is dependent upon the quantum of profit available after the income claims of others have been meet. The rate of dividend also depends upon the policy followed by the management of company for the management of its earnings. Equity shares are; therefore, also known as variable income security. Being the owners of the company, shareholders bear the risk of ownership. Equity capital is paid after meeting all other claims including that the preference shareholders. They, thus, bear the risk both regarding dividend and return of capital. Equity share capital cannot be redeemed during the life time of the company. Thus, it is the source of permanent capital available to the business enterprise.

Features of Equity Shares

Equity shares have a number of features, which distinguish them from other securities. These features generally relate to the right and claims of equity shareholders. These are discussed below:

(a) Claim for Income

Equity shareholders have a claim to the residual income of company, that is, the earnings which are available after paying expenses, interest charges, taxes and preference dividends. The income of equity shareholders may be retained by the firm or paid out as dividends. Dividends are immediate cash flows to shareholders. Retained earnings are reinvested in the business and shareholders stand to gain in future in the form of the firm's enhanced earning power and value of the business, ultimately resulting in unhands dividend and capital appreciation.

It should be noted that a company is not under a legal obligation to distribute dividends out of available earnings. The dividend decision is the prerogative of the board of directors and the equity shareholders are entitled to dividend that is declared by the board of directors.

(b) Claim on assets

Equity shareholders also have a residual clime on the company, assets in the case of liquidation. The assets of the business are utilized first to meet the claims of creditors and preference shareholders, and whatever is left thereafter belongs to the equity shareholders. Thus, equity shares provide a cushion to absorb losses on liquidation and may even remain unpaid.

(c) Right to Control

Equity shareholders as owner of the company have voting write in the meeting of the shareholders on the basis of the principles 'one share one vote'. The control of the company rests with the board of directors, who is elected by the equity shareholders. Thus, equity shareholders exercise an direct control over the working of the company. If the board fails to protect their interests, they can replace directors. However, the control by the equity shareholders is often weak and ineffective because of the apathy and indifference of most of the shareholders who rarely bother to cast their votes by post or through proxy, let alone attend the annual meetings.

(d) Pre-emptive rights

The pre-emptive right enables existing equity shareholders to maintain their proportional ownership. The companies Act requires companies to give existing equity shareholders the first opportunity to purchase new equity shares being issued by the company in the same proportion as their current ownership. Thus, if a shareholder owns one per cent of the company's equity share he has pre-emptive right to by one per cent of new shares issued. Shares so offered to existing shareholders are called right shares. A shareholder may however, decline to exercise this right.

(e) Limited Liability

Although equity shareholders are the owners of the company, their liability is limited to the par value of shares purchased by them. If a shareholder has already fully paid the issue price of shares he cannot be asked to contribute more in the event of a financial distress as in the case of sole proprietary business or partnership firms where they have unlimited liability. They limited liability feature of equity shareholders encourages otherwise unwilling investor to invest their funds in the company.

6.3 (2) Preference Share Capital

Preference shares are the shares which enjoy preference over equity shares in regard to, (a) payment of dividend and (b) payment of the principal amount at the time of liquidation of the company. Preference share is considered to be a hybrid security since it partake some feature of ordinary shares and some feature of debentures. It is similar to equity share in the following ways:

1. Preference dividend is payable only out of distribution profits.
2. Preference dividend is not an obligatory payment.
3. Preference dividend is not a tax-deductible payment.

Preference share is similar to debenture in the following ways:

Types of preference Shares

Depending upon the various feathers, which can be attached to preference shares, they can be classified into the following categories:

(a) Cumulative or Non-cumulative preference Shares

Cumulative preference shares have a right to claim dividend on such shares also, for which dividend could not be paid due to inadequate profits. The unpaid dividend on such shares is carried forward and accumulative dividend becomes payable in the year in which the company has divisible profits. It should be noted that a company couldn't declare' dividend on equity shares unless preference dividends are paid with arrears.

If the preference shares are non-cumulative, unpaid dividends cannot be carried forward. Dividends on such shares are payable if there are sufficient profits and the shareholders shall have no claim for the arrears of the dividend. Preference shares issued in India are generally cumulative preference shares.

(b) Redeemable or non-redeemable preference Shares

Redeemable preference shares have a specified maturity. These have a limited life after which these are supposed to be retired. Non-redeemable are perpetual preference shares on the other hand have no maturity period and cannot be redeemed unless the company is liquidated. The redemption of preference share capital can be carried out either out of profits by creating a capital redemption reserve or out of the proceeds of a fresh issue of equity preference capital.

(c) Convertible or Non-convertible preference Shares

Convertible preference shares provide the shareholders an option of converting preference shares into equity share at a certain ratio during a given period of time. For example, the preference shareholders may have the option of converting preference shares into equity shares in the ratio 1:2 after two years from the date of issue. The preference shares, which are not convertible into equity shares, are non-convertible preference shares.

(d) Participating or N0n-participating Preference Shares

Participating preference shares entitle preference shareholders to participate in surplus profit (that is, profit left after preference dividend and equity dividend at certain rates every year and residual assets (that is, assets left after meeting the claims of preference shareholders) in the event of liquidation according to a pre-determined criteria). For example, a preference share may carry the following participation feature:

(a) It is entitled to an extra dividend

(b) In the event of liquidation, it is entitled to 15 per cent of the assets left after meeting all claims except the claims of equity shareholders. Non-participating preference share do not carry the additional right to share surplus profits and residual assets of the company.

6.3 (3) Debenture

A debenture is an instrument in writing for raising long-term debt capital. It a promissory note issued by a company acknowledge a debt by it not its holders. It provides for the payment of the principal sum and interest thereon at regular intervals. Debentures have issue price at which they are originally issued, an interest rate and a specified maturity date. The purchasers of debentures are called debentures holders. In USA, they are more popular as Bonds. However, uncured bonds are known as debentures. In India, so such made between debentures and bonds. The public sector companies in the country have mostly issued bonds.

Features of Debentures

The important features of debentures are given below:

(a) Interest

The interest payment on debentures is a fixed obligation, irrespective of the financial situation of the issuing firm. Interest rate is called the contractual or coupon rate of interest. It indicates the percentage of the par value of the debenture that will be paid out annually, semi-annually or quarterly. Debentures interest is tax deductible for computing the company's tax liability.

(b) Maturity

Debentures are issued for a specific period of time. The maturity of a debenture indicates the length of time for witch funds from debentures could be available to the company for use. If the company fails to pay for debentures issued by it on maturity the debenture holders may forced the winding up of the company as creditors.

(c) Claim on assets

Debenture holders have prior claim on the assets of the company being creditors of the concern. They have to be paid first before making any payment to preference or equity shareholders in the event of liquidation of the company. Further, the debenture holders may have either specific charge or floating charge against the assets of the company. However, they are not entitled to any share in the surplus assets of the company.

(d) Control

Since debenture holders are creditors of the company, they do not have any voting rights either to elect directors of the company or to decide other matters. Hence, they do not any control or the management of the company.

(e) Call option

Debenture issued sometimes carries a call option, which provides the issuing company the option to redeem debenture at a certain price before the maturity date. Often the call option is exercisable after the expiry of specified period from the date of issue. The call (buy back) price may be more then the par value of the debenture.

Types of Debentures

Debentures can be classified into various categories on the basis of security, transferability and convertibility features attached to the instrument. These are:

(a) Unsecured (straight) or secured (Mortgage) Debentures

Unsecured debentures have no charge any of the asset of the company while secured debentures carry a fixed or floating charge on the assets of the company. The usual practice is to create a charge on the immoveable properties of the company both present and future by way of an equitable mortgage. Secured debentures are paid in priority to unsecured creditors. The public limited companies issuing debentures to the public are permitted to issue only secured debentures.

(b) Bearer (unregistered) or Registered Debenture

Bearer debentures are freely negotiable and can be transferred by a simple endorsement. On the other hand, only executing a transfer deed a filing a copy of it with the company can transfer registered debentures. The registered debentures holders receive interest cheques automatically from the company whereas interest is paid on bearer debentures only upon presentation. The government now permits only registered debentures to be issued to public.

(c) Convertible or non-convertible Debentures

Convertible debentures are the once, which can be converted into equity shares as per the terms of the issue with the regard to price and time of conversion. Convertible debentures can be either fully convertible or party convertible. Fully convertible debentures, debentures carry two parts: a convertible part and a non-convertible part. Non-convertible part will carry interest until it is repaid as per the provision in the debenture trust deed.

Non-convertible debentures (NCDs) are pure debentures without a feather of conversion. Of late, non-convertible debentures have been issued with warrants, which entitled the holder to buy a specified future data at a fixed price.

6.3 (4) Term Loans

Term loans, also known as term finance represent a source of debt finance, which is available to business enterprises for meeting their medium-term and long-term financial needs. Medium-term loans are available for periods ranging from one to five years and long-term loans are for periods beyond five years. Terms loans are obtained from the banks and financial institutions generally for financing large expansion, modernization or diversification projects. Therefore, this method of financing is also project financing. Term loans differ from short-term bank loans, which are employed to finance short-term working capital needs and tend to be self-liquidation over a period of time, usually, less than a year.

Features of Term Loans

Term loans have a number of features. These include:

(a) Maturity

Term loans are provided by banks and specially created financial institutions. Financial institutions provide term loans generally for a period of 6 to 10 years. In some cases, a grace period of 1 to 2 years (Moratorium) is also granted. During this period, the firm is not required to make any payment. Commercial banks advance term loans generally for a period of 1 to 5 years.

(b) Security

Term loans are always secured. Generally assets, which are financed with the proceeds of the term loan, provide the prime security. Other assets of the firm may serve as collateral security. Also, the lender may create fixed or floating charge against the firm's assets.

(c) Restrictive covenants

In order to project their interest, financial institutions generally impose restrictive conditions on the borrowers.

(d) Repayment schedule

The repayment schedule specified the time schedule for paying interest and principal. The common practice in India is to have payment of principal in equal instalments and pay interest on the unpaid loan. Thus, the interest payment will decline over years and the total loan payment (principal plus interest) will not be equal in each period. Paying loan in instalment saves the company from repaying huge amount at the time of loan maturity. Such payments are called balloon payments.

6.3 (5) Retained Earnings

An existing company can also generate finance through its internal sources that is by retaining a part of its yearly earnings over a period of time. Retained earnings thus constitute the sum total of those profits which have been realized over the year and have not been distributed amongst the shareholders as dividend but have been retained or reinvested in the firm. This process of retaining profits over the years is also known as ploughing back of profits. Under this method, a part of total profits is transferred to various reserves such as General Reserve. Reserve Fund, and Replacement Fund etc.

6.3 (6) Lease Financing

Lease is a contractual arrangement under which the owner of an asset (called the lesser) gives the right to use his asset to another party (lessee) over a specified period of time for a consideration called the lease rental. The lessee pays the rental to the lessor as regular fixed payments over a period of time at the beginning or at the end of a month, quarter, half-year or year. Although generally fixed, the amount and timing of payment of lease rentals can be tailored to the lessee's profits or cash flows. At the end of the lease contract, the asset reverts to the lessor. However in long-term lease contracts, the lessee is generally given the option to buy or renew the lease. While leasing of land and building has been known from old times, the leasing of industrial equipments is a relatively recent phenomenon, particularly on the Indian scene. Though lease financing represents marginal source of long term financing in India at present, it is gaining in popularity and is expected to assume greater significance in the years to come.

Types of Leases

These are several types of leases prevalent in financial markets. The major ones are:

(a) Operating Lease

Short-term cancellable lease agreement are called operating leases. Instead of taking an asset on long-term basis at one point of time, lessee prefers the system of hiring an asset for each period with the option of renewing the same after its expiration date, for example, lease contracts for computer, office equipment, car, hotel rooms, etc. the lessor is generally responsible for maintenance and insurance cost as well as for bearing the risk of obsolescence. However, the lease rentals are generally higher.

(b) Financial Lease

Long-term, non-cancellable lease contracts are known as financial lease. Financial leases amortize the cost of the asset over the term of lease. These are therefore, also called full-pay out leases. Financial lease entails lower risk to the lessor. The maintenance and service costs are generally borne by the lessee. This kind of lease is commonly used for leasing land, building and large equipments etc.

(c) Sale and Lease Back

Under this form of lease arrangement, the firm sells an asset already owned by it to another firm and hires it back from the buyer. By such an arrangement, the firm cannot only salvage its liquidity position but also retain the services of the asset for the life of the lease. Besides, such arrangements may provide substantial tax benefits.

(d) Direct Lease

Under direct leasing, the lessee acquires the equipment either from the manufacturing company directly or arranges the desired equipment to be purchased by the leasing company. In the latter situation, the lessee identifies the equipment he would like to use, arranges for the leasing company to buy it from the manufacturer and sings a contract with leasing company. In the former situation, the manufacturing company itself acts as a lessor.

(e) Primary and Secondary Lease

The lease contract is sometimes divided into parts for the purpose of lease rentals. Primary lease provides for the recovery of the cost of the asset and profit through lease rentals during the initial years of lease contract (about 4 to 5 years) which is followed by a secondary perpetual lease on nominal lease rentals. In other words, more lease rentals are charges in the primary period and less in the secondary period of the contract.

(f) Cross Border or International Lease

In case of cross border lease, the lessor and the lessee are situated in two different countries. In involves relationships and tax implications more complex than the domestic lease. When the lease transaction takes place between three parties manufactures, lessor and lessee in three different countries, it is called foreign to foreign lease.

(g) Closed and open Ended Lease

In the close ended lease, the asset gets transferred to the lessor at the end, and the risk of obsolescence, residual, value etc. remain with the lessor being the legal owner of the asset. In the open-ended lease, the lessee has the option of purchasing the asset at the end of lease higher rate.

6.4 SELF-CHECK EXERCISE

1. Expenses borne in connection with the raising of capital from the public are referred to as _____expenses.

2. Debtors are constituents of working capital requirements? True OR False

3. Retained earnings is a source of ___term finance

4. Preference share holders are the true owners of the company? True OR False

6.5 SUMMARY

It is imperative to measure the cost of a project and evaluate its financial aspects. On the basis of the measured cost, the means of financing are explored and ascertained. An appropriate capital structure and right estimate of sales and production plays a crucial role.

6.6 GLOSSARY

1. Pre-operative expense: preliminary expenses
2. Cash losses: higher cash outflows than cash inflows during a period

6.7 ANSWERS TO SELF-CHECK EXERCISE

1. Capital issue expenses
2. True
3. Long term
4. False

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6.9 TERMINAL QUESTIONS

1. What are the components of cost of project?
2. Describe briefly the various means of financing a project.

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CHAPTER – 7
CAPITAL STRUCTURE PLANNING

STRUCTURE

7.0 LEARNING OBJECTIVES

1. To understand the importance and determinants of capital structure.
2. To study the financial schemes of financial institutions.

7.1 INTRODUCTION

We described the various means of finance that can be tapped for a project in the previous lesson. How should one go about determining the specific means of finance for a given project? It is an important question to be answered. The present lesson is devoted to various guidelines and considerations that should be borne in mind for answering this question. Various financing schemes offered by the financial institutions have also been discussed in this lesson.

7.2 CAPITAL STRUCTURE

Capital structure of a firm refers to the composition or makeup of its capitalizations and it includes all long-term capital resources viz. loans, reserves, shares and bonds. It is frequently used to indicate the long-term sources of fund employed in a business enterprise. Capital structure refers to the proportion in which the firm raises its long-term funds from various sources of capital.

7.3 IMPORTANCE OF CAPITAL STRUCTURE

The following reasons make capital structure decision as one of the most important decision.

1. Financial risk assumed by a firm depends upon its capital structure.
2. Capital structure affects the cost of capital of the firm.

3. Capital structure affects the value of the firm by either affecting its cost of capital or financial risk or both.
4. Financial flexibility of a firm depends upon its capital structure
5. Capital structure of a firm depicts the attitude of the management towards risk and return.

7.4 DETERMINANTS OF CAPITAL STRUCTURE

Capital structure decision is highly individualistic. Every firm must design its capital structure having regard to the relevant factors affecting such capital structure. A large number of factors have a bearing on the design of the capital structure of a firm. These factors differ in intensity from one industry to another industry and even from one firm to another firm within the same industry. While designing the capital structure of a firm, its financial manager should take care of the relevant factors affecting the capital structure of the firm. Some of the important factors affecting the capital structure decision are discussed below:

1. Nature of business

The nature of business of a firm has a significant influence on its capital structure. Those businesses, which do not have stable income and face more risk, should prefer equity capital. Those companies which are engaged in public utility services or producing commodities of basic consumption may rise capital through the issue of debenture of preference shares.

An asset on long-term basis at one point of time, lease prefers the system of hiring an asset for each period with the option of renewing the same its expiration date, for example, lease contracts for computers, office equipment car hotel rooms etc. the lesson is generally responsible. However, the lease rentals are generally higher.

(b) Financial Lease

Long-term, non-cancellable lease contracts are known as financial lease. Financial leases amortize the cost of the asset over the term of lease. These are therefore, also called full-payout leases. Financial lease entails lower risk to the lessor. The maintenance and services costs are generally borne by the lessee. This kind of lease is commonly used for leasing land, building and large equipments etc.

(c) Sale and Lease Back

Under this form of lease arrangement, the firm sells on asset already owned by it to another firm and hires it back from the buyer. By such an arrangement, the firm cannot only salvage its liquidity position but also retain the service of the asset for the life of the lease. Besides, such arrangements may provide substantial.

(d) Direct Lease

Under direct leasing, the lessee acquires the equipment either from the manufacturing company directly or arranges the desire equipment to be purchased by the leasing company. In the latter situation, the lessee indentifies the equipment he would like to use, arranges for the leasing company to buy it from the manufacturing and sings a contract with leasing company. In the former situation the manufacturing company itself acts a lessor.

(e) Primary and Secondary Lease

The lease contract is sometimes dividend into two parts for the purpose of lease rentals, primary lease provides for the recovery of the cost of the asset and profit through lease rentals during the initial years of lease contracts (about 4 to 5 years) which is followed by a secondary perpetual lease on nominal lease rentals. In other words, more lease rentals are charged in the primary period and less in the secondary period of the contracts.

(f) Cross Border Lease or International Lease

In case of cross border lease, the lessor and the lessee are situated in two different countries. It involves relationship and tax implications more complex than the domestic lease. When the lease transaction takes place between three parties: manufactures, lessor and lessee in three different countries, it is called foreign lease.

(g) Closed and Open Ended Lease

In the close ended lease, the asset gets transferred to the lessor at the end, and the risk of obsolescence, residual value etc. remain with the lessor being the legal owner of the asset. In the open-ended lease, the lessee has the option of purchasing the asset at the end of lease higher rate.

2. Growth and stability of sales

The nature and pattern of sales of a firm has a significant affect on its capital structure. A firm whose sales are stable or rising steadily can generate more cash to discharge fixed interest obligation and pay preference dividend. On the other hand, those firms whose sales are fluctuating and cannot be predicted accurately cannot assume fixed interest obligations. Therefore those firms, those sales are stable or rising steadily, can raise their capital through the issue of debt. On the other hand, those firms whose sales are fluctuating should prefer issuing equity capital for raising funds.

3. Cost of capital

The cost of different sources of capital has a special effect on the capital structure of a firm. Different sources of capital should be combined in such a manner so that the overall cost of capital of the firm is the minimum and the financial risk is within manageable limits. From cost of capital point of view, debt is a cheaper source of capital as compared to cost of preference capital and cost of equity capital on account of two reasons: (i) the rate of interest on debt in lower than the rate of dividend on preference capital or equity capital and (ii) interest on debt is tax deductible whereas dividend on preference capital or equity capital has to be paid out of post-tax profits. The cost of equity is the highest as the company has to pay a high rate of dividend to satisfy the expectations of equity shareholders. The cost of preference capital lines between the cost of debt and cost of equity capital. From the cost point of view, debt is preferable to equity capital.

4. Risk

Capital structure of firm should pose minimum possible risk. From risk point of view, debt is the most risky source of capital due to (i) a firm has to pay fixed amount of interest irrespective of its net operating income, and (ii) in case of default the creditors can ask for the winding up of the business. Equity capital, on the other hand, is the least risky source of capital. There is no fixed commitment to pay equity dividend. Equity capital has not to be returned to the equity shareholders

during the life time of the company. Preference capital involves moderate degree of risk. It is more risky than equity capital but lesser risky than debt. From risk point of view, the issue of equity capital is preferable to the issue of debt or preference capital.

5. Ability to serve debt

The ability to serve debt depends upon the Pattern and magnitude of cash flows of a firm. If a firm can generate sufficient cash to discharge are fixed interest obligations and loan repayments, it can have more debt capital structure. On the other hand, a firm with meagre cash flows from operations should not raise debt capital. Generally two ratios (i) interest coverage ratio and (ii) cash to debt service ratio are computed to assess the debt service ability of a firm.

6. Operational Characteristics

Operational characteristics of a firm influence its capital structure in a significant manner. Different firm may employ different technologies to manufacture their products. Some firms employ labour intensive technologies of production whereas others may adopt capital –intensive technologies. Those firms, which employ capital-intensive technologies of productions, have large investment in fixed assets. Fixed costs constitute a major portion of total costs in such firms and thus these firms have more operating risk. Therefore, these firms should assume lesser financial risk to keep the overall risk within manageable limits. They should prefer equity capital to debt. On the other hand, firms with labour intensive technologies of production and trading firms do not have to invest much in fixed assets. Fixed costs of these firms are lower as compared to fixed costs of these firms employing capital-intensive technologies. These firms are subject to lesser operating risk and therefore they can afford to use more of debt capital.

7. Purpose of financing

The purpose for which funds are to be raised has a distinct bearing on the capital structure of a firm. If the funds are needed for a productive purpose like expansion or diversification, which is expected to generate sufficient cash inflows, the firm may consider the issue of debentures for raising capital for such a purpose. On the other hand, if the funds are needed for an unproductive purpose like meeting some legal or social responsibilities, the issue of equity capital should be preferred.

8. Age and size of firm

The age and size of the firm considerably affect the design of its capital structure. New and small firms have to depend upon outside equity and debt capital. As a firm grows in size, retained earnings start replacing outside debt and equity. Large and reputed companies have access to the capital market and therefore they can raise their capital through the issue of different kinds of securities. On the other hand, small firms do not have an access to the capital market and therefore, they have to depend more on owned capital.

9. Period of finance

The period for which funds are needed also affect the capital structure. If the funds are needed permanently or for a long period of time, than the issue of equity capital, irredeemable debentures or preference shares should be considered. On the other hand, if the funds are needed for medium term or for relatively shorter period, than the issue of redeemable debentures or redeemable preference shares should be preferred.

10. Corporate tax rate

Presence of corporate taxes has a significant influence on the cost of various sources of capital and hence on the capital structure of firm. As started earlier, interest on debt is tax deductible whereas dividend on preference capital or equity capital has to be paid out of post-tax profits. Consequently, cost of debt is significantly lower than the cost of equity or cost of preference capital. Therefore, it can be said the higher the tax rate, greater is the advantage of using debt capital as compared to equity capital or preference capital.

11. Floatation costs

Floatation cost of raising funds from various sources of capital should be given due consideration while, designing the capital structure of a firm. Floatation costs consist of expenses of printing, promotional martial and publicity, brokerage and commission payable to intermediaries like brokers and bankers. Generally, flotation costs of debentures are lower than that of equity capital. From the floatation costs point of view debt is preference to equity shares.

12. Nature of Investors

Investors can be divided into different categories on the basis of their risk return preferences. Some investors are prepared to assume higher risk to earn higher return. On the other hand, some other investors prefer playing safe. They do not want to assume higher risk and satisfied with lower return. While designing its capital structure, the firm should take care of the requirements of its investors. For those investors who do not want to take higher risk, the firm should consider issuing debentures or preference shares. For risk assuming investors the equity share should be issued.

13. Capital market conditions

Conditions prevailing in the capital market not only determine the types of securities to be issued but also the rate of interest on debentures, rate of dividend on preference capital and the issue prices of various secularities. In case of favourable market conditions, the company can issue various types of securities to raise capital for its expansion and other purposes. On the other hand, if the conditions in the capital market are depressed, the firm cannot think of raising capital through the issue of equity capital and other securities. In such a situation it has to approach financial institutions for term loans to fulfil its requirement of funds.

14. Attitude of management

Management of different firms differ in skills, judgement, experience, temperament and motivation. Some management are aggressive. They are prepared to assume higher risk to reduce the cost of capital and increase the market values of their firms. Such management are conservative. They do not want to assume more risk. Such management prefer equity capital as a source of funds for the firm. The conservatism on the aggressiveness of the management depends upon the age, experience, ambition and confidence of the persons constituting the management team. Therefore these factors also affect the capital structure of a firm.

15. Legal and other conditions

Lastly while designing its capital structure: the firm should also take care of the relevant provision of various laws framed by the government from time to time. It should also take care of the norms set by financing institution, securities and Exchange Board of India and stock exchanges.

7.5 FINANCING SCHEMES OF FINANCIAL INSTITUTION

Financial institutions provide both direct and indirect financial assistance.

7.5 (1) Direct Financial Assistance

Financial institution provides direct financial assistance in the following ways:

Rupee Term Loans: the most significant from of assistance provided by financial institution, rupee term loans are given directly to industrial concerns for setting up new projects as well as for expansion, modernisations, and renovation projects. These funds are provided for incurring expenditure for land, building plant and machinery, technical know-how, miscellaneous fixed assets, preliminary expenses, preoperative expenses, and margin money for working capital.

Foreign Currency Term Loans: financial institution provide foreign currency term loan from meeting the foreign currency expenditure, towards import of plant, machinery and equipment, and also towards payment of foreign technical know-how fees. The periodical liability for interest and principal remains in the currency\currencies of the loans and is translated into rupee at the prevailing rate of exchange for making payments to the financial institutions.

Subscriptions to Equity Shares and Debentures: In addition to providing term loans (in rupee as well as foreign currencies), financial institutions also subscribe to equity as well as debenture capital in a limited way.

Lease Finance: A lease represents a contractual arrangement whereby the lesser (the financial institution) grants the lesson the right to use an asset in, return for periodic lease payments.

Hire Purchase Finance: under a hire purchase arrangement the financial institution gives assets on hire to a user (hirer) who pays periodic hire purchase instalments. On payment of the fire purchase instalment, the ownership' of the assets is transferred from the financial institution to the hire.

Bill Discounting: financing institutions discount bills arising from the purchase of capital goods to some extent.

Short Term Credit: Asset-based credit of a relatively shorter tenor is now being provided by financing institution.

Seed Capital: Financial institution provides seed capital to supplement the resources of promoters of small and medium scale industrial units. Support in this form, however, is being phased out.

7.5 (2) Indirect Financial Assistance

Besides providing direct financial assistance, financial institutions extend help to industrial units in obtaining finance\credit through the following ways.

Deferred Payment Guarantee: Financial institutions issue guarantee on behalf of the buyers of industrial machinery to the supplier offering the facility of deferred payments. Should there be a default by the buyer in the payment of deferred instalments, financial institutions make the payment and subsequently recover the amount from assisted unit. A nominal commission is charged for providing such guarantee.

Guarantee for Foreign: Currency Loans: Financial institutions provide guarantee for foreign currency loans obtained by industrial concerns from institutions and banks abroad. A nominal commission is charged to the assisted unit f or such guarantee.

7.6 FINANCING POLICIES AND NORMS

The key financial policies and norms followed by the institutions are as follow:

Project Size and is Institutional Participation

State level financial institutions along with commercial banks under the IDBI refinancing scheme finance projects costing up to RS.100 million. For any single project, the following term loan limits apply under the IDBI refinancing scheme: Rs. 15 million by State Financial Corporations. Rs. 25 million by state industrial Development Corporations, projects costing more than Rs. 100 million are considered for financing by the all India financial institutions.

Debt-Equity Norms

The general debt-equity norm for medium and large-scale projects is 1.5:1. This serves as a broad guideline against which variations are permitted on a case-to-case basis.

Promoters' Contribution Norm

Earlier, the contribution required from the promoter used to be between 12.5 per cent and 22.5 per cent of the project cost depending on factors like the background of the promoter, the location of the project, and so on. Presently, however, the minimum contribution from the promoters is 22.5 per cent, irrespective of anything. Only for small-scale industries, SIDBI has stipulated a minimum promoters' contribution ranging from 17.5 per cent to 22.5 per cent depending on the location of the project.

Over-run Financing

When an application for over run financing is received, the appraising financial institution tries to segregate between controllable over-run (caused by factors deemed controllable by the management) and uncontrollable over-run (caused by factors outside the control of management). While the financial institutions take a lenient view with respect to uncontrollable cost over-run (which results primarily from changes' in governmental policies and exchange fluctuations), they are disinclined to support controllable cost over-run.for Uncontrollable cost over-run the norms of financing (the debt-equity norm and the promoters' contribution norm) as applicable to the original project cost are followed. Controllable cost over-run, however, is usually financed by promoters and by way of public subscription.

7.7 SPECIAL FINANCING SCHEMES

Several special scheme have been designed to serve the varied need of industry, the important ones are discussed below:

Bill Rediscounting Scheme IDBI has a bill-rediscounting scheme to enable industry units to buy capital equipment on a deferred payment basis. The scheme work as follows:

The prospective buyer suggests to the manufacture/seller of capital equipment that instead of making full payment in cash he would like to avail of the facility of deferred payments under the bill rediscounting scheme of IDIB. The manufacture/seller, if he agrees to the proposal of the buyer, divides the cost of equipment, excluding advance payment, into half-yearly or yearly instalments

and prepares a separate bill/ promissory note for each instalment plus interest in respect of deferred payment. (The period of deferred payment is normally less than 5 years). The bill promissory notes are accepted/guaranteed by, or on behalf of the buyer on delivery of the equipment. The manufacture/ seller discounts the bills/promissory notes with his banker, realizing the cost of his machinery. (The discount payable by the seller/manufacture to his banker is included in the amount of bills in the form of interest). The banker of the manufacture/seller buys back the bill from IDBI three days (working days) in advance of their due date and gets payments from the acceptor/guarantor of the bills on maturity due dates.

Supplier's Line of Credit

Somewhat similar to the bill rediscounting scheme of IDBI, the supplier's line of credit is 'provided by ICICI to indigenous manufactures of machinery for selling their equipment on deferred payment terms. Under the IDBI scheme, usance bills/promissory notes are discounted by commercial banks that in turn avail of the IDBI rediscounting facility. Under the ICICI scheme, however payment is made directly to the indigenous machinery manufacture against usance bills accepted or guaranteed by the purchaser's bank.

The salient features of the supplier's line of credit are:

- ❖ The scheme provides assistance to indigenous machinery manufactures for sale of equipment (along with spares) to actual users for balancing, replacement: and modernization purposes only.
- ❖ A non-revolving line of credit is extended to the seller normally with a validity period of two years from the date from sanction. Each time the seller wants to avail of the line of credit, he has to get ICICI's prior approval.
- ❖ Advances are made against usance bills duly accepted or guaranteed by the purchase's bank.
- ❖ The amount of deferred credit is usually between 80 to 90 per cent of the value of the other- the balance is payable by the buyer as advance payment. The period of deferred credit is five to seven years and the amount is repayable in ten to fourteen equal half yearly instalments.
- ❖ The interest rate on the supplier's line of credit facility is currently 18 per cent per annum for a five-year facility and 18.5 per cent annum for a seven years facility.

7.8 SELF-CHECK EXERCISE

1. Capital structure of a firm refers to the composition or makeup of its capitalizations and it includes all long-term capital resources? True OR False
2. Capital structure affects the cost of capital of the firm? True OR False
3. From cost of capital point of view, _____is a cheaper source of capital.
4. _____ratios are calculated to assess the debt service ability of a firm.

7.9 SUMMARY

Capital structure planning is one of the strategic 0f financial management. Considerable attention is needed for designing the capital structure of the fire. Capital structure decision directly affects the cost of capital, financial risk and value of a firm. A right capital structure decision can reduce the cost of capital and increase the value of the firm. On the other hand, a wrong capital structure decision can adversely affect the value of the firm. As stated earlier, different sources of capital differ in risk return characteristics from each other. The cost of the capital and the financial risk of the firm depend upon the way the capital of the firm is raised. Thus a financial of a firm through the design of an appropriate capital of the firm is raised. Thus a financial manager can contribute to the fulfilment of value maximization objective of a firm through the design of an appropriate capital structure. Therefore due care should be exercised while selecting the financial mix.

7.10 GLOSSARY

1. Cost of capital: the minimum return investors expect for providing capital to a company.
2. Floatation cost: expenses which are associated with issuing of new securities.

7.11 ANSWERS TO SELF-CHECK EXERCISE

1. True
2. True
3. Debt
4. Interest coverage ratio, cash to debt service ratio

7.12 REFERENCES/SUGGESTED READINGS

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7.13 TERMINAL QUESTIONS

1. What are the determinants of capital structure?
2. Critically evaluate various financing schemes of financial institution known to you.

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CHAPTER-8
PROFITABILITY ANALYSIS AND FINANCIAL PROJECTIONS

STRUCTURE

8.0 LEARNING OBJECTIVES

1. To understand factors affecting Profit.
2. To understand profit maximization, its advantages and limitations.

8.1 INTRODUCTION

Profitability analysis technique employed in several industrial countries is vitally important to assess the operational efficiency of a project and its profitability. It also seeks to correct the structural deficiencies and improve productivity and profits.

Profit is the primary objective of an enterprises, in view of heavy investment, which is necessary for the success of most enterprises, profit in the accounting sense tends to become a long-term objective, which measures not only the success of a product but also of the development of the market for it. The word “profit” implies a comparison of the operations of business between two specific dates, which are usually separated by an interval of one year. In order to optimize these corporate resources of wealth on which national prosperity depends, the basic financial objective of companies is to maximize, within socially acceptable limits, profit from the use of the funds employed by them. The maximization of profit within a socially acceptable limit implies that a proper regard for public interest has been shown. No company can survive long without profit, for profit is the ultimate measure of its effectiveness. Also, and in a capitalist society, there is no future for a private enterprise showing repeat losses. The crucial measures of the effective performance of a business are profit, which really is a measure of how well a business performs economically.

Profit is a signal for the allocation of resource and a yardstick for judging managerial efficiency. i t is wrong to believe that the importance given to profit planning in the literature on business finance does not reflect its genuine, importance in the financing activities of a modern business firm. In fact, it is the growth of profit, which enables a firm to pay higher dividends to its ordinary shareholders.

Profit result from transactions, which should satisfy both the parties to it. The vendor should be satisfied that the prise is acceptable, and that it gives him an appropriate return for the work he has done and the risks he has taken. The purchaser should be satisfied that he has had a full value for his money. Irrespective of the way in which a company's profitability is expressed, its profit potential depends on its product so that they provide value not only to the customer, but also to the company itself. Good pricing result in good profits.

Profit is a dominant goal of a business, and profit making should be the main objective in terms of which the general effectiveness of an organization is measured have long been concerned with profit and have framed theories to explain both their meaning and distribution. According to them, profit is the reward for entrepreneurship. A source of funds, which is completely within the internal system, is that of profit making. The exact contribution, which profit make to funds, is a disputable matter. But the fact that funds are augmented by profits and reduced by losses should be beyond controversy.

Goals or objectives are the ends, which a business enterprise seeks to achieve through its existence and operations. A typical business establishment seeks to achieve more than one goal and there are always restraints to the attainment of some goals. Objectives vary with the passage of time. Goals common to most contemporary establishments are; quality products and services, growth, employee satisfaction and development, service to society.

8.2 FACTORS AFFECTING PROFIT

A number of factors influence profit variations. These are:

1. Mix of product changes: The effect of the mix of product changes upon profit is fairly easy to interpret and record, if a good system is in use.
2. Volume of fluctuations: The volume of sales plays a tremendous part in profit making. So long a sustained maximum volume continues at the top of capacity curve, break-even point would be far away. The profit path is wide and deep at the point.
3. Performance changes on any volume: To attain real sophistication part in profit calculation, the true profits at any given volume which should exist at a planned breakeven point are separated from the profit created by the performance at one attained volume.
4. A change in fixed costs changes the break-even point, but not the marginal profit. The marginal point is the profit picked up above the break-even point.
5. A change in variable costs and selling prices changes both the break-even point and the marginal profit.
6. The rate of marginal profit is affected by a change in variable costs, selling price and operating performance as against planned performance.

7. When both the fixed variable cost change and when they move in tandem, the effect of the break-even point is pronounced and definite. When they move in opposition to each other, the effect is very weak.
8. The marginal break-even point is that point of output at which out-of-pocket costs are recovered. Depreciation and amortization costs are excluded from them.

If the fact that the central purpose of a business is to earn a profit is accepted, the first problem is to determine the factors, which determine the level of profitability should first measure the relationship between profits and the funds committed in the business to earn that profit.

The first step in devising the strategy is to measure the task. For private industry, the measure of a task is the gap between the level of profit achieved by a business without the introduction of any major changes and the level of profit, which the target profitability measurement indicates, should be earned. Value is what people think it is. Any analysis is in the final test, subject to the values that the world at large is prepared to place upon it. The people, who are prepare to buy it of course, say the final word. The value of the decision-maker to the sensitivity analysis is that he can choose that which, he thinks, is the most likely value for any variable and read off the resulting rate of return or NPV. He does not have to accept a single-valued estimate based on somebody else's appraisal of the outcomes. The measurement and control of profitably in a company or any other business organisation should from one of the principal objectives of the finance function of a management.

A return on investment has come to be regarded as perhaps the most important measure of industrial and commercial efficiency. This is, as it should be, weather in the different activities of a capitalist economy or in the field of public investment. Even, the communist regime of the USSR which eschewed the profit motives the recognized return on investment as a proper measure of efficiency.

Indicators for Measuring Income

T.A. Lee has suggested following requisites for measuring income. He is of the opinion that income is:

1. A guide to dividend and retention policy.
2. A measure of management effectiveness.
3. A measure of a management's stewardship of the entry's resources.
4. A means of evaluating the result of past decisions and of working on future decisions.
5. A managerial aid in a variety of decision areas within and outside the business entry.

8.3 ESTIMATES OF SALES AND PRODUCTION

Typically, the starting point for profitability projections is the forecast for sales revenues. In estimating sales revenues, the following considerations should be borne in mind:

1) It is not advisable to assume a high capacity utilization level in the first year of operation. Even if the technology is simple and the company may not face technical problems in achieving a high rate of capacity utilization in the first year itself, there are likely to be other constraints like raw material storage, limited power, marketing problems, etc. It is sensible to assume that capacity utilization would be somewhat low in the first year and rise thereafter gradually to reach the maximum level in the third or fourth year of operation. A reasonable

assumption with respect to capacity utilization is as follows: 40-50 per cent of the installed capacity in the first year, 50-80 per cent in the second year and 80-90- per cent from the third year onwards.

2) It is not necessary to make adjustment for stocks of finished goods. For practical purposes, it may be assumed that production would be equal to sales.
3) The selling price considered should be the price realizable by the company not of excise duty. It shall, however, include dealers' commission, which is shown as an item of expense (as part of sales expenses).
4) The selling price used may be the present selling price-it is generally assumed that changes in selling price will be matched by proportionate changes in cost of production. If a portion of production is saleable at controlled price, take the controlled price of that portion.

Sales and production are closely interrelated. Hence they may be estimated together.

8.4 ESTIMATING COST OF PRODUCTION

Given the estimated production, the cost of production may be worked out. The major components of cost of production are:

- ❖ Material cost
- ❖ Utilities cost
- ❖ Labour cost
- ❖ Factory overhead cost

Materials

The most important element of cost, the material cost comprises the cost of raw materials, chemicals, components, and consumable stores requires for production. It is a function of the quantities in which these materials are required and the price payable for them.

While estimating the material cost, the following points should be borne in mind:

1) The requirements of various material inputs per unit of output may be established on the basis of one or more of the following: (a) theoretical consumption norms, (b) experience of the industry, (c) performance guarantees, and (d) specification of machinery suppliers.
2) The total requirement of various material inputs can be obtained by multiplying the requirements per unit of output with the expected output during the year.
3) The prices of material input are defined in CIF (cost, insurance, and freight) terms.
4) The present costs of various material inputs are considered. In other words, the factor of inflation is ignored. It may be recalled that the factor of inflation is ignored in estimating the sales revenges too.
5) If seasonal fluctuations in prices are regular, the same must be considered in estimating the cost of material inputs.

Utilities

Utilities consist of power, water, and fuel. The requirements of power, water, and fuel any be determined on the basis of the norms specified by the collaborators, consultants, etc. Or the consumption standards in the industry, whichever is higher.

The cost of power here would include only the cost of bought out power and it may be estimated on the basis of power tariff structure of the concerned electricity boards. The cost of captive power would naturally be reflected in the cost of fuel, etc. The cost payable to local authorities and charge payable to some other firm to water and/or steam supply may be shown separately. Where the entire water requirement is meet out of own wells, water charges need to be shown separately. The cost of fuel (furnace oil, coal, firewood, etc.) often an important item is somewhat more difficult to estimate.

Labour

Labour cost is the cost of all manpower employed in the factory. Labour cost naturally is a function of the number of employees and the rate of remuneration. The requirement of workers depends on the number of operators/helpers required for operating various machines and manning various services. The number of supervisory personnel and administrative staff may be calculated on the basis of the general norms prevailing in the industry.

In estimating remuneration rates, the prevailing rates in the industry/area should be taken into account. The remuneration should include, beside basic pay, dearness allowances, house rent allowance, conveyance allowance, reimbursement, leave travel concession provident fund contribution, gratuity contribution, and bonus payments, in addition, account should be taken of adding a certain percentage, on a global basis, to the basic pay. It is, however, advisable to make a detailed analysis, at least in the beginning. Labour cost estimate may be raised at the rate of 5 per cent per annum to allow for annual increment. Etc.

Labour cost may be calculated for the year in which the maximum capacity utilisation is first achieved. For the earlier years, when the capacity utilisation teds to be low, somewhat lower labour cost, but not proportionately lower in relation to capacity may be assumed.

Factory Overheads

The expenses on repairs and maintenance, rent, taxes, insurance on factory assets, and so on are collectively referred to as factory overheads. Repairs and maintenance expenses depends on the state of the machinery. This expense tends to be lower in the initial years and higher in the later years. Rant, taxes, insurance, etc May be calculated at the existing rates. A provision should be made for meeting miscellaneous factory. In addition, a contingency margin may be provided on the items of factory overheads.

8.5 PROFITABLITY PROJECTIONS (OR ESTIMATES OF WORKING RESULTS)

Given the estimate of sales revenue and cost of production, the next step is to prepare the profitability projection or estimates of working results (as they are referred to by term-leading financial institution in India). The estimates of working result may be prepared along the following lines:

A. Cost of production

B. Total administrative expenses

C. Total sales expenses

D. Royalty and know-how payable

E. Total cost of production (A+B+C+D)

F. Expected sales

G. Gross profit before interest

H. Total financial expenses

I. Deprecation

J. Operating profit (G-H-I)

K. Preliminary expenses written off

L. Profit/loss before taxation (J+K-L)

M. Provision for taxation

N. Profit after tax (M-N)

Less Dividend on

- Preference Capital

- Equity Capital

O. Retained profit

P. Net cash accrual (P+I+L)

Cost of production – This represent the cost of materials, labour, utilities, and factory overheads.

Total Administrative Expenses – This consists of (i) administrative salaries, (ii) remuneration to directors, (iii) professional fees, (iv) light, postage, telegrams, and telephones, and office supplies (stationery, printing, etc.) (v) insurance and taxed on office property, and (vi) miscellaneous items.

Total Sales Expenses – The expanses included under this head are: (i) commission payable to dealers, (ii) packing and forwarding charges, (iii) salary of sales staff (which may be increased at 5 per cent per annum), (iv) sales promotion and advertising expenses, and (v) other miscellaneous expenses.

The selling expenses depend mainly on the nature of industry and the kind of competitive conditions that prevail. The experience of similar firms in the industry may be used as a basic guideline.

Royalty and know-how payable – Royalty and know-how payable annually may be shown here. The royalty rate is usually 2-5 per cent of sales. Further, royalty is payable often for a limited number of years, say 5 to 10 years.

Total cost of production – this is simply the sum of cost of production; total administrative expenses, total sales expenses, and royalty and projection exercise.

Expected Sales – The figures of expected sales are drawn from the estimate of sales and production prepared earlier in the financial analysis and projection exercise.

Gross profit Before Interest – This represents the difference between expected sales and total cost of production.

Total Financial Expenses – Financial expenses consist of interest on term loans, interest on bank borrowings, commitment charges on term loans, and commission for bank guarantees. The principal financial expenses, of course, are interest on term loans and interest on bank borrowings.

In estimating the interest on term loans, two points should b borne in mind:

(i) Interest on term loans is based on the based on the present rate of interest charges by the leading financial institutions and commercial banks.

(ii) Interest amount would decrease according to the repayment schedule of term loan.

The interest on bank borrowings may be estimated as follows:

(i) Determine the total requirement of the working capital,

(ii) Find out the quantum of bank borrowing that would be available against the total working capital requirement, and

(iii) Calculate the interest charges on the basis of the prevailing interest rates.

Depreciation: This is an important item, particularly for capital-intensive projects. In figuring out the depreciation charge, the following point should be borne in mind:

1) Contingency margin and pre-operative expenses provided in estimating the cost of project should be added to fixed assets proportionately to ascertain the value of fixed assets for determining the depreciation charge.
2) Preliminary expenses in excess of 2.5 per cent of the project cost (excluding working capital margin) should be added to fixed assets proportionately to ascertain the value of fixed assets of determining the deprecation charge.
3) The income tax Act specifies that the written down value method should be used for tax purposes in further specifies the rate of depreciation applicable to different kinds of assets.
4) For company law (financial reporting) purposes, the method of depreciation may be either the written down value (WDV) method or the straight-line (SL) method. From 1988 onwards the depreciation rates under the Companies Act have been delinked from those under the income tax Act.

Other income - This represents income arising from transactions not part of the normal operations of the firm. Examples of such transactions are: sale of machinery, disposal of scrap etc. Expert disposal of scrap, which can be reasonably anticipated and estimated, the effect of other non-operating transactions can hardly be estimated. Of course, when non-operating transactions result in a deficit, other income would be negative-put differently there will be a non-operating loss.

Write-off of Preliminary Expenses – preliminary expenses up to 2.5 per cent of the cost of project or capital employed, whichever is higher, can be amortized in ten equal annual instalments.

Profit/Loss Before Taxation – This is equal to: operating profit + other income – write-off of preliminary expenses.

Provision for Taxation – to figure out the tax burden, a sound understanding of the income tax Act a complicated legislation-and relevant case laws is required. While calculating the taxable income, a variety of incentives and concessions have to be taken into account. Once the taxable income, as per the income tax Act, is calculated, the tax burden can be figured out fairly easily by applying the appropriate tax rates.

Profit After Taxation – This is simply profit/loss before taxation minus provision for taxation. A part of profit after tax is usually paid out as dividend-dividend on preference capital and dividend on equity capital.

Retained profit – The difference between profit after tax and dividend payment is referred to as retained profit. It is also called ploughed earning.

Net Cash Accrual – The net cash accrual from operations is equal to: retained profit + depreciation-write-off of preliminary expenses + other non-cash charges.

8.6 CHARATERISTICS OF PROFIT PALNNING AND CONTROL

1. Probe into the Future – profit planning is an indicator of what the future holds for a company.
2. Flexibility: This activity calls for an attitude of flexibility and a capacity to adjust to changes. Plans should contain strategies to advance or retreat, as the situation demands. Any programme of profit planning and control should provide some margin for adjustment. A budget should not dominate business but should help it. It is meant for the business and not vice versa. No straightjacket should be imposed on profit planning and control.
3. Sensitivity: This activity requires sensitivity to change. It should be of real value in maintaining a company' competitive condition and ensure an excellent profit performance.
4. Excellent Direction and Control: profit planning requires both centralized and decentralized direction and control. A businessman will have to decide this for himself in the light of the peculiar conditions of his own his business.
5. Support: In order to make to a success, a meaningful support of the top management should be available. The top management must be effectively sold on the ideas of profit planning and control. Without support, profit planning is bound to be a flop.
6. Organization: profit planning should rest on a sound organizational structure and clear-cut lines of authority and responsibility. The authority of different executives and supervisor should be properly spelled out.
7. Confidence: management should ensure that is policies, plans, objectives and standards are all realistic. It should be confidence that all the individuals responsible for profit planning and control but their heart and soul into making a success of the organization.
8. Performance: In profit planning, programmes should be so developed as to ensure that the expectations of performance are justified. Fiscal values are estimated for various accounting classifications. It is necessary to supplement fiscal expectations with the standards of performance.
9. Participation: This refers to the involvement of everyone in the organization to the fullest extent in developing plans and in carrying out related responsibilities. Even lower levels of management should react favourably to participation in the process of profit planning and control.
10. Individual Recognition: The accomplishment of outstanding as well as substandard performances should be individually identified and recognized. The system of evaluation should be fair, understandable and reasonably accurate.
11. Responsibility Reporting: In responsibility reporting, costs are planned and adjusted in accordance with organizational responsibility, and communicated to and from the individuals responsible for their incurrence. There should be effective responsibility accounting in terms of assigned responsibilities. A chart of accounts should be set up in terms of areas of managerial responsibilities.

12. Management by Exception: Executives should devote their time to unusual items rather than be concerned with paltry, routine matters. To make this principle effective, profit planning and control system must be designed in such a way that exceptions stand out.
13. Standards: profit planning and control presume a system of goals, objectives and standards. These are in fact benchmarks of profit planning and control.
14. Effective Communication: to encourage participation, it is necessary to have effective communication among the individuals who are expected to participate in the programme of profit planning and control.
15. Timeliness: There should be definite time schedule for planning performance reports, control action and follow-up. In other words, there should be a planner.
16. Realism: This activity should be realistic. Plans should be capable of being translated into actual practice. In profit planning, the management should avoid under conservatism and irrational optimism. A most practical approach should be made to any programme of profit planning and control. Its uses should be properly understood and its limitations correctly visualized. The programme should not be too optimistic or too pessimistic, but should itself be a golden mean. Moreover, too many things should not be padded into a programme of profit planning and control.
17. Significance: profit planning and control should neither be too prices, nor should it contains too little information. Such facts should only be taken included was would be essential for both these activities.
18. Cost Consciousness: cost consciousness is more an attitude than anything else. Advantages should be taken to stimulate people from top to bottom and obtain their co-operation in the campaign for controlling expenditure.
19. Follow-up: The quality of performance should be checked as soon as possible. Poor performance should be subjected to corrective action. Outstanding performance should be recognized and persons who are responsible for it should be adequately and properly rewarded.
20. Education: supervisory personnel should be educated in the objectives, potentials, fundamentals and techniques of profit planning and control. All budget problems should be made known to them.

8.7 ADVANTAGES OF PROFIT MAXIMIZATION

Profit maximization has been considered to be the most important business objective for the following reasons:

1. It is rational to accept profit for a business enterprise.
2. It is difficult to survive without profit maximization.
3. Even for the attainment of social and economic welfare, profit maximization has to be achieved.
4. A business with a high level of profitability will generate a high level of funds, out of which it can provide for expansion, in addition to a substantial and increasing return to its shareholders.

5. In the absence of profit, business activity would remain static. A firm cannot afford to do this because:

a. Price level are not stable. Profits, therefore, have to made to create additional resources.

b. Investors is business would expect a positive return on their investment. Profits are essential for ensuring this return.

c. It would not be possible to maintain the same level of activity because of the pressures for the expansion of business. The resources required for this purpose have to be provided through profits.

8.8 LIMITATIONS OF PROFIT MAXIMIZATION

1) Profit is essential, but it would be wrong to assume that every action initiated by the board of Directors is aimed at maximizing profits, irrespective of its social consequences.

2) One of the difficulties in looking at the comparative profitability of a number of companies lies in their different standard of valuing business assets.

8.9 SELF-CHECK EXERCISE

1. No company can survive long without _____, for _____ is the ultimate measure of its effectiveness.
2. A change in fixed costs changes the marginal profit. True OR False
3. A change in variable costs and selling prices changes both the break-even point and the _____.
4. Factory overhead cost is a major component of cost of production? True OR False
5. Utilities consist of _____,_____,_____

8.10 SUMMARY

Profit motive is the prime mover of business activity. In fact, profitability is the most useful overall measure to the health of an enterprise. In other words, the profitability of an enterprise in anyone year is the relationship between the profit made and the funds employed to earn the profit. Profitability analysis is a useful tool/technique to entrepreneurs to take right decisions in maximizing profits and to bankers and financial institutions to arrive at the viability of the enterprise and its financial needs.

8.11 GLOSSARY

1. Material cost: amount of money invested in the production of a product
2. Factory overhead cost: total cost involved in operating all production facilities of a manufacturing business that cannot be traced directly to a product

8.12 ANSWERS TO SELF-CHECK EXERCISE

1. Profit, profit
2. False
3. Marginal profit
4. True
5. Power, water, fuel

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8.14 TERMINAL QUESTIONS

1. Show how various financial estimates and projections are inter-related?
2. Discuss in detail the major components of cost of production.

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CHAPTER - 9
BREAK – EVEN ANALYSIS

STRUCTURE

9.0 LEARNING OBJECTIVES

1. To study break even analysis and its utility.
2. To understand performance and sensitivity analysis.

9.1 INTRODUCTION

The profitability projections or estimates of working results discussed prevision lesson are based on the assumption that the project would operate to given leaves of capacity utilization in future. In addition to knowing that the projected profits would be a certain levels of capacity utilization, it is also helpful to know that the helpful to know that the level of operation should be avoid lasses. For this purpose, the break-even point, this refers to the level of operation should be avoid losses. For this purpose, the break-even point, this refers to the level of operation at which the project neither makes profit nor incurs loss, is calculated.

The determination of the break-even point of a firm is an important factor in assessing it profitability. It is a valuable control technique and a planning device in my business enterprise. It depicts the relation between total coat and total revenue at the level of a particular output. Ordinarily, the profit of an industrial unit depends upon the selling price of product (revenue), volume of business (it depends on price) and cost price of the product.

If an entrepreneur is aware of the product cost and its selling price, he can plan the volume of his sale in order to achieve a certain level of profit. The break-even point is determined as that point of sales volume at which the total cost and revenue are identical.

Keeping in view of importance of break-even analysis in profit planning this lesson is devoted to understand the following:

- ❖ Break-even analysis
- ❖ Profit planning and bank borrowings
- ❖ Performance Analysis and
- ❖ Sensitivity Analysis

9.2 BREAK-EVEN POINT

Break-even point is an important measure being used by the promotions and bank is deciding the viability of a new project, especially in respect of manufacturing activities. This technique is useful dealing with a new project or a new activity of the existing unit.

The break-even point (BEP) establishes the level of output/production, which evenly breaks the costs and revenues. It is the level of production at which the turnover just covers the fixed overheads and the unit starts making profits.

From the banker's point of view, the project should achieve a break-even position within a reasonable time from the start of production. Bankers consider the project which reaches a break-even point earlier, as a viable project they cannot only expect earlier repayment of their advances in the case of such projects but can also be assured that the project can fairly adapt itself to the day-to-day developing technology. The projects, which are unlikely to reach the break-even point in the third or fourth year of its commencement of production, will not be a viable proposal for the bankers.

The break-even analysis also determines the margin of safety, i.e., excess of budgeted or actual sales over the break-even the sales so that the bankers would know how sensitive a project is to recession. This is an important factor in determining the feasibility of the project and its ability to absorb the ups and down in the economy. The bankers, as lenders of funds, insist upon a reasonable margin of safety so that fixed costs are met a fairly earlier stage.

9.3 CALCULATION OF BEP

As a first step in computing the break-even point, the costs are divided into two broad categories, fixed costs and variable costs, which may be defined as follows:

Fixed Cost –

Almost every business insures certain costs, which are fixed in nature. These costs remain contest irrespective of changes in the volume of input. They main represent depreciation charge, property tax, insurance, and rent: they main consist of salaries paid to employees; they main consist of interest burden on long-term debt. Fixed costs arise as a result of capacity creation and are invariant with respect to changes in the level of activity (or the level of capacity utilization). They are essentially a function of time.

Variable Cost

Several important elements of costs vary directly with output. For example, the material cost is a function of output. Likewise, the cost of power and other utilities may vary directly with output. All such costs, which vary proportionately with output, are referred to as variable costs.

In the case of a new project where the capacity utilization level is expected to rise gradually over a period of 3 to 4 years, fixed costs are normally planned in such a way that they are stepped up as and when necessary to meet the projected increases in capacity utilization. Hence, the calculation of the break-even point for a new project must be with reference to the fixed costs expected to be incurred in the third year or fourth year when the project is supposed to reach the rated capacity utilization level.

Once the costs are segregated into fixed costs and variable costs, the break-even point can be calculated in terms of physical units and in terms of sales turnover.

(i) In terms of physical units: The number of units required to be sold to achieve the break-even point can be calculated using the following formula:

BEP = (FC)/C

Where

FC = fixed cost

VC = variable cost

SP = selling price

C = contribution per unit (C = SP – VC)

(ii) In term of sales volumes: break-even point in terms of sales volume can be calculated using the following formula:

BEP = (Fixed Expenses X Sales)/Total Contribution

9.4 UTILITY OF THE BREAK-EVEN ANALYSIS

The utility 0f Break-Even Analysis is as follows:-

- ❖ It serves as the most useful and important managerial tool to study Cost-output profit relationship at varying level of output.
- ❖ It is useful in reviewing pricing policies.
- ❖ It aids in planning capitalization of the enterprises.
- ❖ It provides the entrepreneur to decide whether to acquire or not assets involving additional fixed costs.

9.5 SHORTCOMINGS OF THE BREAK-EVEN ANALYSIS

The BEP analysis is based on some assumptions, such as sales, costs, production, sales, etc. The technique will be only of financial value unless all these assumptions are well calculated. Besides, the technique is a preliminary and supplementary tool in the whole exercise of ratio analysis.

Another important factor in using the technique is to provide cost-escalation as a built-in safeguard against increase in prices.

The most important factor while using the technique, however is the proper analysis of various costs into fixed costs and variable cost, as there are some types of costs, which do not fall into either of the categories. These are the expenses, which are partly fixed and partly variable. In a break-even analysis, these semi-fixed costs cannot be treated independently but have to be isolated into the usual categories of fixed and variable elements.

Break-even analysis may not prove useful to rapidly growing enterprises and to enterprises, which frequently change their product mix.

It has limited utility in the case of multi product.

It does not take due cognizance of factors like uncertainty and risk involved in estimates of costs, volume and profits.

Irrespective of these shortcomings inherent in the usage of this technique, it is an important tool for the profitability analysis of the new project.

9.6 PROFIT PLANING AND BANK BORROWINGS;

Banks providing working capital finance require proper planning of activities and funds requirements by the borrowing enterprises. To ensure this, the RBI appointed a working group to review the system of cash credit (Chairman: Shri KB Chore) in April 1979. A major recommendation of this committee accepted by the RBI was to regulate bank credit through the Quarterly Information System (QIS) statements.

Quarterly Information System: Statements and their Scrutiny

It is mandatory for all borrowers enjoying bank credit by way of fund based working capital limits above and inclusive of Rs. 50 lakh to submit such statements. The various forms to be furnished are as follows:

Form 1: Projections for ensuring quarter

(i) Production/sales,

a) Whether quantity and value as a percentage of annual projection are reasonable, keeping in view orders on hand, past trends, seasonality etc.

b) Capacity utilizations/BEP/margin of safety.

(ii) Inventory

a) Whether holding norms relevant to particular industry group are complied with and if not, reasons for higher holding.

b) Whether there is a mismatch in various types of raw materials held and whether with the projected raw material holding, production as per projection can be achieved.

c) Abnormality, if any, in finished goods holding.

d) Whether stores and spares projected are within limits.

(iii) Receivables

Whether there is any abnormality in holding period, quantum, debtor velocity and over dues.

(iv) Other current assets

a) Whether advances to suppliers projected are as per practice.

b) Whether cash and bank balance projections are reasonable.

(v) Creditors

a) Whether the actual credit received is truly projected – to be verified on the basis of past trends and current market practice.

b) Whether materials received against letters of credit are included under this head and if such materials are included under inventory.

(vi) Other current liabilities

a) Whether advances received from customers and statutory liabilities are projected and are as per past trends.

b) Whether repayment obligations payable within a year are included.

c) Whether overall projections are comparable with the projections on the basis of which facilities were sanctioned.

d) Whether bank borrowing projections are reasonable and are within the sanctioned limit, within MPEF, under method, commensurate with available fully-paid stocks and receivables.

e) Whether sufficient net working capital and current ration of over 1.33 is available.

Form II: Actuals for the past quarter

The actuals furnished are to be compared with estimates given earlier as per form I and variations if any, under individual components are to be analysed. Checks applied for scrutiny of form I can also be used for this purpose also with slight modifications.

Form III: Provisional half-yearly operational data with funds flow position

(i) Whether the operations of the borrower are broadly as per projections or nearer to projection is to be scrutinized under various heads such as:

(a) Sales

(b) Operating profit

(c) Closing stock

(d) Percentage of raw material consumed

(e) Percentage cost of production to sales

Should the operative data indicate symptoms of slackness in the unit's activity, the borrower should be prepared to initiate corrective action to gear up and achieve projection so as to become eligible for drawl of facilities.

(ii) Funds flow statement, inter alia, should scrutinize;

a. Whether short term funds are used for short term purposes or are there any diversions;

b. Whether long term sources are sufficient to sustain the provision of sufficient net working capital;

c. How are the sources of funds deployed and whether they are proper?

With the abolition of CAS and introduction of CMA in its place, more responsibility devolves on banks to ensure the quality of credit. Therefore, banks have to be alert in checking the QIS statements, imposition of penalty to ensure compliance of submission of statement by borrowers act as a check on credit discipline.

9.7 PERFORMANCE ANALYSIS

Two types of ratio are very helpful in performance analysis – the profit and loss account ratios that show the relationship of various items of profit and loss accounts with sales and the turnover ratios that show how well a company is utilizing its resources. The broadest measures of overall performance are, however, given by the ROI or return on investment. This ratio has been discussed below:

Return on Investment

This ratio shows how much a company is earning on its capital employed. Thus if a company has Rs. 5 lakh as equity capital and Rs. 3 lakh as loan, its total capital employed would be Rs. 8 lakh. Suppose it earns Rs. 80,000 in a year before interest and taxation and ROI will be 10%. It is calculated thus:

(net profit before interest and income tax/ capital employed)x100

Net Capital Employed is the amount of funds invested in business. It can be calculated from the balance sheet in one of the following two ways:

a) Equity Share Capital + Preference Share Capital + Reserves and Surplus +Short Term and Long Term Liabilities – Non-operating Assets (e.g. Investments) and miscellaneous expenditure if such item appears on the assets side of the balance sheet.

   OR

b) Fixed Assets + Current Assets- Current Liabilities.

   It is obvious that the amount of net capital employed would be the same whichever way it is calculated. The following point may be noted in this regard.

c) It is not generally proper to include outside investments when calculating the Net Capital Employed. The profit is also the profit before interest on such investments. The idea is that the return on investment for funds employed within the business should be calculated separately from the return on investment for funds employed outside a business. However, if the ROI for the total business is to be calculated, investment should be included in the figure of Net Capital Employed, and the income from such investments should also be taken into credit when calculating Net Profit Before Interest and Tax.

Intangible Assets (Assets which have no physical existence like goodwill, patent and trademark) should be included in the figure of Capital Employed, especially if they have been paid for. Only if these are totally fictitious and represent no rights or benefits to the business, should they be excluded from the figure of Net Capital Employed.

ROI is a very significant measure for inter-firm comparison and for evaluating performances of various units within a firm. Actually, ROI combines in itself the net effect of all types of ratios. Ratios of the Profit and Loss Account and turnover ratios indicate the performance of a company. All these ratios are ultimately reflected in ROI. A slight fall in turnover efficiency or a rise in costs would immediately affect the ROI. It is because of this that ROI is called the broadest measure of performance.

9.8 SENSITIVITY ANALYSIS

Under the sensitivity analysis, instead of using one estimate of each variable, several estimates are used under varying conditions.

Applying sensitivity analysis at the project planning stage by finding the optimistic and pessimistic alternatives can reduce the element of uncertainty. For example, considering the pessimistic solutions, the project's viability in the worst of all possible situations can be determined. If the sensitivity analysis shows that the project will be commercially viable under pessimistic conditions, the project can be considered non-risky.

With the help of sensitivity analysis, it is easy to identify the most important factors in a project, such as raw materials, labour and energy and to determine any possibilities of input substitution.

The break-even analysis can be made more realistic by applying the sensitivity analysis. For example, alternative break-even calculations can be done with optimistic and pessimistic estimates of costs and selling prices. Similarly, alternative estimates of the business prospects can be made on the basis of optimistic and pessimistic estimates of demand and capacity utilization.

Sensitivity analysis thus helps to understand the extent to which a project can face adverse conditions.

9.9 SELF-CHECK EXERCISE

1. _____is a valuable control technique and a planning device in a business enterprise.
2. Break even point is the level of production at which the turnover exceeds the fixed overheads. True OR False
3. Margin of safety, is the excess of _____or actual sales over the break-even the sales.

9.10 SUMMARY

Break-even point is an important measure used for deciding the viability of a new project, especially in respect of manufacturing activities. This technique is useful dealing with a project or a new activity of the existing unit. The break-even point (BEP) establishes the level of output/production, which evenly breaks the costs and revenues. It is the level of production at which the turnover just covers the fixed overheads and the unit starts making profits. From the banker's point of view, the project should achieve a break-even position within a reasonable time from the start of production. Bankers consider the project, which reaches a break-even point earlier, as a viable project. They cannot only expect earlier repayment of their advances in the case of such projects but also be assured that the project can fairly adapt itself to the day-to-day developing technology.

The break-even analysis also determines the margin of safety, i.e., excess of budgeted oe actual sales over the break-even sales so that the bankers would know how sensitive a project is to recession. This is an important factor in determining the feasibility of the project and its ability to absorb the ups and downs in the economy. The bankers, as lenders of funds, insist upon a reasonable margin of safety so that fixed costs are met at a fairly earlier stage.

9.11 GLOSSARY

1. Break even analysis: study of relationship between costs and sales revenue
2. Performance analysis: examination of financial performance indicators in comparison with the results achieved by competing firms

9.12 ANSWERS TO SELF-CHECK EXERCISE

1. Break-even analysis
2. False
3. Budgeted

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9.14 TERMINAL QUESTIONS

1. What is the break-even point? How is it calculated for a new project?
2. What do you understand by performance analysis?

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CHAPTER – 10
CASH FLOW STATEMENTS

STRUCTURE

10.0 LEARNING OBJECTIVES

1. To understand the relationship between management decision and cash flow.
2. To study the mechanics of cash flow dynamics.

10.1 Introduction

The cash flow statement shows the movement of cash into and out of the firm and its net impact on the cash balance with the firm. This statement serves as a tool of financial planning and control. Having regard to the importance of cash flow statements, this chapter is devoted to the study of the relationship between cash flow analysis and management decisions and the preparation of cash flow statements.

10.2 Management Decisions and Cash Flow

Cash does not flow on its own; it flows as a direct consequence of the management's action or inaction in operating the cash tank. But whose hands are on the tap? There are ten categories of management decisions which cause the cash flow. These are summarized as follows:

(1) Operating Decisions. Culminating in potential cash flow from operations before tax.

(2) Capital Expenditure Decisions

(a) Acquisition (purchase)

(b) Disposal (sale)

(3) Inventory Decisions

(a) Increase in inventory

(b) Decrease in inventory

(4) Customer Credit Decisions

(a) Increase or Extension of Credit

(b) Reduction in Credit

(5) Supplier Credit Policies

(a) Increase in or extension of credit

(b) Reduction in credit

(6) Other accepted credit terms

(7) Taxes on Profits

(8) Financial Obligations

(a) Interest payment

(b)Dividend payment

(c)Repayment of borrowed capital

(9) Investment Decisions: utilization of temporary surplus cash.

(a) Purchase

(b) Sale

(10) Financing Decisions: acquisition of new money

(a) From shareholders

(b) By borrowing

Any useful analysis of the cash flow will highlight the impact of the above mentioned decision areas if the management is to use such analysis to guide the firm along the path of solvency. For this reason, the cash tank approach may be the most powerful method of presentation.

10.3 STAGING POSTS IN THE MEASUREMENT OF CASH FLOWS

The source and application of cash or cash flow statement should not only show the sources and application in such a way as to balance nicely, at the end it should highlight which functional areas of management have contributed to the final cash position of the firm. Both borrowers and lenders should be concerned not only with cash movements, but also with the area of management, which has caused these movements.

Cash flow analysis should use sub-totals to reveal the following staging posts in determining the ultimate cash flow position:

CASH FLOW OUT OF INVESTING ACTIVITIES

OUTFLOW:

A. Acquisitions of fixed assets

B. Acquisition of investments

C. Loans to other companies

D. Investment in joint ventures

DEDUCT: INFLOW:

A. Sale of fixed assets
B. Interest received
C. Dividend received
D. Sale of investments

Net cash Outflow/Inflow of Investing Activities;

CASH FLOW ARISING FROM FINANCING ACTIVITIES

INFLOW:

A. Proceeds from issue of share capital
B. Proceeds from borrowing

DEDUCT: OUTFLOW:

A. Share issue expenses
B. Redemption of debentures
C. Premium paid on redemption of debentures
D. Dividend paid
E. Debenture issue expenses

Net Cash Inflow in Course of Financing Activities.

Stage 1 should show the potential cash flow operations before tax, i.e., that source of cash flow which has been generated by the operating management from normal trading, unadulterated by other cash movements or financing and tax decisions over which the operating management has little or no control. This item generally speaking, is profit before interest and tax, plus depreciation and any other non-cash charges against profit.

Stage 2 reveals the internally generated cash flow, i.e., stage 1 minus the tax actually paid on corporate profits. This stage is akin to person's take home pay and indicates the net amount generated by current operations for internal consumption.

Stage 3 shows the operating cash profile, i.e., stage 2 minus the necessary investment (or plus the disinvestments) in additional fixed assets, services, inventories and customer credit that will be necessary to achieve the level of activity reflected at Stage 1. This stage indicates whether the operational activities of the firm are self-supporting, whether they require the input of additional finance or whether they are providing a surplus.

Stage 4 reveals the total cash requirements (or surplus), i.e., Stage 3 further adjusted for non-operating financial obligations such as the payment of interest and dividends, significant payments under leasing contracts and necessary repayments of borrowing or preference share capital.

Stage 5 shows either the financing of Stage 4 requirements, i.e., the detailed proposals for funding any requirements at stage 4 or the utilization of stage 4 surplus, i.e., the proposals for dealing with any surplus revealed at stage 4.

10.4 MECHANICS OF CASH FLOW DYNAMICS

It is evident from the foregoing discussion that the term cash has not been used in the narrow sense of cash, although cash is a part of funds. It is also obvious that the term cash has been used with an all-embracing connotation of economic values. There can be economic values without any involvement of cash. For example, if the promoter against the allotment of shares in consideration provides land for the factory building therefore, both the aspects of transactions will figure in the cash flow statement although no cash is involved in it. The term cash may, therefore, be defined as denoting cash and economic values.

The fundamental principles of cash flow mechanics may now be stated in the following way:

Sources of Cash	***Uses of Cash***
1. An increase in equity is a source	A decrease in equity is a use of cash
2. An increase in any liability is a source of cash	A decrease in liability is use of cash
3. A decrease in any asset is a source of cash	An increase in asset is a use of cash

(a) Balance Sheet and Profit and Loss Account as a Basis of Historical Cash Flow Statement:

The balance sheet is a statement of the financial position of a business at a particular point of time. It is like a snapshot depicting the financial position at a particular moment (as at the close of business) on a certain date; it does not, therefore, cover a period of time.

As the balance sheet is like a financial snapshot, it is perhaps more appropriate to consider it as one frame out of a cine film continuously recording the economic activities of a business enterprise in money terms. The connecting link between two such frames (balance sheet) is the profit and loss account. And the cash flow reservoir may be depicted with this link as the starting point.

The first flow into the reservoir, then, is the cash flow or cash accruals comprising net profit and depreciation. To this may be added tax payable to arrive at the amount of gross cash. The first outflows are on account of tax and dividends. The balance is net cash.

Further Inflows (Sources)	***Further Outflows (Uses)***
1. Increase in capital	Decrease in capital
2. Increase in term liabilities	Decrease in term liabilities
3. Decrease in fixed and non-current assets	Increase in fixed and non-current assets
4. Increase in short-term bank borrowings and other current liabilities	Decrease in short-term bank borrowings and other current liabilities
5. Decrease in inventory/receivables and other current assets	Increase in inventory/receivables and other current assets

The first three items constitute long-term sources and uses, while the last two constitute short-term sources and uses.

(b) Budgeted Balance Sheet and Profit and Loss Account as a Basis of Projected Cash Flow Statement:

It has already been seen that a balance sheet is like a financial snapshot of a business activity which is continually changing and that it should be more appropriately looked upon as one frame out of a cine film continuously recording the economic activities of a business enterprise in monetary terms.

Now the impact of budgeting may be seen as a movement from one frame in the film to a subsequent frame. In other words, the objective here is to trace the steps necessary to from a balance sheet at the beginning of a budgeted period to a budgeted balance sheet at the end. The link between two such balance sheets is provided by a set of budgeted accounts.

The budgetary process starts with a sales budget, which has to be prepared by taking into account the profit margin, production facilities and availability of financial resources. The sales budget may be further broken down into finished goods budget with sub-budgets for purchases, labour, overheads and selling/general/administrative expenses. The capital expenditure budget has two sub-budgets, viz., fixed assets budgets and research and development budgets. There are two separate budgets for sundry creditors and sundry debtors. The combined effect of the sales budget, capital expenditure budget and sundry creditors and sundry debtors budgets, in so far as they relate to actual receipts and payments of cash are reflected in the cash budget. The combined effect of the sales budget and capital expenditure budget, in so far as they relate to revenue/expense aspects, are reflected in the budgeted profit and loss account. And the residual impact of the sales budget, in so far as they effect the assets or liabilities of the enterprise and the profit or loss arrived at in the budgeted profit and loss account, are reflected in the budgeted balance sheet. When once the budgeted profit and loss account and the budgeted balance sheet are arrived at, the preparation of a budgeted cash flow statement is in all respects similar to a historical cash flow statement.

10.5 FORMAT OF CASH FLOW STATEMENT AS PER THE REQUIREMENT OF FINANCIAL INSTITUTIONS

The format for preparing the cash flow statement, which is really a cash budget, as prescribed by the all India financial institutions is shown below. While this format calls for preparing the cash flow statement on a half yearly basis for the construction period and an annual basis for the operating period (for ten years) for managerial purposes, it may be helpful to prepare it on a quarterly basis for the construction period and half yearly basis for the first 2 to 3 operating years for managerial purposes. This would facilitate better financial planning, project evaluation and fund control.

Cash Flow Statement

Sources of Cash

1. Share issue
2. Profit before taxation with interest added back
3. Depreciation provision for the year
4. Development rebate reserve
5. Increase in secured medium and long-term borrowings for the project
6. Other medium/long term loans

7. Increase in unsecured loans and deposits
8. Increase in bank borrowings for working capital
9. Increase in liabilities for deferred payment (including interest) to machinery suppliers
10. Sale of fixed assets
11. Sale of investments
12. Other income (indicate details)

Total (A)

Disposition of Cash

1. Capital expenditure for the budget
2. Other normal capital expenditure
3. Increase in working capital*
4. Decrease in secured medium and long-term borrowings
    - All India Institutions
    - SFCs
    - Banks
5. Decrease in unsecured loans and deposits
6. Decrease in bank borrowings for working capital
7. Decrease in liabilities for deferred payments (including interest) to machinery suppliers
8. Increase in investments in other companies
9. Interest on term loans
10. Interest on bank borrowings for working capital
11. Taxation
12. Dividends
    - Equity
    - Preference
13. Other expenditure (indicate details) Total (B)
    - Opening Balance of cash in hand and at bank
    - Net surplus/deficit (A-B)
    - Closing balance of cash in hand and at bank

*Working capital here is defined as: (Current assets other than cash) – (Current liabilities other than bank borrowings)

10.6 PROJECTED BALANCE SHEETS

The balance sheet showing the balances in various asset and liability accounts reflects the financial condition of the firm at a given point of time. The format of balance sheet prescribed by the Companies Act is given below:

Format of Balance Sheet Prescribed by the Companies Act

Liabilities	Assets
Share Capital	Fixed Assets
Reserves and surplus	Investments
Secured loans	Current assets, loans and advances
Unsecured loans	Miscellaneous expenditures and losses
Current liabilities and provisions	

The liabilities side of the balance sheet shows the sources of finance employed by the business. A word about its components shown on the left hand side of the balance sheet is in order. *Share capital* consists of paid-up equity and preference capital. *Reserves and surplus* represent mainly the accumulated retained earnings. They are shown in different accounts like the capital reserve, the investment allowance reserve and the general reserve. *Secured loans* represent the borrowings of the firm against which security has been provided.

The important components of secured loans are debentures, term loans from financial institutions and loans from commercial banks. *Unsecured loans* represent borrowings against which no specific security has been provided. The important constituents are: fixed deposits from public and unsecured loans from promoters. *Current liabilities* are obligations which mature in the near future, usually a year. These obligations arise mainly from activities, which enter the operating cycle: payables from acquiring materials and supplies used in production and accrual of wages, salaries and rentals. *Provisions* include mainly tax provision, provision for provident fund, provision for pension and gratuity and provision for proposed dividends.

The assets side of the balance sheet shows how funds have been used in the business. The major asset components may be described briefly. *Fixed assets* are tangible long-lived resources ordinarily used for producing goods and services. They are shown at original cost less depreciation. *Investments* represent financial securities owned by the firm. *Current assets, loans and advances* consist of cash, debtors, inventories of different kinds and loans and advances made by the firm. *Miscellaneous expenditures and losses* represent outlays not covered by the previously described asset accounts and accumulated losses, is any.

For preparing the projected balance sheet at the end of year n + 1, we need information about the following:

- The balance sheet at the end of year n
- The projected income statement and the distribution of earnings for the year n + 1
- The sources of external financing proposed to be tapped in the year n + 1
- The proposed repayment of debt capital (long-term, intermediate term and short term) during the year n + 1
- The outlays and the disposal of fixed assets during the year n + 1
- The changes in the level of current assets during the year n + 1

- The changes in other assets and certain outlays like preoperative and preliminary expenses (which are capitalized) during the year n + 1
- The cash balance at the end of year n + 1

10.7 LIMITATIONS OF CASH FLOW STATEMENT

The limitations of Cash Flow Statement are:

a) The cash flow statement shows the changes that have taken place between the dates of two balance sheets. It may not, however, show the detailed path of the changes.

b) The inside information, like the scrapping of an asset, will not be available in the balance sheet in many cases. To that extent, the cash flow statement becomes an understatement.

c) The projected cash flow statement is based on set of budget accounts. These budget accounts are themselves based on sales forecasts/estimates, which may not be accurate.

The cash flow technique suffers from these limitations because of the limitations of the balance sheet and the budget accounts.

However, within these limitations and given the nature of the balance sheet and budget accounts, the dynamic nature of the cash flow control as one of the tools for decision making and management control needs no emphasis.

10.8 INTERPRETATION OF CASH FLOW STATEMENT

The cash flow statement answers the following questions:

i. Where did the profits go? Why are they not available for the payment of dividends or the financing of an expansion programme?

ii. Why is equity necessary?

iii. Why cash should not be obtained from outside sources?

iv. What are the additional cash generated by the enterprise?

v. How much additional cash obtained from the various other sources?

vi. What is the impact of cash flow on the future profitability and dividend paying capacity?

vii. Is there any undue build up of any asset – fixed assets, inventory or receivables? If yes, how much? And for how much time?

viii. Is the increase in the buildup of inventory/receivables commensurate with an increase in short term bank borrowings sought for?

ix. Is there any diversion, i.e., are short term cash used for the buildup of fixed and non-current assets? Or used for something to acquire non-productive assets?

x. Is the financing pattern acceptable on all scores?

10.9 SELF-CHECK EXERCISE

1. Acquisition of fixed assets is an example of cash outflow. True OR False

2. Decrease in fixed and non-current assets is a source of cash outflow. True OR False

3. *Reserves and* _____ represent the accumulated retained earnings.

10.10 SUMMARY

Cash flow analysis is a tool in judging the performance of project/enterprise. It helps the entrepreneur, banker and other concerned people to know about the health of an enterprise. It also indicates the direction in which it is progressing. It also gives the warning signals, if any, in its own way. Financial analysis gives a clearer picture of a project as far as its financial factors are concerned. Financial statements, particularly the ratios, require a detailed, critical examination to test their validity.

This examination is possible by looking into the internal management of the concern. Thus financial analysis is a right step in financial management.

10.11 GLOSSARY

1. Capital expenditure decisions: decisions about the amount to be spent to acquire and upgrade productive assets in order to increase capacity of a company for more than one accounting period

10.12 ANSWERS TO SELF-CHECK EXERCISE

1. True
2. False
3. Surpluses

10.13 REFERENCES

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10.14 TERMINAL QUESTIONS

1. Discuss the projected cash flow statement.
2. Discuss the contents of the balance sheet.

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CHAPTER – 11
METHODS OF PROJECT APPRAISAL

STRUCTURE

11.0 LEARNING OBJECTIVES

1. To understand project appraisal or capital budgeting.
2. To learn different methods of capital budgeting projects.

11.1 INTRODUCTION

Project appraisal or capital budgeting is the making of long-term decision for investment (capital outlays) and their financing. Capital budgeting decisions are the most difficult and significant decisions because the future to be foreseen is distant and hard to perceive. Also these decisions have a significant effect upon a company's future earnings and growth. A right capital budgeting decision can put the company on the growth path. On the other hand a wrong capital budgeting can result into the failure of the company. Thus success or failure of a business significantly depends upon quality of capital budgeting process employed in it. In a capital budgeting decision three steps are involved:

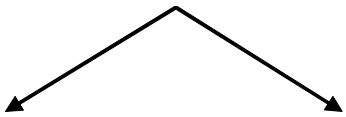
1. Estimation of cash flows
2. Estimation of required rate of return (cost of capital)
3. Application of a decision criterion for making the choice

11.2 INVESTMENT EVALUATION CRITERIA OR METHODS OF APPRAISAL OF CAPITAL BUDGETING PROJECTS

The investment evaluation criteria may be referred to as capital budgeting techniques. There are several different techniques for capital budgeting decision. The areas where these techniques are used relate to: (a) accepting or rejecting an investment proposal (b) ranking of independent investment proposal (c) choosing mutually exclusive investment proposals.

Capital budgeting criteria can broadly be classified into two categories: (i) Traditional techniques and (ii) Discounted cash flow techniques. The principle difference between the traditional and discounted cash flow techniques is that the traditional techniques ignore time value of money whereas discounted cash flow techniques consider time value of money while evaluating the costs and benefits of a project. In one form or the other discounted cash flow techniques require cash flow to be discounted at a certain rate popularly called cost of capital. Another difference between the two types of techniques is that all discounted cash flow techniques take into consideration all benefits and costs occurring during the entire life of one project whereas some of the traditional techniques ignore cash flows beyond a certain point:

Techniques of Capital Budgeting



Traditional Techniques	**Discounted Cash flow Techniques**
(1) Payback period	**(1)Net Present Value**
(2) Accounting Rate of Return	**(2) Profitability Index**
	(3) Internal Rate of Internal

11.2 (1) Traditional techniques

11.2 (1) (a) payback period method

Pay-back period is the simplest and most widely employed criterion of capital budgeting. Payback period can be defined as the period in which the original cost of investment in a project is received back. Thus payback measures the number of years required for the cash benefits coming from a project to pay back the original investment. Cash benefits here represent cash flows after taxes (CFAT).

$$\text{Pay-back period} = \frac{\text{Initial Investment}}{\text{Constant annual cash flows}}$$

If for example an investment of Rs. 60.000 in a project is expected to produce CFAT of Rs. 15,000 annually for 8 years, its payback period will be four years.

Acceptance/rejection Rule – payback period can be used as an acceptance rejection criterion for capital budgeting projects. If the payback period of a project is less than the maximum payback period set by the management, it would be accepted, if not it would be rejected. In case of mutually exclusive projects, the project with the shortest payback period would be accepted and others would be rejected. In case of independent projects while ranking different projects for acceptance highest rank is given to the project having shortest payback period and lowest rank to the project with the longest payback period. Thus while selecting among alternative projects shorter payback period is preferred to longer payback period.

Advantages of Payback Period

The payback period has a number of merits:

1. It is a simple to understand and easy to calculate.
2. It enables a firm to choose an investment, which yields a quick return on cash funds. It weights early returns heavily and ignores distant returns. It thus contains a built hedge against economic depreciation and obsolescence.
3. It enables a firm to know the period required to recover the original investment in a project and thus determine the degree of risk associated with the investment.
4. It is based upon the cash flow concept of benefits of a project and thus is an objective criterion.
5. It saves cost, it require lesser labour and time as compared to other sophisticated method of capital budgeting.

Disadvantages

Although payback period is the simplest, oldest and most frequently used capital budgeting criterion, it suffers from serious limitations. Its major shortcomings are as follows:

1. The payback period completely ignores the cash inflows after the payback period.
2. It ignores time value of money. It does not differentiate between projects on the basis of timing and magnitude of cash flows. It consider only the recovery period as a whole.
3. It does not measure the profitability of a project as it does not consider all cash inflows generated by the project.
4. Determination of maximum payback period is a fairly difficult task. There is no rational basis for setting a maximum payback period.
5. Indicate effort is made to ascertain the relative merits of alternative opportunities and maximize profit. Thus payback period method is not consistent with the objective of maximizing the market value of the firm's shares.
6. It does not take into consideration the cost of capital which is a very important factor of making sound investment decisions.

11.2 (1) (b) Rate of Return Method

The rate of return method takes into consideration the earning expected from the projects over their whole life. It is also known as the accounting rate of return (ARR) at it uses accounting information as revealed by the financial statements. Under this method accounting concept of net

profit after tax and deprecations is used rather than cash flows. Rate of return is found out by dividing the expected profits of the project by the required investment and multiplying by 100.

The rate of return method has two variants, which are discussed below:

(a) Average Rate of Return Method: this method establishes the relationship between average annual profit and the total investment. To calculate average rate of return, average profit after tax and depreciations is calculated and then it is divided by the total investment.

$$\text{Average Rate of Return} = \frac{\text{Average profit after dep. \& taxes}}{\text{Total Investment}}$$

(b) Return on average investment – this method is considered to be an improvement over the average rate of return method. The average return on average investment in computed by dividing the average profit depreciation and taxes by the average investment.

$$\text{Average return on Average Investment} = \frac{\text{Average Annual Profit} \times 100}{\text{Average Investment}}$$

The average investment is determined by dividing the net investment by two and adding to it the salvage value. This averaging process assumes the use of straight-line depreciation in which case the book value of the asset declines at a constant rate from its purchase price to its salvage value. This means that on the average, firm will have one half of the depreciable value plus salvage value of the asset in its books. Salvage value is not divided by two as it remains tied up throughout the project life and is recovered only at the end of the life of the project. Likewise if additional net working capital is required which would be released only at the end of the project life it should also be added for determining relevant investment for the purpose of computing net investment. Thus investment is computed as follows:

= ½ (initial investment – salvage value) + Salvage value + Net Working Capital

Acceptance/Rejections Rule

According to accounting rate of return method projects with higher accounting rate of return are preferred to those with lower rate. Management of the firm may also fix a certain minimum rate of return (cut of rate of return) that must be earned from all the investment projects. Projects with higher rates of return than the cut off rate would qualify to be accepted and those with lower rate of return will be rejected. Rate of return method can also be used to rank the independent projects in descending order of importance starting with the highest rate of return and ending with the proposal with the lowest rate of return.

Advantages of Rate of Return Method

a. It is simple to understand and easy to operate. It requires the figure of accounting profit after taxes, which is easily available.
b. Unlike discounted cash flow techniques it does not involve tedious and complex calculation.
c. It considers total benefits associated with the project and hence gives a better view of profitability as compared to payback period method.

Disadvantages

1. This method uses accounting profits instead of cash flows. Cash flows are considered superior to accounting profits for project evaluation. Accounting profits involve accounting ambiguities and do not consider the re-investment potential of a project's benefits. Cash flow concept does not involve any ambiguity and take cares of reinvestment potential of a project and hence the total benefits of the projects.
2. This method ignores time value of money as the profits earned in different years during the project life are given equal weight by averaging the profits. This method ignores the fact that a rupee received earlier has more value than a rupee received later.
3. It requires the use of a cut off rate of return to decide the acceptance or rejection of a project. There is not any objective procedure of determining cut off rate of return.
4. This method does not consider the size of investment required for each project. Competing projects may have some rate of return but may require different investment.
5. This method is does not consider any benefits, which can accrue to the firm from the sale of equipment replaced by the new investment. For the purpose of financial decision making new investment should measure in terms of incremental cash outflows of the new investment i.e. new investment minus the sale proceed of the equipment's replaced + or – tax adjustment. But the rate of return does not make any such adjustment to determine the amount of average investment.
6. This method cannot be applied to a situation where the investment in a project is made in parts and considerable time is needed to put the project to commercial use.

11.2 (2) Discounted Cash Flow or Time Adjusted Techniques

Discounted cash flow or time-adjusted techniques also called modern methods of capital budgeting are becoming increasing popular due to their superiority over traditional methods i.e. payback period and accounting rate of retune. It is recognized that discounted cash flow (DCF) methods provide a more objective basis for capital budgeting decisions as they are theoretically more correct.

DCF methods are based upon cash flow concept of benefits and costs. For evaluating an investment project with the help of a DCF method the first step is to estimate (CFAT cash flow after tax) stream of the project. These methods take into consideration all benefits and costs during the entire life of a project. Above all these methods take into determination the time value of money while evaluating the costs or benefits of a project. In one form or the other all the methods require discounting of each flows at firm's cost of capital. A firm's cost of capital is the minimum rate of return which must be earned on a project to justify such investment.

Discounted cash flow methods consists of (i) Net present value (NPV)method (ii) internal rate of return (IRR) method (iii) Profitability Index (PI) or Benefit Cost ratio method.

11.2 (2) (a) Net Present value (NPV) Method

Net present Value (NVP) method takes into consideration the time value of money. It recognizes the fact that a rupee earned today is worth more than a rupee to be earned tomorrow. To quote a simple proverb: 'a bird in hand is worth two in "the bush". This method recognized the fact that cash

flows arising at different periods of time differ in value and are not comparable. To make such cash flows comparable, their equivalent present values are found out. Present value of the cash flows occurring in future can be found out by discounting them at an appropriate discount rate (firm's cost of capital). Net present value (NPV) of a project is calculated by deducting the present value of cash outflows from the present value of cash inflows. Thus NVP may be defined as the summation of the present value of cash inflows (CFAT) in all the years of the project life minus the summation of present value of cash outflows relating to the project. Following steps are needed to compute the NVP of a project.

1. Forecast the stream of cash inflows and outflows.
2. Determine an appropriate discount rate of compute the present value of future cash flows. Usually this discount rate is the firm's cost of capital.
3. Compute the present value of total investment outlay (cash outflows) at the predetermination discount rate. If the project requires the investment only in the initial year, then the present value of cash outflows would be the same as the cost of investment.
4. Compute the present value of cash inflows (CFAT) arising in different years of projects life by using the discount rate.
5. Calculate NVP of the project by subtracting present value of cash outflows from the present value of cash inflows.

Accept/Reject Criterion

Net present value can be used as a criterion in case of capital budgeting projects. Projects having positive NPV can be accepted and those with negative NPV are out rightly rejected.

Symbolically,

(i) NPV > Zero accept

(ii) NPV < Zero reject

(iii) NPV = Zero indifferent position regarding, acceptance or rejection of project.

NPV of a project being zero means that the acceptance of project would neither add to the value of the firm nor reduce it. So when NPV is zero, the firm may or may not accept the project. In such a case other variables such as availability of capital, the effect of the project on other projects etc. are taken care of for making the decision.

NPV can also be used as a criterion for making a choice between mutually exclusive projects. The project with higher NPV is given performance over the project with lower NPV. For ranking the independent projects in a situation of capital rationing, the various projects would be ranked in order of their NPVs, the project with the highest NPV would be given the first rank followed by others in the descending order.

Advantages of Net Present Value Method:

The NPV method possesses several merits. Some important merits of the method are explained below:

1. It recognizes the time value of money. This method is suitable for evaluating the project with uneven cash flows and cash flows occurring at different periods of time.

2. It considers the total benefits (cash inflows) arising out of the proposal over its lifetime.
3. It takes into consideration of objective of maximizing the value of the firm.
4. In a situation when the cost of capital of a firm is likely to undergo a change in future, a changing discount rate can be built into NPV calculations by altering denominator.

Disadvantages of Net Present value Method

Although NPV method is theoretically correct technique for the selection of investment projects yet it has certain limitations also. Some major limitations are described below:

1. NPV method requires the calculations of cost of capital/required rate of return. Calculation of cost of capital is a difficult task.
2. As compared to traditional method this method is difficult to understand and operate.
3. This method cannot be used for evaluating those projects, which have unequal lives.
4. This method does not give good results while evaluating projects with unequal initial investment.

11.2 (2) (b) Profitability Index (PI) or Benefit Cost Ratio (B/C Ratio):

PI or B/C Ratio method of capital budgeting is similar to NPV method. PI also requires the computation of present values of both cash outflows as well as cash inflows relating to a project. The profitability index is the relationship that exists between the present value of cash inflows and cash outflows of a project. It can be defined as the ratio between the present value of future cash inflows and the present value of cash outflows. Mathematically,

$$PI = \frac{\text{Present value of cash inflow}}{\text{Present value of cash outflow}}$$

Acceptance/Rejection Criterion

When PI is used as a decision criterion, project with higher PI is given preference over projects with lower PI. In any case the PI of a project should exceed one if it is to quality for acceptance. When PI equals one the firm would be indifferent regarding the selection or rejection of the project. While ranking the independent projects in a situation of capital rationing; the highest rank would be given to the project with highest PI followed by others in order of the magnitude of their PIs.

NPV and PI approaches give the same results regarding the investment proposal. When PI is greater than I, NPV would be positive and project would be accepted by using either NPV or PI criterion. When PI is less than I, NPV would be negative and the project would be rejected by both the methods. When PI is I NPV be zero and the firm would be indifferent regarding the acceptance of the project.

Advantages of Profitability Index

1. It recognizes time value of money.
2. It considers all the benefits resulting from a project spread over its life.
3. It is consistent with the objective of maximizing of value of the firm.
4. Change in the discount rate of computing present value of future cash inflows is possible under this method.

5. It is a better method of capital budgeting than NPV in a situation of capital rationing as NPV method evaluates the absolute worth of a project whereas IP method evaluates the relative worth.

Disadvantage of Profitability Index

1. It is difficult to understand and operate.
2. It requires calculation of cost of capital which is a difficult task.
3. It cannot be used for comparing those projects having unequal lives.

11.2 (2) (c) Internal Rate of Return Method

After net present value and profitability index, internal rate of return (IRR) is the third discounted cash flow (DCF) method for appraising capital investment projects. IRR is also known as yield on investment, marginal productivity of capital, time adjusted rate of return and so on.

IRR can be defined as the rate of discount, which equates the aggregate of present value of cash inflows with the present value of cash outflows relating to a project. In other words IRR is the rate of discount, which renders the NPV of a project equal to zero.

Acceptance/Rejection Rule

For making a capital budgeting decision with the help of IRR method, the IRR of a project is compared with the required rate, or return (cost of capital). If the IRR higher the required rate of return, the project qualifies for acceptance. One the other hand if the IRR is lower than the cost of capital the project is out rightly rejected. For selecting a project from amongst mutually exclusive projects the project with the highest IRR is selected. IRR can also be used for ranking of independent projects in a situation of capital rationing. The project with the highest IRR is given the highest rank followed by others in order of their IRRs.

Advantages of IRR

Like other DCF techniques IRR method is also a theoretically correct technique to evaluate capital projects. It possesses the following advantages.

1. It considers the time value of money as the cash flows occurring different time periods in future are discounted to the present under this method.
2. It takes into consideration the entire cash inflows and outflows spread over the project life.
3. It is a better method of capital budgeting than NPV method as it provides an estimate of return on investment.

Disadvantages of IRR

Although IRR is a theoretically sound decision criterion, it suffers from serious limitations.

1. It involves difficult calculations. It involves a trial and error procedure and computing of IRR is a time consuming process.
2. This method may lead to the computation of multiple IRRs, which can be confusing. The meaning of multiple IRRs is that more than one discount rate can equate the present value of cash inflows and outflows. This situation arises in case of those projects the life of which is not certain.

3. This method assumes that earnings are reinvested at the internal rate of return for the remaining fife of the project. The assumption is not justifiable in a situation when the average rate of return earned by the firm is different from the internal rate of return.
4. In case of mutually exclusive projects, the method selected the project that has the highest IRR. In reality this may not be consistence with the value maximization objective; value of a firm has direct relationship with the NPV. Therefore NPV would be better criterion when the project sizes are different and there is no problem of capital rationing.

The importance of the risk dimension in capital budgeting can hardly be over-emphasized. In fact, profitability and risk are closely related; it is very likely that a project, which is potentially very profitable, may also increase the perceived risk of the firm. This trade-off between risk and profitability would have a bearing on the investors' perception of the firm before and after acceptance of a specific proposal. It may also have an adverse effect on the market price of shares, total valuation of the firm and its goal.

11.3 TECHNIQUES OF PROJECT APPRAISAL UNDER RISK AND UNCERTAINTY

Followings techniques are used to handle risk in capital budgeting decision.

11.3 (a) Sensitivity Analysis

One measure, which expresses risk in more prices terms, is sensitivity analysis. It provides information as to how sensitive the estimated project parameters, namely, the expected cash flow, the discount rate and the project life are to estimation errors. The analysis on these lines is important as the future is always uncertain and there will always be estimation errors. The method adopted under the sensitivity analysis is to evaluative a project using a number of estimated cash flows to provide to the decision-maker an insight into the variability of the outcomes. Let us illustrate the use of sensitivity analysis for estimated cash flows.

The sensitivity analysis provides different cash flow estimates under three assumption: (i) the worst (i.e. the most pessimistic), (ii) the expected (i.e. the most likely), and (iii) the best (i.e. the most optimistic) outcomes associated with the project. This is illustrated in example 1.

Example 1

Initial Cash Outlays	Project X	Project Y
Cash flow estimates: (t=1-15)	-Rs. 80,000	-Rs.80,000
Wors	12,000	.0
Most-likely	16,000	6,000
Best	20,000	32,000
Required rate of return Economic	12%	12%

The NPV of each project assuming a 12% required rate of return can be calculated for each of the possible cash flows. Present value tables indicate that the present value of Rs. 1 annuity for 15 years at 12% discount is 6.811. Multiplying each possible cash flow by present value factor, we get the present value of cash flows.

Table 1 demonstrates the present value of the cash flows of the two projects in different situations.

Table - 1

Projected	Project X		Project Y	
Cash flows	PV Rs.	NPV Rs.	PV Rs.	NPV Rs.
Worst	81,732	1,732	Nil	80,000
Most-likely	1,08,976	28,976	1,08,976	28,976
Best	1,36,220	56,220	,17,952	1,37,952

Sensitivity analysis can produce some very useful information about projects that appear equally desirable on the basis of the most likely estimates of their cash flows. Project X is less risky than project Y. The actual selection of the project (assuming projects are mutually exclusive) will depend on the decision-makers attitude towards risk. If the decision-maker is conservative, he will select project X as there is no possibility of suffering losses. On the other hand, if he is risk-taker, he will choose project X as it has the possibility of paying a very high return as compared to project X. Sensitivity analysis, in spite of being crude, does provide the decision-maker with more than one estimate of the project's outcome and, thus an insight into the variability of the returns.

It has been shown above that sensitivity analysis provides more than one estimate of the future return of the project. It is, therefore, superior to the single-figure forecast as it gives a more precise idea regarding the variability of the returns. But it has a limitation in that it does not disclose the chances of the occurrence of the variations.

The qualification of variability of returns involves two steps. First, depending on the chance of occurrence of a particular cash flow estimate, probabilities are assignment of probabilities can be objective or subjective. Objective probability refers on the assignment of a probability, which is based on a large number of observations, under independent and identical situations, on the basis of the experience of happening or not happening of the event.

11.3 (b) Risk-Adjusted Discount Rate Approach

The risk-adjustment discount rate approach is one of the simplest methods used for incorporating risk into the capital budgeting decisions. Under this method, the amount of risk inherent in a project is incorporated in the discount rate used in the present value calculation. For evaluating relatively risky projects, relatively high discount rates are used and relativity safe projects would have relatively low discount rates.

The risk-adjusted discount rate approach presumably represents the differential risk in the different classes of investments. The rational for using different internal rate of return for different projects is as follows. The rate of discount or what we refer to as the cost of capital (K), is the minimum acceptable required rate of return. it is the rate, which the investors demand in providing capital to the firm for that type of investment since such a rate is available elsewhere in the economy on assets of similar risk. Therefore, if the project earns less than the rates earned in the economy for that risk, the shareholders will be earning less than the prevailing rate for that risk level and the value of the company's shares will fall. The cost of capital, therefore, represents the investors time preference for money for a typical investment project. Thus, it is equivalent to the prevailing rate in

the market on the risk class of investment. A well-accepted economic premise is that the required rate of return should increase as risk rises. Therefore, the greater the risk involved in the project, the higher should be the discount rate and vice versa.

Accept-Reject Decision

The risk-adjusted discount rate approach can be used with both the NPV and IRR. If the NPV method is used to evaluate capital expenditure decisions, the NPV would be calculated using the risk-adjusted discount rate. If the NPV is positive the proposal would qualify for acceptance. A negative NPV would signify that the project should be rejected. In case of the IRR as a decision criterion, the IRR of a project would be compared with the risk-adjusted required rate of return. If the internal rate of return exceeds the risk-adjusted rate, the proposal would be accepted, otherwise not.

Thus, projects are evaluated on the basis of future cash flow projections, their certainty equivalents and the risk free discount rate. This has been explained in the following example.

Example

.	Rs.
Cash Outlays	3,00,000
CFAT Year 1	1,50,000
Year 2	1,80,000
Year 3	1,20,000

Risk-less rate of return = 9%

Risk-adjusted rate of return for the current project = 15%

Solution:

	CFAT.	P.V.F. At 15%	Present Value
Year 1	1,50,000	0.870	1,30,500
Year 2	1,80,000	0.756	1,36,080
Year 3	1,20,000	0.658	78,960
		Total	3,45,540
		Less initial investment	3,00,000
		Net Present Value	45,540

Given the expected cash flows and estimated to incorporate risk in the capital budgeting analysis expected NPV is positive NPV is positive and the project should be accepted.

The risk-adjusted discount rate approach to incorporate risk in the capital budgeting analysis has certain merits. First, it is simple to calculate and easy to understand. Moreover, firms in actual practice apply different standards of cost of capital for different projects. It has, therefore, the merit of operational feasibility.

However, this method also has certain operational and conceptual difficulties. The principal operational difficulty of this approach is the determination of the time-adjusted discount rate. While it is logical to assume that projects, which involve more risk, should be discounted at a higher rate

and vice versa, the difficulty encountered is how to precisely express a higher risk in terms of a higher discount rate. In other words, determining an appropriate discount rate in consonance with the differing degrees of risks of various projects over the years for the same project is bound to be a difficult task.

The second problem of this approach is that it does not make direct use of the information available from the probability distribution of expected future cash. Moreover, conceptually, this approach adjusts the wrong element. It is the future cash flow of a project, which is subject to risk. We should adjust the cash flows and not the required rate of return.

Finally, under this method, the process of adding the risk premium to the discount rate leads to a compounding of risk overtime. This is not a theoretically desirable practice. It is because the discounting process should only take into account time value consideration and not risk considerations.

11.3 (c) Certainty-Equivalent Approach

The certainty-equivalent approach can also be used for evaluating risky investment projects. This method overcomes some of the weakness of the risk-adjustment discount rate method. Under the certainty-equivalent approach, the riskiness of the project is taken into consideration by adjusting the expected cash flows and not the discount rate. This method eliminates the problem arising out of the inclusion of risk premium in the discounting process.

Steps Involved

The incorporation of risk in the investment decision on the basis of certainty-equivalent approach involves the following steps:

Conversion of risky cash into equivalent risk less cash flows: as already observed, the incorporation of risk in the capital budgeting analysis is done, according to this approach, by modifying the expected cash inflows. The first step, therefore, involves the determination of the basis for modifying the cash flows to adjust for risk. The risk-adjustment factor is expressed in terms of a certainty-equivalent coefficient. The certainty-equivalent coefficient represents the relationship between certain (risky less) cash flows and risky (uncertain) cash flows.

$$\text{Thus, the coefficient is equal to } \frac{\text{Risk less cash flow}}{\text{Risky cash flow}}$$

Let us understand the rationing of the coefficient. The investment decisions' are associated with risk because the future returns are uncertain in the sense that the actual returns are likely to vary from the estimates. If the returns could be made certain there would be no element of risk. It can reasonably be expected that investors would prefer a relatively smaller but certain cash flows than an inception, thought slightly larger, cash flows. How much less they would accept would depend on the perception with respect to risk. Therefore, depending on the risk perception of the firm, the first step in the use of the certainty-equivalent approach is to ascertain risk less cash flows comparable to the expected cash flows streams from the project.

Suppose a project is expected to generate a cash flow amounting to Rs. 80,000. Since this involves risk, a smaller but certain cash flow would be as acceptable to the firm as this one. Let us assume that, on the basis of the utility preference of the management with respect to risk, the firm would rank a certain cash flow of Rs. 6,000 as equal to uncertain cash flow of Rs. 10,000. Another way of saying the same thing would be that the certainty-equivalent of Rs. 10,000 is Rs. 6,000, or the comparable risky flow for the risk less flow of Rs. 10, 000. Thus, the certainty equivalent coefficient is 0.60 (Rs. 6, 000/ Rs. 10, 000). This coefficient, when multiplied by the risky cash flow, would generate the risk less cash flows, i.e. 0.6 × Rs. 10,000 = Rs. 6,000.

The coefficient is a fractional amount, which can assume a value between 0 and 1. There is an inverse relationship between the degree of risk and the value of the coefficient; the higher the risks associated with the projected cash flow, the lower the coefficient and vice versa.

Present value calculation: after the expected cash flows have been converted into certainty-equivalents, the second step under this approach is to calculate their present values. The rate of discount used for this purpose is the risk-free rate.

Accept-reject-rule:

Using the NPV method, the proposal would be accepted if the NPV of the certainty-equivalent cash flow is positive, otherwise it would be rejected. In case of the application of the IRR method the internal rate of return of the project, would be compared with the risk-free discount rate. If IRR exceeds the risk-free of discount then the project would be expected. If not, it would be rejected.

We illustrate below the certainty-equivalent approach to adjust risk to capital budgeting analysis on the basis of Example used for Risk adjusted Rate of Discount.

Let us further assume that the certainty-equivalent coefficients for future cash inflows in different years are:

Year	Certainty equivalent
1	0.9
2	0.8
3	0.7

The certainty equivalent cash flows will be as under

Year	CFAT	CE	CE Cash flows
1	Rs. 1,50,000	0.9	1,35,000
2	Rs. 1,80,000	0.8	1,44000
3	Rs. 1,20,000	0.7	84,000

The NPV of the project will be computed by using the risk free rate of discount as follows:

Year	CE cash flows	P.V.F.at 9%	Present Value
1	1,35,000	0.917	1,23,795
2	1,44,000	0.842	1,21,248
3	84,000	0.772	64,848
		Total	3,09,891
		Investment	3,00,000
		Net present value	9891

Since the NPV is positive, the project can be accepted.

Evaluation

The certainty-equivalent approach has the advantage of being simple to calculate. Another merit of this approach is that it incorporates risk by modifying the cash flows, which are subject to risk. It is, therefore, conceptually superior to the time-adjusted discount rate approach.

Its demerits arise out of the practical problems of implementation. The crucial element in the application of this approach is the certainty equivalent coefficient. It depends upon the utility preference of the management and the perception of the investors. Being a subjective estimate it cannot be objective, precise and consistent. The conclusions based on such an estimate would be questionable. Another weakness of this method is does not directly use of probability distribution of possible cash flows. Compared to the risk adjusted discount rate approach it is more difficult to calculate.

11.3 (d) Probability Distribution Approach

Probability distribution approach can be used for the evaluation of risky projects. We have introduced the use of the concept of probability for incorporating risk in evaluating capital budgeting proposals while understanding the process of measurement of risk. The probability distribution of cash flows overtime provides valuable information about the expected value of return and the dispersion of the probability distribution of possible returns. On the basis of this information an accept-reject decision can be taken.

The application of the theory in analysing risk in capital budgeting depends upon the behaviour of the cash flows. From the point of view of behaviour, cash flow can be (i) independent, or (ii) dependent. The assumption that the cash flows are independent over time signifies that future cash flows are not affected by the cash flows in the preceding or following years. Thus, cash flows in year 2 are not dependent on cash flows in year 1 and so on. When cash flows in one period depend upon the cash flows in previous periods they are referred to as dependent cash flows. We now illustrate the application of the probability theory to analyse risk in capital budgeting on the assumption f independent cash flows.

Independence of Cash Flows over Time

The mathematical formulation to determine the expected value of the probability distribution of NPV for any projects is:

$NPV = CFI/(I+Rf)^1 + CF2/(I+Rf)^2 + Cf3/(I+Rf)^3 + ... + Cfn/(I+Rf)^n .Co$

Where = Cf1,Cf2, Cf3.....Cfn are the expected value of net CFAT in different year of the project life and Co in the initial investment.

Rf is the risk less rate of interest.

The standard deviation of the probability distribution of NPV is equal to

- $(NPV) = Ï\%1^2/(1+rf)^2 + Ï\%1^2/(1+Rf)^4 + \text{————} + Ï\%n^2/(1+Rf)^{2n}$

Where Ï% (NPV) is the standard deviation of the probability distribution of expected cash flow for period, Ï% t would be calculated as follows:

$Ï\%t = (PI\ (CFI-CF)^2 + P2(CF2-CF)^2 + \text{————} Pn\ (CFn-CF)^2)^{1/2}$

The above calculations of the standard deviation and the NPV will produce significant volume of information for evaluating the risk of the investment proposal.

The calculations are illustrated in the following example.

Suppose that there is a project which involves initial cost of Rs. 10,000 at t=0). It is expected to generate net cash flows during the first 3 years the probability as shown in Table 5.

Example

Table 5

Expected cash flows			
Period I		Period II	
Probability	Net cash flows Rs.	Probability	Net cash flows Rs.
O.10	3,000	0.10	3,000
0.25	4,000	0.25	4,000
0.30	5,000	0.30	5,000
0.25	6,000	0.25	6,000
0.10	7,000	0.10	7,000

Solution:

(i) Expected Values: for the calculation of the standard deviation for different periods, the expected values are to be calculated first. These are calculated in Table.

(ii) The standard deviation of possible net cash flows is:

Ï% 1 =

Thus, the standard deviation for period I is:

$Ï\%1=[(0.10(3,000-5,000)^2 + 0.25\ (4,000-5,000)^2 + 0.30\ (5,000-5,000)^2 + 0.25\ (6,000-5,000)^2 + 0.10(7,000-5,000)^2]^{1/2}$

= Rs. 1140.18 approximately.

When calculated on similar lines the standard deviation for periods 2 and 3 also work out of to Rs. 1140.18 approximately.

(iii) $NPV = 5,000/1.10+4000/(1.10)^2+3000/(1.10)^3-10000$

= Rs. 5,000(0.909) +4,000(0.826) +3,000(0.751)-(10,000)

= Rs. 102 approximately

(iv) The standard deviation under the assumption of independence of cash flows over time

$Ï\% =[(1140.18)^2/(1.10)^2+(1140.18)^2/(1.10)^4+1140.18)^2/1.10)^6]^{1/2}$

= Rs. 1642 approximately

Calculation of Expected Value of Each Period

Year - 1

Probability	Net cash flows	Expected value (1×2)
0.10	3,000	300
0.25	4,000	1000
0.30	5,000	1500
0.25	6,000	1500
0.10	7,000	700
		CFI = Rs. 5,000

Year – 2

Probability (1)	Net cash flow (2) Rs.	Expected value (1×2) (3) Rs.
0.10	2,000	200
0.25	3,000	750
0.30	4,000	1200
0.25	5,000	1250
0.10	6,000	600
		CF2 = Rs. 4,000

Year - 3

Probability (1)	Net cash flow (2) Rs.	Expected value (1×2) (3) Rs.
0.10	1,000	100
0.25	2,000	500
0.30	3,000	900
0.25	4,000	1000
0.10	5,000	500
		CF2 = Rs. 3,000

11.3 (e) Decision Tree Analysis

In modern business there are complex investment decisions, which involve a sequence of decisions over time. Such sequential decision can be handled by plotting decision trees. A decision tree is a graphic representation of the relationship between the present decision and future events, future events and their consequence. The decision tree approach is especially useful for situations in which decisions at one time also affect the decisions of the firm at some later date. Another useful application of the decision tree approach is for such projects, which require decision to be made in sequential parts.

The sequence of events is mapped out over time in a format resembling branches of a tree and hence the analysis in known as decision tree analysis. The various step involved in a tree analysis are

- ❖ Identification of the problem;
- ❖ Finding out the alternatives;
- ❖ Exhibiting for decision tree indicating the decision points, chance events, and other relevant data;
- ❖ Specification of probabilities and monetary values for each inflows; and
- ❖ Analysis of the alternatives.

To illustrate the decision tree approach let us consider the following example:

Example:

Suppose that a firm has an investment opportunity requiring an investment of Rs.100,000. The investment proposal is expected to have a 2-year economic life with no salvage value. In year 1, there is a 0.3 probability that CFAT will be Rs.40,000; a 0.4 probability that a CFAT will be Rs. 55,000 and a 0.3 probability that CFAT will be Rs. 75,000. In year 2 CFAT possibilities depend upon the CFAT that occurs in year 1. That is the CFAT for the year 2 are dependent on the CFAT of the year 1. Accordingly the probabilities assigned with the CFAT of the year 2 are conditional probabilities. The estimated conditional CFAT and their associated probabilities are as follows:

CFAT = 40,000		CFAT = 55,000		CFAT = 75,000	
CFAT	Probability	CFAT	Probability	CFAT	Probability
20,000	0.2	65,000	0.3	80,000	0.1
50,000	0.6	75,000	0.4	100,000	0.9
75,000	0.2	80,000	0.3	120.000	0.1

It may be noted that the decision free figure covers all the dimensions of the problem; (i) the timing of CFAT, (ii) the possible CFAT outcomes in each year including the conditional nature of the CFAT outcomes in the year 2), and the probabilities associated with these outcomes. The decision tree shown nine distinct possibilities, the project could assume if accepted. For example, one probability is that the CFAT for the first year may amount of Rs. 40,000 and for the year 2 Rs. 20000. Assuming a 12% rate of discount the NPV of the project is negative. Therefore the project should not be accepted. Like-wise the best outcome is CFAT = Rs. 75,000 in the first year and CFAT = Rs. 120,000 in the second year. The NPV would be the highest among all the nine possible combinations in this case.

The expected NPV of the project is given by the last column of the table, which is Rs. 9512.20. It is a positive therefore the project can be accepted. The figures in the last column have been computed by multiplying the conditional NPVs with their respective joint probabilities.

The decision tree approach is a very useful approach for deciding proposal in a situation of uncertainty. It gives a bird's eye view of all the possibilities associated with the project. It also enables the management to prepare for adverse future outcomes.

11.4 SELF-CHECK EXERCISE

1. _____is the technique of long-term decision for investment (capital outlays) and their financing.
2. Project appraisal and capital budgeting are synonymous terms. ?True OR False
3. Accounting rate of return is a traditional OR Discounted Cash Flow technique?
4. Internal rate of return is a _____ cash flow technique.
5. A _____ tree is a graphic representation of the relationship between the present decision and future events, future events and their consequence.

Year 1		Year 2		Path number	Exp No. 12% of disc
Probab ilities	CFAT	Probabili- ties	CFAT		
		0.2	20,000	1	-48
0.3	40,000	0.6	50,000	2	-24
		0.2	75,000	3	-45
		0.3	65,000	4	920
0.4	55,000	0.4	75,000	5	889
		0.3	80,000	6	128
		0.1	80,000	7	307
0.3	75,000	0.8	100,000	8	466
		0.1	120,000	9	626

11.5 SUMMARY

Capital budgeting decisions are the most difficult and significant decisions because the future to be foreseen is distant and hard to perceive. Also these decisions have a significant effect upon a company's future earnings and growth. A right capital budgeting decision can put the company on the growth path. On the other hand a wrong capital budgeting can result into the failure of the company. Thus success or failure of a business significantly depends upon quality of capital budgeting process employed in it.

11.6 GLOSSARY

1. Pay Back Period Method: The amount of time taken to break even on an investment
2. Rate of Return Method: Method of investment appraisal which determines return on investment by totalling the cash flows (over the years for which the money was invested) and dividing that amount by the number of years.
3. Net Present Value: The difference between the present value of the future cash flows from an investment and the amount of investment.

11.7 ANSWERS TO SELF-CHECK EXERCISE

1. Capital budgeting
2. True
3. Traditional Technique
4. Discounted cash flow technique
5. Decision

11.8 REFERENCES/SUGGESTED READINGS

- Patel, Bhavesh M, Project Management, Vikas publishing House pvt. Ltd., New Delhi
- Chaudhary, S.: Project Management, Tata McGraw Hill, New Delhi.
- IBH. Planning Commission: Manual for Preparation of Feasibility Report.
- Timothy, D.R. and W.R Sewell: Project Appraisal and Review, Macmillan, India.

11.9 TERMINAL QUESTIONS

1. What is the rationale for the net present value method?
2. What's discounted paybacks period?
3. Evaluate sensitivity analysis as a method for assessing risk.

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CHAPTER – 12
PROJECT IMPLEMENTATION PRACTICES IN INDIA

STRUCTURE

12.0 LEARNING OBJECTIVES

1. To understand the relevance of economic analysis.
2. To study the Indian practise of investment appraisal.

12.1 INTRODUCTION

This lesson is devoted to the study of the practices of Indian enterprises, financial institutions and the government enterprises in the country. The pertinent questions, which may be raised in this context, include the following:

- How much importance is assigned to economic analysis of capital expenditures in practice?
- What methods are used for analyzing capital expenditures in practice and what is the rationale underlying these methods?
- In what ways can economic analysis of capital expenditures be improved in practice?

A survey conducted by Prasanna Chandra was addressed to find out answers to these questions. He included twenty firms, varying on several dimensions like industry category, size, financial performance and capital intensity, in this survey. In these firms, executives responsible for capital investment evaluation and capital budget preparation were interviewed. The interviews, semi-structured in nature were conducted to obtain answers to the questions posed above.

12.2 IMPORTANCE OF ECONOMIC ANALYSIS

According to the conclusions drawn in the survey, the nature of economic analysis of capital expenditures varies from project to project. In a few cases, elaborate analysis is carried out. In most of the cases, however, the analysis is done in sketchy terms. On the whole, one may say that economic analysis is played in a rather low key. The reasons appear to be as follows:

(a) Most of the proposals are meant either for the replacement of some worn out equipment forming part of a production complex or for adding capacity at some stage of production to ensure better balancing of capacities at various stages. In these cases, it is difficult to evaluate independently the economics of proposed investments. They are usually labeled 'urgent' or 'necessary' and this prejudgment precludes further thinking.

(b) Project proposals are reviewed at two or three levels (in one organization as many as five levels of review were obtained, but this was an exceptional case) before a final decision and the judgment of the reviewing authorities is regarded more important than detailed analysis.

(c) It is difficult to estimate accurately the costs and revenues associated with capital investments. The range of error in these estimates, it is argued, does not justify sophisticated analysis.

(d) In many cases only one type of equipment or machinery satisfied the specific requirements. In the absence of alternatives that can be compared, detailed analysis seems to be unwarranted.

12.3 METHODS OF APPRAISAL AND THEIR RATIONALE

1. A wide variety of measures are used for evaluating investments. These include measures suggested by capital budgeting literature and several non-standard measures.
2. The most commonly used method for evaluating investments of a small size is the payback method.
3. For investments of large size the average rate of return is commonly used as the principal criterion and the payback period is used as a supplementary criterion.
4. Discounted cash flow (DCF) techniques though not commonly used, are gaining in importance, particularly in the evaluation of large investments. In one company where informal appraisals are used for smaller outlays. DCF analysis is being used for all independent projects, which generally involve substantial outlays.
5. Several other criteria are used for evaluating investments: profit per rupee invested, cost saving per unit of product, investment required to replace a worker. It appears that these criteria are more intelligible to operations-minded managers. Although, in some cases these criteria are closely related to measures suggested in theory, it is difficult to make generalizations about their suitability. The variety of measures used by project sponsors seems to create problems of understanding and comparison for the higher executives.
6. Although specific measures of investment worth are calculated, only few firms have a well defined policy about the acceptability of investment projects based on such calculations. By and large, no fixed standards are used for acceptance/rejection of projects. The final decision rested with top management, which combined quantitative measures with subjective judgments in an unspecified manner.
7. Limited funds do not appear to be a serious constraint with prosperous firms. The situation with less prosperous firms is different. Limited funds often pose a serious bottleneck with firms, which have poor financial resources. In these firms investments are made only when they are unavoidable. In other words, they adopt the criterion of 'non-postponability' to use a term suggested by one manager.

Room for Improvement

On the basis of the foregoing, we make the following suggestions for improving capital budgeting practice:

1. As far as possible the criteria of investment evaluation should be standardized. The use of many measures makes comparison difficult.
2. The concepts used in analysis must be clearly defined. Vague, qualitative phrases should be avoided and substituted by quantitative measures wherever possible.
3. The characteristics of various methods must be properly understood.
4. Discounted cash flow techniques should receive greater emphasis. They are theoretically superior and practically feasible. The use of these techniques compels a firm to 'look ahead' which in itself has a significant payoff. This advantage, however, can be enjoyed only if the 'look ahead' is done carefully and realistically. If it is done in a very mechanical fashion then no advantage is likely to accrue.

The argument of some executives, that discounted cash flow techniques require difficult-to-obtain information and that many persons are not familiar with them, reflects inertia and a non-progressive outlook. Determined efforts to introduce discounted cash flow techniques can overcome these hurdles.

In sum, evaluation must be carried out in explicit, well-defined, preferably standardized terms and should be based on sound economic logic. Informal and cursory treatment should give way to thorough and rigorous analysis. It must be realized that the prerogative of investment decision-making has a concomitant responsibility to base such decisions on a careful and sound evaluation.

12.4 PROJECT APPRAISAL BY FINANCIAL INSTITUTIONS

The all India term-lending financial institutions, IDBI, IFCI and ICICI appraise project proposals primarily from the financial point of view. However, they also scrutinize projects from the larger social point of view. ICICI was perhaps the first financial institution to introduce a system of economic analysis as distinct from financial profitability analysis. IFCI adopted a system of economic appraisal in 1979. Finally, IDBI also introduced a system for economic appraisal of projects financed by them. Though there are some minor variations, the three institutions follow essentially a similar approach, which is a simplified version of the L-M approach. The appraisal procedure followed by IDBI is being described below. IDBI, in its economic appraisal of industrial projects, considers three aspects:

a) Economic rate of return
b) Effective rate of protection
c) Domestic resource cost

Economic Rate of Return

The method followed by IDBI to calculate the economic rate of return may be described as a partial Little-Mirrlees method because while international prices are used for valuation of tradable inputs and outputs, L-M method is not followed in its entirety. The significant elements of IDBI's method are described below:

1. International prices are regarded as the relevant economic prices and hence it is necessary to substitute market prices with international prices for all non-labour inputs and outputs.
2. For tradable items, where international prices are not directly available, CIF prices are used for inputs and FOB prices are used for outputs.
3. For tradable items where international prices are not directly available and for non-tradable items (like electricity, transportation etc.) social conversion factors are used to convert actual rupee cost into social cost. In some cases (like land) a social conversion factor is applied directly to the actual rupee cost. In other cases (like transport) the actual rupee cost is broken down into three components are valued in social terms. Generally, the social cost of the tradable component is obtained by multiplying it by a factor of 1/1.5; the social cost of labour component is obtained by multiplying it by a factor of 0.5 (shadow price of labour is considered to be 50 percent of the actual); the social cost of the residual component is obtained by multiplying it by a factor of 0.5.

Effective Rate of Protection

Tariffs, import restrictions and subsidies are used to encourage domestic industries and protect them against international competition. Effective Rate of Protection (ERP) measures the extent to which a project is sheltered. It is calculated as follows:

(Value added at domestic prices – Value added at world prices) / Value added at world prices

The ratio is multiplied by 100 to express the ERP in percentage terms.

The domestic selling price is net of taxes and excise duties but inclusive of a reasonable selling commission. The selling price at world price is the CIF price for imports and FOB for exports.

The input cost consists of the costs of the following inputs:

- Raw materials and stores
- Power, fuel, and water
- Part of administrative overheads and expenses
- Selling expenses

The distinction between rated treaded inputs (which are valued both at domestic and world prices) and non-traded inputs (which are valued at domestic price only) is made as follows:

1. Raw Materials and Stores: in general these are taken as trades items and their value at domestic and world prices (CIF prices) are estimated. However, raw materials which have a low value-to-volume ratio and involve disproportionately high transport cost (like silica and pulp) and which are imported are regarded as non-traded items.
2. Power, Fuel, and Water: these are normally treated as 'non-traded' items. However, where fuel is in the form of oil and /or coal and fuel costs are significant, it should be regarded as a traded item and valued at both domestic and world prices.
3. Repairs and Maintenance: this is non-traded item. However, when this entails substantial consumption of spares and chemicals (not included in raw materials) it is regarded as a traded item and valued at both domestic and world prices.

4. Selling Expenses: this is regarded as a non-traded item.
5. Part of Administrative Overheads and Expenses: administrative costs may be divided into two parts- labour costs and other expenses (like rent, insurance charges, telephone traffic, etc.). Since labour costs are part of value added, other expenses only are considered as input costs. These are regarded as non-traded items.

The difference between the selling price and input costs in the value added. This represents payment to labour and capital.

Domestic Resource Cost

The domestic resource cost (DRC) is calculated a appraisals follows:

(Value added at domestic prices)/Value added at world prices x (Exchange rate)

12.5 PUBLIC SECTOR INVESTMENT DECISIONS IN INDIA

The public sector has been assigned a pre-eminent role in the Indian economy. The public sector today commands a predominant position in many basic industries: coal, crude oil and refining, steel, power, fertilizers, locomotives, basic drugs, machine tools, and so on.

12.6 PROJECT APPRAISAL AND MANAGEMENT DIVISION

1. The functions of the Project Appraisal & Management Division are:
   a) To develop formats and guidelines for the submission of proposals for projects / programmes,
   b) To undertake support research studies,
   c) To assist Central Ministries in establishing proper procedures for preparation of reports of projects and programmes.

2. The scope of work:

Appraisal of all the projects and schemes posed to Expenditure Finance Committee (EFC) and for Public Investment Board (PIB).

3. The PAMD prepares a comprehensive appraisal note in consultation with the Subject division(s).

4. As a part of techno-economic appraisal, PAMD appraises Central Sector schemes/projects costing Rs.25 Cr. & above, and prepares Appraisal Notes in consultation with the Subject Division of the Planning Commission, before these are considered by the Public Investment Board (PIB), Expenditure Finance Committee (EFC), Committee of Public Investment Board (CPIB) and Expanded Board of Railways (EBR), depending upon the nature and size of the proposal.

A separate Division named 'Project Appraisal Division' was set up in the erstwhile Planning Commission in 1972 to undertake techno-economic appraisal of major projects and programmes in the public sector for facilitating investment decisions by the Government.

It was reconstituted as Project Appraisal and Management Division (PAMD) on 6th January, 1994. The PAMD undertakes appraisal of public funded plan projects and schemes in consultation with the subject divisions of the NITI Aayog before these are considered for recommendation/ decision by the Public Investment Board or Expenditure Finance Committee depending upon the nature of the project and project cost. The Projects / Schemes costing above Rs.500 crore are appraised by this Division (w.e.f. 29-08-2014 as per enhanced delegation of powers issued by the Ministry of Finance (Department of Expenditure) vide O.M. No. 24(35)/PF-II/2012 dated 29th August 2014).

The appraisal by PAMD broadly includes need and justification for the project/scheme, demand-supply gap in development, technical feasibility, organizational, managerial and financial capabilities of project authorities, reliability of cost estimates, financial and economic viability etc. of the projects/schemes. In addition, proposals for Revised Cost Estimates are also appraised by PAMD.

12.7 PUBLIC INVESTMENT BOARD

Public Finance (Central) Division is primarily engaged with all issues relating to the Central Plan of the Government of India. In this regard, this division is entrusted with the appraisal and approval of all public funded schemes and projects of the Central Ministries/ PSUs. For all projects of the Central Ministries/PSUs with more than a budgetary outlay of Rs.500 crores, this division acts as the Secretariat for the Public Investment Board (PIB) headed by the Secretary (Expenditure) for appraisal of such projects. For Revised Cost Estimate (RCE) of a project, for increase in cost beyond 20% of the firmed up cost estimate due to time overrun, change in scope, under-estimation etc., PIB headed by Secretary (Expenditure) appraises the same if the RCE is more than Rs. 500 crore. In case of projects, for pre-investment activities, the PIB appraises the project if the amount on such activities is more than Rs. 500 crore. Similarly, this division is responsible for holding of the Expenditure Finance Committee (EFC) chaired by the Secretary (Expenditure) in case of all schemes of the Central Government where the budgetary allocation is in excess of Rs.500 crores.

This division is also concerned for constantly improving the quality of public expenditure though better scheme/project formulation, emphasis on outputs, deliverables, impact assessment and convergence approach. A continuous endeavour is made to rationalize the Centrally Sponsored Schemes (CSSs) and Central Sector Schemes (CSs) for optimal and focused use of public resources. This division is also responsible for preparation of outcome budgets for all Central Ministries/Departments in consultation with the NITI Aayog. This output-outcome framework shall be for all CSSs and CSs dealing with identified measurable outcomes in the relevant medium term framework and physical and financial outputs are targeted on a year to year basis. This division also communicates, in consultation with the Budget Division, the outlays for both Central Sector and Centrally Sponsored Schemes over a Finance Commission Cycle.

This division also deals with the financial restructuring of Central PSUs on the recommendations of the Bureau for Restructuring of Public Sector Enterprises (BRPSE). At the same time, it is also engaged in working out modalities for financial assistance to CPSEs, quantification of their Internal and Extra Budgetary Resource (IEBR) generation as well as planned CAPEX for preparation of budget, finalizing modernization of plants and machinery to ensure more efficient production.

This division also deals with various issues relating to Food, Fertilizers and Petroleum subsidy, including their quantification and extension of assistance to the stake holders. The division is also engaged in active consultation with the stake holder ministries in shaping the subsidy policy of the Government by way of a dynamic rationalization process to ensure better targeting of beneficiaries, better efficiency, cost effectiveness and better delivery of services.

This division also deals with various issues of Direct Benefit Transfer (DBT) in coordination with the DBT Mission, aadhaar seeding of beneficiaries data base and use of the Public Financial Management System (PFMS) in order to have end to end digitized information on all central

expenditures encompassing CSSs, CSs, subsidies and other expenditure. Public Finance (Central) Division is also the Secretariat of National Clean Energy and Environment Fund (NCEEF) and is tasked with holding meetings of Inter-Ministerial Group (IMG) headed by the Finance Secretary for appraisal of eligible projects to get Viability Gap Funding (VGF) from the NCEEF.

This division also deals with the issues of Public Procurement Policy including the rules and regulations thereof as well as its administration. It also maintains the Swachh Bharat Kosh (SBK) to attract Corporate Social Responsibility (CSR) funds from corporate sector and contributions from individuals and philanthropists for achieving the objective of Clean India (Swachh Bharat) by the year 2019.

The above assignments of this division is handled in two units; (i) Public Finance (Central-I) and (ii) Public Finance (Central-II) headed by two Joint Secretaries.

12.8 ELF-CHECK EXERCISE

1. The most commonly used method for evaluating investments of a small size is the _____method.
2. For investments of large size _____method of capital budgeting is commonly used as the principal criterion.

12.9 SUMMARY

Practises adopted by Indian enterprises, financial institutions and government enterprises in India have been discussed in this chapter. It assesses the practise importance given to economic analysis of capital expenditures and practises of methods used for analyzing capital expenditures.

12.10 GLOSSARY

1. Economic Analysis: A systematic approach to determining the optimum use of scarce resources, involving comparison of two or more alternatives in achieving a specific objective under the given assumptions and constraints
2. Economic Rate of Return: The Interest rate at which the cost and benefits of a project, discounted over its life, are equal.

12.11 ANSWERS TO SELF-CHECK EXERCISE

1. Payback period
2. Average rate of return

12.12 REFERENCES

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- Websites: niti.gov.in, doe.gov.in

12.13 TERMINAL QUESTIONS:

1. What are the Investment Appraisal Practices in India? Explain.
2. What is the relevance of Economic Analysis.
3. Briefly explain the process of economic analysis.

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CHAPTER-13
SOCIAL COST-BENEFIT ANALYSIS

STRUCTURE

13.0 LEARNING OBJECTIVES

1. To understand the social cost benefit analysis.
2. To study the different approaches to social cost benefit analysis.

13.1 INTRODUCTION

The essence of the theory of social cost\benefit analysis is that is does not accept that the actual receipts of a project adequately measure social benefits and actual expenditures measures social cost. The reason is that actual prices may be an inadequate indicator of economic benefits and costs. For example, in developing countries like India, the prices of necessities are set low, despite their economic importance, while the prices of less essential goods are set high (through a system of taxes and duties). As a result, some projects, which appear very profitable when their outputs and inputs are valued at actual prices, are, in fact, unattractive from the viewpoint of the national economy, while other apparently unprofitable projects have high economic returns. But the theory accepts that actual receipts and expenditures can be suitably adjusted so that the difference between them, closely analogous to ordinary profit, will properly reflect the social gain.

13.2 OBJECTIVES OF SOCIAL COST-BENEFIT ANALYSIS

The objective of social cost-benefit analysis is, in its widest sense, to secure and achieve the value of money in economic life by simply evaluating the costs and benefits of alternative economic choices and selecting an alternative which offers the largest net benefit, i.e. the highest margin of benefit over cost.

Very broadly, social-cost benefit analysis involves the following steps:

1. Estimates of cost and benefits, which will accrue to the project implementing body.
2. Estimates of cost and benefits, which will accrue to individual members of society as consumers or as suppliers of factor input.

3. Estimates of cost and benefits, which will accrue to the community
4. Estimates of cost and benefits, which will accrue to the national Exchequer.
5. Discounting the costs and benefits, which accrue over a period of time to determine the feasibility of the project.

Here again, the non-quantifiable benefits are stated only in descriptive terms. These strategies will work to towards the appropriate calculation of the profitability Ratio (PR).

While this is the general approach to project formulations, implementations and evaluation, the same may be modified to suit the circumstances.

13.3 MAIN FEATURES OF COST-BENEFIT ANALYSIS

Prest and Turvey defined cost-benefit analysis as "a practical way of assessing the desirability of projects, where it is important to take a long view (in the sense of looking at repercussion in the future as well as the near future and a wide view in the sense of allowing side-effects of many decisions relating to industries, regions etc.), i.e. it implies the enumeration and evaluations of all the relevant cost and benefits." This definition focuses attention on the main features of cost-benefit analysis. It covers five distinct issues:

1. Assessing the desirability of projects in the public, as opposed to the private sector.
2. Identification of costs and benefits.
3. Measurement of costs and benefits.
4. The effect of (risk and uncertainty) time in investment appraisal.
5. Presentation of results- the investment criterion.

13.4 RATIONALE FOR SCBA

In SCBA the focus is on the social costs and benefits of the project. These often tend to differ from the monetary costs and benefits of the project. The principal sources of discrepancy are:

- ❖ Market imperfections
- ❖ Externalities
- ❖ Taxes
- ❖ Concern for saving
- ❖ Concern for redistribution
- ❖ Merit wants

Market Imperfections

Market prices, which form the basis for computing ions of the monetary costs and benefits from the point of view of project sponsor, reflect social values only under conditions of perfect competition, which are rarely, if ever, realized by developing countries. When imperfections are obtained, 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 wages paid to labour are usually more than that the wages 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 exchange, is typically less than the rate that would prevail in the absence of foreign regulation. That is why foreign exchange usually commands premium in unofficial transactions.

Externalities

A project may have beneficial or harmful external effects. For example, it may create certain infrastructure facilities like roads, which benefit the neighboring areas. Likewise, a project may have a harmful external effect like environmental pollution. These 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

Taxes and Subsidies

From the private point of view, taxes are definite monetary costs and subsidies are definite monetary gains. From the social point of view, however, taxes and subsidies are generally regarded as transfer payments and hence considered irrelevant.

Concern for Savings

Unconcerned about how its benefits are divided between consumption and saving, a private firm does not put differential valuation or savings and consumption. From a social point of view, however, the division of benefits between consumption and savings (which leads to investment) is relevant, particularly in capital-scarce developing countries. A rupee of benefits saved is deemed more valuable than a rupee of benefits consumed. The concern of society for savings and investment is duly reflected by SCBA wherein a higher valuation is placed on savings and a lower valuation is put on consumption.

Concern for Redistribution

A private firm does not bother how its benefits are described across various groups in the society. The society, however, is concerned about the distribution of benefits across different groups. A rupee of benefit going to a poor section is considered more valuable than a rupee 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 consumers in the market place do not seek these. While merit wants are not relevant from the private point of view, they are important from the social point of view.

13.5 UNIDO APPROACH

Towards the end of the sixties and in the early seventies two principal approaches for SCBA emerged: the UNIDO approach and the little-Mirrless approach this section discusses the UNIDO approach.

The UNIDO approach was first articulated in the Guidelines for project evaluation, which provides a comprehensive framework for SCBA i developing countries. The rigour and length of the work created a demand for a succinct and operational guide for project evaluation in practice. Fulfil this need, UNIDO come out with another publication, Guide to practical project appraisal in 1978. The UNIDO method of project appraisal involves five stages:

1. Calculation of financial profitability of the project measured at market price.

2. Obtaining the net benefits of project measured at market price.
3. Adjustment for the impact of the project on saving and investment.
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.

Each stage of appraisal measures the desirability of the project from a different angle. The measurement of financial profitability of the project in the first stage is similar to the financial evaluation of a commercial project.

Net Benefit in terms of economic (Efficiency) prices

Stage two of the UNIDO approach is concerned with the determination of the net benefit of the project in terms of economic (efficiency) prices, also referred to as shadow prices.

Market prices presents shadow prices only under conditions of perfect markets, which are almost invariably not fulfilled in developing countries. Hence, there is need for developing shadow prices and measuring net economic benefit in terms of these prices.

Shadow pricing: Basic Issues

Certain basic concept and issue must be discussed which are necessary to be understood for the determination of shadow prices. These concepts are; choice of Nume'raire, concept of tradability, source of shadow prices, treatment of taxes, and consumer willingness to pay.

Choice of Nume'raire one of the important aspects of the shadow pricing is the determination of the nume'raire, the unit of account in which the value of inputs or outputs is expressed.

To define the nume'raire, the following questions have to be answered: what unit of currency, domestic for foreign, should be used to express benefits and costs? Should costs and benefits be measured in current values or constant values? With reference to which point-present or future should costs and benefits are evaluated? What use consumption or investment will be made of the income from the project? Should be income of the project be measured in terms of consumption or investment? With reference of which group should be income of the project be measured?

The specifications of the UNIDO nume'raire in terms of the above question is: "net present consumption in the hands of people at the base level of consumption in the private sector in terms of constant price in domestic accounting rupees".

Concept of Tradability

A key issue in shadow pricing is whether a good is tradable or not. For a good that is tradable, the international price is a measure of its opportunity cost to the country. Why? For a tradable good, it is possible to substitute import for domestic production and vice versa; similarly it is possible to substitute export for domestic consumption and vice versa. Hence the international price, also referred to as the border price, represents the 'real' value of the good in terms of economic efficiency.

Sources of shadow prices

The UNIDO approach suggests three sources of shadow pricing, depending on the impact of the project on national economy. A project, as it uses and produces resources, may for any given input or output (i) increase or decrease the total consumption in the economy, (ii) decrease or increase production in the economy, (iii) increase exports or decrease exports.

If the impact of the project is on consumption in the economy, the-basis of shadow pricing is consumer willingness to pay. If the impact of the project is on production in the economy, the basis of shadow pricing is the cost of production. If the impact of the project is on international trade-increase in export, decrease in imports, increase in imports, or decrease in exports the basis of shadow pricing is the foreign exchange value.

Taxes - when shadow prices are being calculated, taxes usually pose difficulties. The general guidelines in the UNIDO approach with respect to taxes are as follows: (i) when a project results in diversion of non-tread inputs which are in fixed supply from other producers or addition to non-traded consumer goods, taxes should be included (ii) when a project augments domestic production by other producers, taxes should be excluded, (iii) for fully traded goods, taxes should be ignored. Consumer Willingness to pay – As noted above, if the impact of the project is on consumption in the economy, the basis of shadow pricing is consumer willingness to pay. A consumer would be prepared to pay any price for a commodity, which is less than the equilibrium price determined by the forces of demand and supply of the commodity.

Measurement of the impact on Distribution

Stages three and four of the UNIDO method are concerned with measuring the value of a project in terms of its contribution to savings and income redistribution. To facilitate such assessments, we must first measure the income gained or lost by individual groups within the society.

Groups

For income distribution analysis, the society may be divided into various groups. The UNIDO approach seeks to identify income gains and losses by the following:

- Project
- Other private business
- Government
- Workers
- Consumes
- External sector.

In addition there can also be, other equally valid groupings:

Measure of Gain or Loss

The gain or loss to an individual group within the society as a result of the project is equal to the difference between the shadow price and the market price of each input or output in the case of physical resources or the deference between the prise and paid and the value received in the case of financial transaction.

Savings Impact and Value

Most of the developing countries face scarcity of capital. Hence, the governments of these countries are concerned about the impact of a project on savings and its value thereof. Stage three of the UNIDO method, concerned with this seeks to answer the following questions:

- Given the income distribution impact of the project what would be its effects on savings?
- What is the value of such savings to the society?

Impact on Savings

The savings impact of a project is equal to:

$\sum \Delta Yi\ MPSi$

ΔYi = change in income of group^i as a result of the project.

MPS^i = marginal propensity to save of group^i

Value of savings

The value of a rupee of saving is the present value of the additional consumption stream produced when that rupee of savings is invested at the margin. The additional stream of consumption generated by a rupee of investment depends on the marginal productivity of capital and the rate of reinvestment from additional income.

Income Distribution Impact

Some governments regard redistribution of income in favour of economically weaker sections or economically backward regions as a socially desirable objective. Due to practical difficulties in pursuing the objective of redistribution entirely through the tax, subsidy, and transfer measures of the government, investment projects are also considered in their evaluation. This call for suitably weighing the get gain or loss by each group, measured earlier, reflect the relative value of income for different group and summing them. The UNIDO Guidelines suggest that an iterative process involving interaction between the analyst and the planners may determine the weights, which essentially reflect political judgements.

Adjustment for merit and demerit goods

In some cases, the analysis has to be extended beyond stage four to reflect the difference between the economic value and social value and social of resources. This difference exists in the case of merit goods and demerit goods. A merit good is one of which the social value exceeds the economic value. For example, a country may place a higher social value than economic value on production of oil because it reduces dependence on foreign supplies. The concept of merit goods can be extended to include a society desirable outcome like creation of employment. In the absence of the project, the government perhaps would be willing to pay unemployment compensation or provide mere make-work jobs. In the case of a demerit good, the social value of the good is less than its economic value. For example a country may regard alcoholic products as having social value less than economic value.

The procedure for adjusting for the difference between social values economic values is as follows: (i) Estimate the economic value (ii) Calculate the adjustment factor as the difference between the ratios of social value to economic value and unity. (iii) Multiply the economic value by the adjustment factor to obtain the adjustment. (iv) Add the adjustment to the net present value of the project as calculated in stage four.

While the adjustment for the difference between the social values and economic, value is seemingly a step in the right direction, it is amendable to abuse. Once the analyst being to make adjustment for social reasons, projects, which are undesirable economically, may be made to appear attractive after such adjustment. Since the dividing line between ‘political’ and ‘social’ is rather nebulous, it becomes somewhat easy to push politically expedient projects, irrespective of their economic merit by investing them with social desirability. While there is no way to prevent such a manipulation, the stage-by-stage UNIDO approach mitigates its occurrence by throwing it in sharp relief.

13.6 Little-Mirrless Approach

I.M.D little and J.A. Mirrless have also developed an approach to social cost benefit analysis expounded by them in the following works: Manual of Industrial Project Analysis in Developing Countries, Vol. II and Project Appraisal and Planning for Developing Countries.

There is considerable similarity the UNIDO approach and the L-M approach. Both the approaches call for.

1. Calculating accounting (shadow) prices particularly for foreign exchange savings and unskilled labour,
2. Considering the factor of equity, and
3. Use of DCF analysis.

Despite considerable similarities there are certain differences between the two approaches:

1) The UNIDO approach measures costs and benefits in terms of domestic rupee whereas the L-M approach measures costs and benefits in terms of international prices also referred to as border prices.
2) The UNIDO approach measures costs and benefits in terms of consumption whereas L-M approach measures costs and benefits in terms of uncommitted social income.
3) The stage-by-stage analysis recommended by the UNIDO approach focuses on efficiency, savings, and redistribution consideration in different stage. The L.M approach, however, tends to view these considerations together.

Shadow prices

The outputs and inputs of a project are classified in to the following categories: (i) treaded goods and services, (ii) non-treaded goods and services, and (iii) labour.

Shadow Price of Traded Goods

The shadow price of a treaded good is considered to be border price. If good is exported, its shadow price is its FOB price and if i good is imported its shadow price is its CIF price. If foreign demand is not perfectly elastic, the marginal export revenue is substituted for the FOB price; similarly, if foreign supply is not perfectly elastic, the marginal import cost is substituted for the CIF price.

Accounting Prices of Non-Traded Goods

Accounting prices for non-traded items are defined in terms of marginal social cost and social benefit. The marginal social cost of a good is the good is the value in terms of accounting price of the resources required to produce and extra unit of the good.

The marginal social benefit is the values of an extra unite of the good from the social point of view. When a good is not taxed and consumed by only one income group, its marginal social benefit is equal to its market price multiplied by a factor, which represents the value assigned to an increase in the income of the group vis-a-vis an equal increase in uncommitted social income.

To determine the accounting price of a non-traded input, one should estimate the proportion in which the demand for that input will be met from increased production and decreased consumption elsewhere in the company. If the proportion of increase in production to decrease in consumptions is, say 4:1 the accounting price of the non-traded input will be

4/5 marginal social cost + 1/5 Marginal social benefit

Use of conversion Factors

Ideally, the accounting price of a non-traded item is defined in terms of marginal social cost and marginal social benefit. In practice, the calculation of marginal social cost and marginal social benefit is often a difficult task. As a practical expended, L-M suggest that the monetary cost of a non-traded item be broken down into tradable, labour, and residual components. The tradable and residual components may be converted into social cost by applying suitable social conversion factor; the labour component's social cost can be obtained by using social wage rate.

Shadow Wage Rate

The shadow wage rate is an important but difficult- to-determine element in social cost benefit analysis. It is a function of several factors: (i) the marginal productivity of labour, (ii) the cost associated with urbanization (cost of transport, urban overheads, etc.), and (iii) the cost of having an additional amount committed to consumption when the consumption of worker increases as a result of the higher income he enjoys in urban employment.

L-M suggests the following formula for calculating the shadow wage rate:

$SWR = c' - 1/5\ (c-m)$

Where

SWR = shadow wage rate

C' = additional resources devoted to consumption

I/S = value of a unit of committed resource

C = consumption of the wage earner

M = marginal product of the wage earner.

To understand clearly the components of SWR, the above equation may be rewritten as follows:

$SWR = m + (c'-c) + (1-I/S)\ (c-m)$,

The first term, m, is the marginal product of labour; the second term, (c'-c), represents the cost of urbanization (it is the cost associated with providing the consumption level of c though it does not from part of it); the third term, (I-I/S) (c-m), represents the cost of having an additional amount (c-m) committed to consumption (it may be noted that is the value of a unit of uncommitted and I/S is the value of a unit of committed resource).

Accounting Rate of Return

The accounting rate of return (interest), is the rate used for discounting social profits. In determining the accounting rate of return the following consideration should be borne mind:

The future social profit for all the projects must be discounted in the same way.

The accounting rate (s) of interest should be such that all mutually compatible projects with positive present social value can be undertaken.

The accounting rate of interest should maintain some kind of balance between. Investment and investible resources: too low, an accounting rate of interest lead to over-investment with inflationary effects and too high an accounting rate of interest leave saving underutilized and result in excessive unemployment.

The rate of return currently being earned is a good guide to the accounting rate of interest when the following conditions are reasonably satisfied: (i) indirect taxes are fairly uniform-with little discrimination between imported and exported commodities and (ii) the social wage rate is close to the actual wage rate.

- ❖ The initial estimate of the accounting rate of interest should, in principle, be such that is would allow only a-few of the best projects in the past.
- ❖ Experience is the best guide to the choice of accounting rate of interest: if the investment requirement of acceptable projects exceeds the availability of investible funds, increase the accounting rate of interest. If the investment requirement of acceptable projects is less than the availability of investible funds, decrease the accounting rate of interest. The adjustment in the accounting rate of interest, however, should be gradual over time.

13.7 SCBA BY FINANCIAL INSTITUTIONS

The all-India term-leading financial institutions, IDBI, IFCI, and ICICI appraise project proposals primarily from the financial point of view. However, they also scrutinize projects from the larger social point of view. ICICI was perhaps the first financial institution to introduce a system of economic analysis as distinct from financial profitability analysis. IFCI adopted a system of economic appraisal in 1979. Finally, IDBI also introduced a system of economic appraisal of projects financed by them. Though there are some minor variations, the three institutions follow essentially a similar approach, which is a simplified version of the L-M approach. The appraisal process followed by the financial institutions has been discussed in previous lesson.

13.8 SELF-CHECK EXERCISE

1. Concern for redistribution is one of the principal source of discrepancy between social costs and monetary costs. True OR False
2. The common market imperfections found in developing countries are _____,_____ and _____

13.9 SUMMARY

It is imperative to do the social cost benefit analysis of any project to assess the implications of that project on the society. This becomes important with the perspective of treating economic objectives as means to achieve the ends to the welfare of the society.

13.10 GLOSSARY

1. Income redistribution: transfer of income from high income groups to low income groups
2. Marginal propensity to save: the change in saving with respect to change in income

13.11 ANSWERS TO SELF-CHECK EXERCISE

1. True
2. Rationing, prescription of minimum wage rates, foreign exchange regulation

13.12 REFERENCES/SUGGESTED READINGS

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13.13 TERMINAL QUESTIONS

1. Discuss the principal sources of discrepancy between social costs and benefits on the one hand and monetary costs and benefits on the other.
2. What are the similarities and differences between the UNIDO Appraisal and the Little Mirrlees approach?

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CHAPTER – 14
PROJECT DESIGN AND NETWORK ANALYSIS

STRUCTURE

14.0 LEARNING OBJECTIVES

1. To understand the relevance of project design and network analysis.
2. To learn about PERT and CPM techniques.

14.1 INTRODUCTION

The execution of a project follows a definite path of planning, scheduling and controlling. The first and the foremost aspect of a project is the project design. It is in fact the heart of the project entity. It defines the individual activities, which go into the corpus of the project and their interrelationship with each other. Project design enables to identify the flow of event, which must take place for the successful implementation of the project.

Network techniques help the management of an organization in performing these functions efficiently and effectively. The technique is concerned with the development of the project work plan and the duration time – estimate and evaluation of these in the light of the constraints of the project situation.

The strategy selected as a result of the techno-economic analysis forms the initiation of the project design development. Briefly, project design is the framework of a project formulated with detailed sequences and develops an acceptable work plan for the project. It helps the entrepreneur to implement the project is scheduled without any hindrance.

The strategy is examined in detail and the details are utilized to compile the sequential narration of the constituent activities of the project. This compilation of the sequential narration is known as the project logic. When it is represented in the form of graphical pattern, it is known as a network.

14.2 IMPORTANCE OF NETWORK ANALYSIS

The network analysis has the potential of unfolding unknown snags involved in project estimates which, when detected, may provide management not only to improve on the on-going project estimates but also to take serious lesson for future application. This would, of course, require seriousness and sincere application of different niceties of the technique of network analysis which require, among other things, that

a) The whole project should be considered with reference to the sequence of activities and events. Sequence here is not a mere mathematical problem. It underlines activities that are to follow one after another leading to an event.

b) This would also require that the events should be thought of in different steams of operations and their relationship understood clearly.

c) The whole project may be put on one network while different segments of the project may be detailed out in separate networks for final integration in the overall network. This would imply that no important detail of any operation in the project, from beginning to end, would miss the attention of the management.

d) The time estimates may be made taking into view to aspects: one projects in which previous experience does not exist at all and time estimates would have to be based on probabilities and two, time estimates may be deterministic, being based on previous experience of similar types of operations in different other projects.

e) Cost estimates would depend on the project time estimate and the changes in the prices, of different factors of production. In this specific context, mere provision of escalation clauses would not be enough. Inflationary changes would have to be attempted so that management may know for certain what slippage in time would mean in terms of cost. This is apart from efficiency variations both favourable and unfavourable on circumstances not quit foreseen at the time the estimates were made.

f) The physical progress of the projects, individuality and simultaneity of events, jobs farmed out snags in different areas of project work would all require adequate notice and application of correctives in proper time. It is also possible that management may think it appropriate and economical to speed up completion of project by what is known as ‘crashing’. The concept of crashing is particularly relevant in view of the avoidance of huge constructive total loss that slippage, dilly-dallying or other factor may cause.

14.3 ORIGIN OF PERT AND CPM

PERT and CPM techniques were developed in the U.S. independently, while CPM came into focus about 1957 as an offshoot of collaboration between Du-point Remington Rand. While different distinctions are often ascribed to CPM and PERT, the distinction is perhaps that the emphasis of CPM is essentially on the activities themselves, the costs associated with completion of each activity and optimum plan for the project as a whole. PERT, which was developed about

1958 as a result of collaboration between the Operational Researcher Division of the United States Navy and a firm of business consultant, had for emphasis the events rather than the activities leading to events. Most of the distinctions have, however, dissolved while both PERT and CPM underwent different measures for attaining perfection through their application as tools.

14.4 PERT

Pert was applied to help solve problems of producing the Polaris Missile system to very tight schedule. Application of PERT has been based on probability estimates covering those pessimistic, those optimistic and those considered normal. In unique types of projects like the Polaris Missile, since previous experience in similar types of activities does not exist; probability calculations have occupied a significant place. However, considering that all these techniques concerned with planning and control of projects have network analysis as a common denominator, it is relevant to point out that these techniques involve building up of Gantt type charts covering each activity, event, time, cost, projects farming out, employment of different classes of managers and workers, procurement of materials, deployment of materials relating to the completion of the project.

Network

A network comprises a set of exponents connected with each other in a sequential relationship with each step till the completion of a project.

Network analysis is a system, which plans both large and small projects by analysing the project activities. Projects are broken down into simple activities, which are then arranged in a logical sequence. It also decided as to which task will be performed simultaneously and which others sequentially. A network diagram constructed below presents the relationship between all the activities involved (see fig. 1). Time, costs and other resources are allocated to different activities.

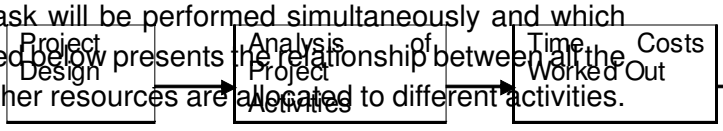

Fig.1 Network Design

Network Techniques

In a project, there may be two categories of jobs or activities-which can be taken up concurrently and which can be taken up only after completing some other activities – either completely or partially. Hence, in a bar chart, some of the bars may run parallel or overlap each other time-wise while some may run serially. The scheduling of construction and identification of potential causes of delay form an important part of a project appraisal. Timing and sequencing of various activities involved in project implantation are reviewed, keeping in view the conditions regarding the availability of construction materials, labour, procurement and delivery periods of plant and machinery, erection and commission, start-up and trial-runs, training of staff, etc. The implementation schedule also takes into account seasonal and other variations in working conditions, which might interfere with the implementation of the project. Several techniques of project scheduling and control such as Bar Charts, Programme Evaluation and Review Techniques (PERT), Critical Path Method (CPM) etc. are used.

Of these CPM have come to be widely used in project management, as they are very useful in the basic management functions of planning, scheduling and control. These techniques can be applied in diverse kinds of projects like construction of a building or a highway, planning and launching of new product, large maintenance projects, scheduling ship construction and repairs, end-of-the month closing of accounts, large, research projects, etc.

Need for Network Techniques

Network analysis helps in designing, planning, coordinating, controlling and decision-making in order to accomplish the project economically in the minimum available time with the limited available resources.

The functions of planning, organizing, directing and controlling are essential to very enterprise regardless of the type, size, purpose, or complexity of the operation. Techniques, of course, vary because they must be adapted to each individual firm. PERT is one of the management techniques, which is considerable more useful to some manages than to others it is of the tested tools of management in industrially developed countries.

It works as a method of minimizing production delays, interruptions, and conflicts; of coordinating and synchronizing the various parts of the overall job; and of expediting the completion of projects towards scheduling and budgeting resources so as to accomplish a predetermined job. It is a communication facility in that it can report developments and keep the managers posted and informed.

PERT is concerned with two concepts:

1. Events: an event is a specific accomplishment that occurs at a recognizable point of time and does not call for either the need of time or resources.
2. Activities: an activity is the work required to complete a specific event.

In PERT, the activities, the events, require time, and resources for its completion.

Steps in PERT

The first step in the development of a PERT network is the establishment of objective. There will be major objectives to be accomplished, linked by supporting objectives. When these are identified, they must be linked together so as to enable to planner to see the project in its true perspective and also see the relationship between and among all the steps. The second step is to schedule work breakdown in great detail. In the third step, both technical and managerial person should begin to work together. The fourth step is that each person who participates in the application of PERT to the control of the project should have some basic familiarity with the general nature of the work and with the ultimate objective desired.

Some authors have also indicated the following steps involved in PERT analysis:

1. Development of project network.
2. Time estimation
3. Determination of critical path, event slacks, and activity floats.
4. Development of project schedule.
5. Calculation of variability duration and the probability of completion in a given time.

PERT deals with the problem of uncertain activity time by the application of statistical analysis to the determination of estimated time for each activity of the project. This technique, as a manager's tool, defines and coordinates what must be done to successfully accomplish the objectives of a project on time. It aids the decision-maker but does not make decisions for him.

In PERT, time is the basic measure. It is usually expressed in colander weeks. The project should be completed whining the stipulated optimistic time. In order to arrives at the most reliable estimate of time, three time estimates are usually employed under this technique as gives below:

i. The optimistic time; it is the shortest time possible if everything goes perfectly well with no complications, the chance of this optimum actually occurring might be one in a hundred.
ii. The pessimistic time: it is longest time conceivable; it includes time for unusual delays and thus the chance of its happening might be only one in a hundred;
iii. The most likely time: it would be the best estimate of what normally would occur.

The differences in these three give a measure of the relative uncertainty involved in the activity.

Advantages of PERT

(a) This technique gives the management the ability to plan the best possible use of resources to achieve a given goal within the overall time and cost limitations.
(b) It helps management to handle the uncertainties involved in programmes where no standard time data of the Taylor-Gantt variety are available.
(c) It presses for the right action, at the right point, and at that right time in the organisation.

Limitations of PERT

(a) The basic difficulty comes in the way of time estimates for the completion of activities because activities are of non-repetitive type.
(b) This technique does not consider resources required at various stages of the project.
(c) Use of this technique for active control of a project requires frequent updating and revising the PERT calculations and this proves quite a costly affair.

14.5 CRITICAL PATH METHOD (CPM)

Next of PERT, the CPM for planning and controlling projects has enjoyed the widest use among all the system that follow the networking principles. CPM was developed in 1956 at the E.I. DuPont Nemours & Co., U.S.A. connection with the periodic overhauling and maintenance of a chemical point. It resulted in reducing the shutdown period from 130 hours to 90 hours and saving hours and saving the company $1 million. CPM has to time-cost estimates for each activity (one time-cost estimate for the normal situation and the other estimate for the crash situation) but does not incorporate any statistical analysis in determining such time estimates. CPM operates on the assumption that there is a precise known time that each activity in the project will take.

Advantages of CPM

Besides being applicable to schedule large and small projects it has some of the important advantages listed below:

(a) It helps in ascertaining the time schedule.
(b) With its aid, control by the management is made easy.

(c) It makes better and detailed planning possible.

(d) It provides a standard method for communicating project plans, schedules, time and cost performance.

(e) It identifies the most critical elements and thus more attention can be paid to these activities.

Limitations of CPM

(a) CPM fails to incorporate statistical analysis in determining the estimates.

(b) It operates on the assumption that there is a precise known time that each activity in the project will take but this may not be true in actual life.

(c) It is difficult to use CPM as a controlling device for the simple reason that one must repeat the entire evaluation of the project each time when changes are introduced into the network. It may be remembered that CPM was initially developed as a static planning model and not as a dynamic controlling device.

14.6 DIFFERENCES BETWEEN PERT AND CPM

Though the fundamental network of PERT and CPM are identical, yet there are certain differences. These differences have been explained below:

1. The origin in PERT is military (naval) whereas that of CPM the origin is industrial.
2. PERT is an event-oriented approach whereas CPM is an activity-oriented system.
3. There is allowance for uncertainty in PERT whereas in CPM there is no such allowance.
4. It has three time estimates in PERT whereas in CPM. There is only one single estimate of time and the emphasis is on cost.
5. PERT is probabilistic model with uncertainty in activity duration whereas CPM is a deterministic model with well-known activity (single) time based upon past experience.
6. PERT does not demarcate between critical and non-critical activities whereas CPM marks critical activities.
7. PERT is especially suitable when high precision in required in time estimates, e.g., defence projects whereas CPM is suitable when reasonable precision is required, e.g., civil construction projects, industrial expansion schemes, etc.
8. PERT time is a averaged whereas in CPM no averaging of time is involved.
9. In PERT the concept of 'crashing' is not applied whereas the concept of crashing is applied in CPM.
10. PERT lays emphasis on reduction of the execution time of the project without too much cost implications. It is time-based whereas CPM lays emphasis on the greatest reduction in completion time with the least increase in project cost. It is cost-based.

14.7 APPLICATION OF NETWORK ANALYSIS

For the purpose of application of PERT/CPM, a project is conceived as a collection in independent activities of job. If one job has to be completed before another can being, the first job is described as an immediate predecessor of the job following or in other words, the latter is an immediate successor of the former.

Two types of graphs are used in PERT/CPM. They are:

(i) Activity on the Arrow (AOA) system.

(ii) Activity on Node (AON) system.

In the AOA system, or the Arrow Diagram Method, an arrow graphically represents an activity. The tail end of the arrow represents the start and the head represents the end of an activity. The description of the activity is written alongside the arrow. In fig.2 for example, a and b describe activities. (For example, in building a may be used to denote an activity like excavation and b to denote concreting). Alternatively, the numbers of nodes can denote activity. For example, activity a can also be denote as (1,2) and activity b as (2,3).

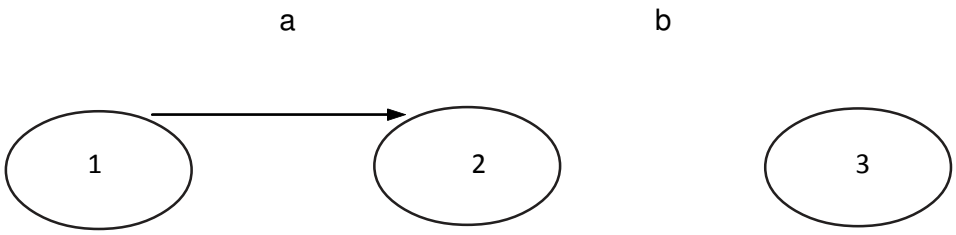

Fig. 2 AOA System

An activity is the actual performances of a task and it consumes time and resources. An event is the start or completion of task and does not consume time or resources. For example, machine installation is an event. Similarly, completion of machine installation is an event.

The length of the arrow in a network diagram does not bear any relationship to the time, which the activity takes, or the resources, which the activity consumes. The direction of the arrow indicates the direction of the workflow. The usual practice is to go from left to right.

All events must be numbered. The same number cannot be used for more than one event.

In the AON system, circle or nodes represent activities and arrows are used to show only the dependence relationship-between the activity nodes (see Fig. 3).

Fig. 3 AON

In the AOA diagram, the time required for an activity is indicated alongside the arrow and in the AON diagram, the time is indicated in the circle. For example, if activity a required 10 days and b requires 12 days, they may be indicated as shown in Fig. 4 and Fig. 5.

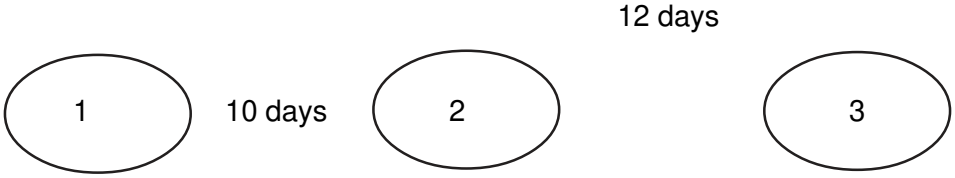

Fig. 4 AOA showing time required for activity

Fig. 5 AON showing time required for activity

It becomes necessary to introduce dummy job(s) in constructing the network diagram if two or more activities in the project have identical immediate predecessor and successors or if two or more jobs have some, but not all, of their immediate predecessors in common. A dummy is an artificial activity introduced in a network to maintain a unique numbering system for the different activities and to keep the logical sequence of activities and their interrelationship correct. A dummy job takes zero time to perform and is used solely to illustrate precedence relationship.

Fig.6 illustrates the use of dummy jobs. Activity b is a common immediate predecessor of both d and c while a is an immediate predecessor of d alone, and c is one of e. Hence two dummy jobs f and g are introduced to indicate the precedence relationship.

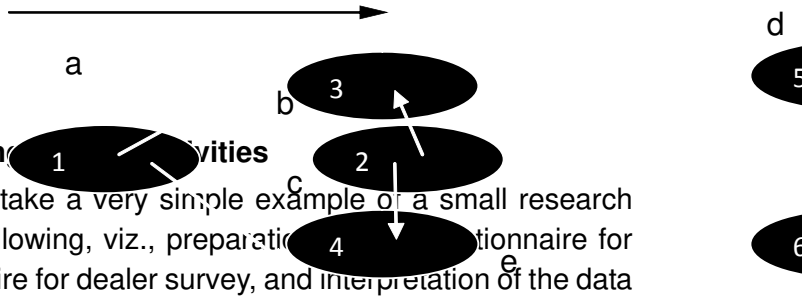

Fig. 6 CPM showing activities

To illustrate the CPM technique, let us take a very simple example of a small research project. The project is decomposed into the following, viz., preparation of questionnaire for consumer survey, preparation of the questionnaire for dealer survey, and interpretation of the data collected by the dealer survey, processing and interpretation of the data collected by the consumer survey. This is represented on Fig. 7.

Job Identification	Job description	Immediate Predecessor	Time required to perform the job
a	Preparation of dealer, Questionnaire	———————-	10 days
b	Preparation of consumer questionnaire	———————-	10 days
c	Dealer survey	a	20 days
d	Consumer survey	b	60 days

e	Processing and interpretation of dealer survey data	c	10 days
f	Processing and interpretation of data	d	30 days

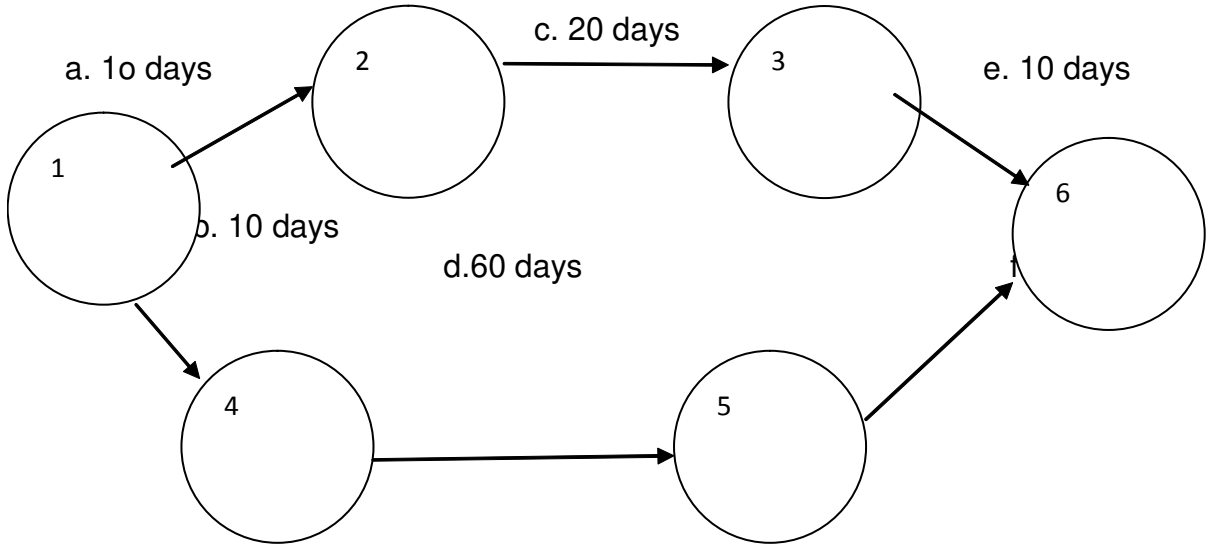

Fig. 7 Critical path

Critical path

The critical path is the longest path in a project network.

A path is a set of nodes connected by arrow beginning at the initial node of a network and ending the terminal node. In Fig. 8, there are two paths: 1-2-3-6 and 1-4-5-6 where the numbers refer to nodes. The length of a path in the network is the total time it takes to travel the path. This time is calculated by adding the individual times between the connected nodes on the path.

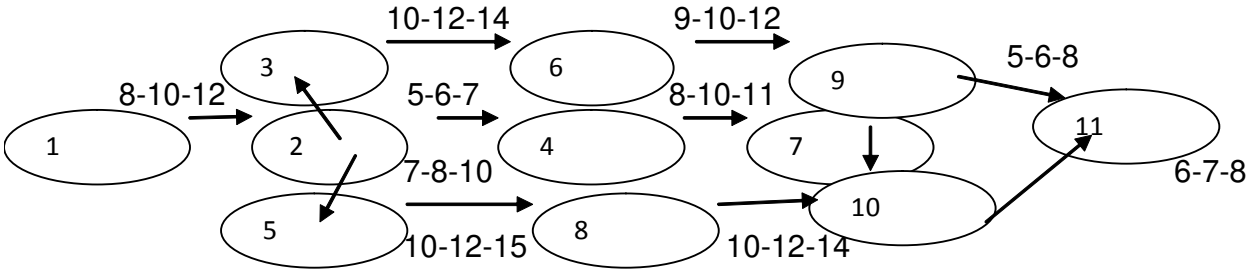

Fig. 8

The longest path in the network diagram here is the one connected nodes 1-4-5-6 because it takes 100 days compared to the path connecting nodes 1-2-3-6 which takes only 40 days. The jobs on the critical path are critical in determining the project's duration and hence they are called critical jobs or critical activities. Thick lines represent the critical path. Alternatively, double lines may represent it.

It is clear that even if the preparation of dealer questionnaire, dealer survey and the processing of the dealer survey data are delayed by a total of 60 days, the total duration of the project will not be affected. This extent of delay that can be caused to jobs on the non-critical path without affecting the total duration of the project is known as slack. In our example, the slack is 60 days.

The concept of critical path makes it clear that if we want to reduce the total duration of a project, we should be able to reduce the time taken by activities on the 'critical path. For example, if we want to complete the research project of our example earlier, we have to reduce time taken by anyone or more of the activities on the critical path (b, d and f) for example; we may reduce the time for the consumer survey by increasing the number of people employed for this purpose. Similarly, the data processing may also be done quickly.

14.8 Management Information System

A management Information System (MIS) is a collection of data processing equipment, producers, software, and people that integrates the sub-system of the organization and provides the needed information in time for efficient managerial decision-making to discharge the managerial functions promptly and efficiently.

An efficient MIS plays a very important role in enabling the managers to efficiently perform managerial functions like planning, organizing, directing and controlling Adequate and up-to-date information is an essential input for all these functions. MIS, therefore, is a prerequisite for efficient management.

The benefits

Network analysis underlines several benefits. The important ones are:

(i) It ensures early and logical planning of the whole project, in terms of both aggregates and disaggregates.

(ii) It puts into perspective the full interrelationship of all activities concerned in the project.

(iii) It monitors the progress of the project to its completion data. Initial plan of projects through network analysis would underline which jobs control the rate of progress and which jobs have time to spare. The controlling job in a fact, the critical job or 'key jobs'. Any delay in completing these jobs hold up the rest of the project while any reduction in time on these jobs reduces the overall time of the project. The sequence of jobs which require the longest time to complete, make up the critical path.

Determination of the critical path assesses management in focusing attention on the critical jobs, so that they remain on schedule. Naturally, critical jobs would be relatively small percentage of the total jobs and would call of managerial alacrity so that project completion time does not suffer. Depending on the nature of the project and the criticality or the completion time, management may either slow down or speed up different of the project so that activities and events remain in consonance to one another.

Reduction of the overall project time may involve selective increase in direct costs, as a result of crashing. However, such increase would be more than compensated by project completion on date or even ahead of schedule. Network analysis helps management to know and judge alternative ways of optimization of direct and indirect costs for giving the minimum total cost.

This is particularly important in view of the fact that it many of the Indian public projects, expenditure during construction has short up several times more than the original project estimates due to various factors.

14.9 MEASURES OF VARIABILITY

Variability in PERT analysis is measured by variance or its square root, standard deviation. Variance of a set of numbers is the average squares difference of the numbers in the set from their arithmetic average. A simple example may be given to illustrate the calculation of variance. Let a series consist of numbers 4,6 and 8. The average of this series is 6. The differences of various numbers in the series from the average are-2,0, and 2. Squaring them we get 4, 0, and 4. Hence variance the average of squared difference is 8/3, and standard deviation is square root of 8/3.

The steps involved in calculating the standard deviation of the duration of critical path are as follows:

1. Determine the standard deviation of the duration of each activity on the critical path.
2. Determine the standard deviation of the total duration of the critical path on the basis of information obtained in step 1.

For determining the standard deviation of the duration of an activity we require the entire probability distribution of activity distribution. We, however, have only three values from this distribution: tp, tm, and to. In PERT analysis, a simplification is used in calculating the standard deviation.

It is estimated by the formula.

Standard deviation = (tp-to)/6

Where tp = pessimistic time

To = optimistic time

Variance is obtained by squaring standard deviation.

Assuming that the probability distribution of various on the critical path is independent, the variance of the critical path duration is obtained by adding variances of activities on the critical path. Variance (critical path duration)= sum of variances of activity durations on the critical path.

This means

Standard deviation (critical path duration) = square root of the sum of variances of activity on the critical path.

For real life projects, which have a large number of activities on the critical path we can reasonably assume that the critical path duration is approximately normally distribution with, mean and standard deviation obtained by the method described above.

A normal distribution looks like a bell-shaped curve. It is symmetric and single peaked and is fully described by its mean and standard deviation. The probability of values lying within certain ranges is as follows:

Range	probability
Mean ± one standard deviation	0.682
Mean ± two standard deviation	0.954
Mean ± three standard deviation	0.998

Probability of Completion by a Specified Date

Armed with information about mean (T) and standard deviation (**ó**) for critical path ratio, which is normally distributed, we can compute the probability of completion by a satisfied date (D) as follow:

1. Find z = (D-T)/ **ó**
2. Obtain cumulative probability up to z by looking at the probability distribution of the standard normal variate as shown in cumulative probability for standard normal distribution.

Cumulative Probability up to z for Standard Normal Distribution

z	Calculative Probability
-3.1	0.001
-2.8	0.003
-2.6	0.005
-2.4	0.008
-2.2	0.0014
-2.0	0.0023
-1.8	0.0036
-1.6	0.0035
-1.4	0.0081
-1.2	0.115
-1.0	0.159
-0.8	0.212
-0.6	0.274
-0.4	0.345
-0.2	0.421
-0.0	0.500
-0.2	0.579
-0.4	0.655
-0.6	0.726
-0.8	0.788
1.0	0.841

1.2	0.885
1.4	0.919
1.6	0.945
1.8	0.964
2.0	0.977
2.2	0.986
2.4	0.992
2.6	0.995
2.8	0.997

The above producer may be illustrated for a project: which has T=28 and (ó = 3.07).the probability of completing this project by certain specified date is shown below.

Probability of Completion by the specified Date

Specified date (D)	z	Probability of completion by D
20	(20-28)/3.07= -2.6	0.005
25	(25-28)/3.07= -1.0	0.059
30	(30-28)/3.07=0.6	0.027

14.10 SELF-CHECK EXERCISE

1. MIS stands for _____?
2. CPM stands for_____?
3. What is the full form of PERT?

14.11 SUMMARY

Project design and network analysis are effective tools of management to achieve the objectives of the project. Network analysis could raise timely warning or management of the manufacturing units and effort could have been made on that basis to persuade buyers to settle dues promptly. It is thus possible for management to pinpoint issue on the basis of network analysis to short them out. The case study suggests that network analysis can provide radar like sensitivities, raising signals and indicating directions for managerial action.

The functions of planning, scheduling and controlling are essential to an organization for execution of a project. Network techniques help the management of the organization in performing all these functions more efficiently. Indian entrepreneurs have been consider to the extent desirable, similar modern and precise project scheduling techniques like PERT and CPM in drawing up the implementation schedule. The schedule of construction furnished by the promoters of the project in most cases simply indicate the period within which major items of project implementation like acquisition of land and site preparation, commencement and completion of civil construction, placing of orders and delivery of imported and indigenous machinery and commencement of commercial

production are expected to be completed. The above schedule neither provides indication of relationship between the various operation nor does it show the extent to which delays in particular operation would affect the reminder of the project duration time in the comparative appraisal of project ideas. Both the techniques discussed are complementary are beneficial in implementing the project. While PERT is time-based, CPM cost-based. An integrated and coordinated technique of PERT and CPM will enable the completion of the project in a optimistic time at a reduced cost. The entrepreneur has to master these techniques in achieving his main objectives. These techniques need to be sharpened and appropriately used in project implementation.

14.12 GLOSSARY

1. Management Information System (MIS): it is a collection of data processing equipment, producers, software and people that integrates the sub-system of the organization and provides the needed information in time for efficient managerial decision-making.
2. Cost projection: estimation of costs and expenditures
3. Direct cost: price that can be completely attributed to the production of specific goods or services

14.13 ANSWERS TO SELF-CHECK EXERCISE

1. Management information system
2. Critical path method
3. Programme evaluation review technique

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14.15 TERMINAL QUESTIONS

1. What is the basic difference between PERT and CPM?
2. What steps are involved in PERT analysis?
3. Discuss the basic principle of network cost system?

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Assignments

Attempt any four assignments: Assignments are compulsory.

1. Describe briefly the aspects of business environment that need to be monitored as well as the dimensions along which a firm may appraise its strengths and weakness for identifying investment opportunities.
2. Discuss the criteria for selecting a particular project.
3. What aspects are considered in technical analysis?
4. Describe the methods available for demand forecasting.
5. Describe briefly the various means of financing a project.
6. What are the determinants of capital structure?
7. Discuss the principal sources of discrepancy between social costs and benefits on the one hand and monetary costs and benefits on the other.
8. What steps are involved in PERT analysis?

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