

READING MATERIAL FOR (Ag Econ 4710 UNDERGRADUATE COURSE) PROJECT FORMULATION EVALUATION AND MONITORING

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As a part of course curriculum, the undergraduate students of B. Sc (Hon.) Agriculture, College of Agriculture CSK HP Agricultural University Palampur have to opt for Ag Econ 4710 (Project Formulation Evaluation and Monitoring) as one of the six elective courses of Agribusiness Management during their 4th year of 4 year B Sc (Hon) Agriculture degree programme. This course is of special significance in making them capable of learning agribusiness and entrepreneurship development, tools and techniques in addition to preparing and evaluating agribusiness projects. The teaching manual has been prepared keeping in view the course contents prescribed by 4th Deans' Committee of ICAR.

During compiling teaching/reading material many books have been consulted the list of which has been provided in the manual. I sincerely acknowledge the financial support of the ICAR, GOI under CDA for developing teaching material in the form of manual. I do hope both students and teachers will find it as a helping hand and students in particular would find it most useful while preparing them for examination. The compiler thanks Dean COA, Palampur and Head Agricultural Economics for motivating him to undertake this work. Any and all errors & omissions are the sole responsibility of the compiler.

Palampur

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COURSE CONTENT

Theory

Basic concepts and definitions; agricultural project- meaning, definition, phases in project cycle, criteria for identification and selection of agricultural projects; project resource management; economic and financial principles as applicable to agricultural projects, preparation of financial statements and project accounts; economic appraisal and evaluation of project investments; shadow prices, undiscounted and discounted measures, viz., payback period, NPW, B-C ratio and IRR; profitability index and sensitivity analysis; concept of entrepreneur and entrepreneurship; essential entrepreneurial traits/qualities, scope of entrepreneurship development in agriculture and allied activities; project planning and scheduling, use of CPM and PERT in project scheduling and execution.

Practical

Computation of project cash flow, NPV, B-C ratio and IRR, exercise on sensitivity analysis under changing conditions and risk, preparation of financial statements and accounts, identification of entrepreneurship qualities and motivation in a particular enterprise, application

Reference Books

Sr. No.	Title of Book	Author(s)	Publisher
1	Agricultural Finance and Management	S. S Reddy; P. Raghu Ram	Oxford & IBH Publishing Co. New Delhi.
2	An Introduction to Agricultural Finance	U. K Pandey	Kalyani Publishers New Delhi
3	Introduction to Agricultural Economics and Agribusiness Management	J M Talathi, V. G Naik and V.N Jalgaonkar	Ane Books India, New Delhi
4	Analysis of Agricultural Projects	J P Gittinger	World Bank Publication
5	Projects: Planning Analysis, Selection, Implementation and Review	Prasanna Chandra	Tata McGraw Hill Publishing Company Limited, New Delhi
6	Operations Research: Techniques for Management	V K Kapoor and Sumant Kapoor	Sultan Chand & Sons, New Delhi
7	Agribusiness Management	J S Amarnath and APV Samvel	Satish Serial Publishing House, Delhi

UNIT 1

AGRICULTURAL PROJECTS EVALUATION

Agricultural Project

An agricultural project is defined as an investment activity in agricultural and allied activities where financial resources are utilized to create the capital assets with an anticipation of benefits over time. In other words it is an activity where money is spent to realize the expected returns and requires planning, financing and implementation as a unit. It also refers to specific activity, with specific starting point and specific end point to achieve a specific objective. The agricultural project may include projects such as irrigation, dairy, poultry, piggery, rural credit, social forestry, land reclamation/leveling, rural development projects, etc.

Terms & Concepts

Backward Linkage or induced linkage: This refers to relationship between an agricultural farm and suppliers of its inputs. A change in the output of a farm will get transmitted backward to the supplier of its input by changing in demand for inputs.

Forward linkage or stemming linkage: This refers to the relationship between an agricultural farm and other agro industries or farm which employs its output as an input. A change in output or price will get transmitted forward to user of its product.

Gestation period: It is a period required for the investment in a project to produce a visible return.

Tangible cost/benefits: Costs or benefits which either can be quantified or at least can be priced.

Intangible cost/benefits: Costs or benefits which either can't be quantified or at least cant be priced.

Secondary benefits: These are of two types. One is forward linkage (stemming linkage) and other is backward linkages (induced linkage). New values would arise consequent to the increased production of crops and livestock from the new proposed project i.e. irrigation project. The direct benefit is the increase in the output of crops and livestock, and smaller increase in the farmers costs. The increased output will facilitate increased activities in marketing, transportation, processing and add to the profits of the persons involved in these activities. This is forward linkage. The extra profits accrued to the input suppliers as a result of project implementation reflect the backward linkage.

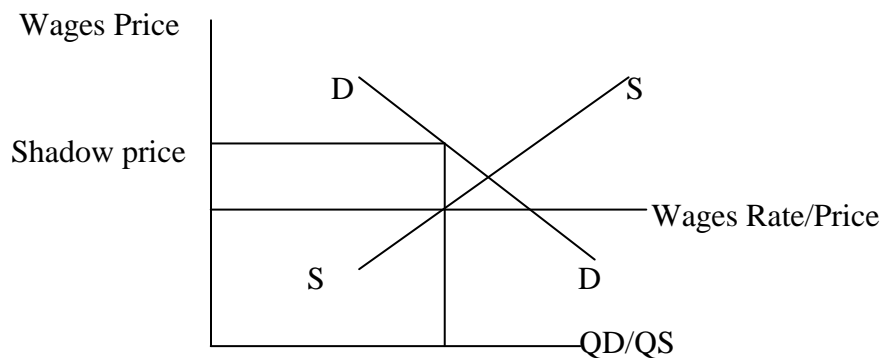
Opportunity cost: It is also known as alternative cost. It is the value of enterprise or factor of production in its next best alternative foregone. Assuming that the land is put to production of crop or housing units then rent that is obtained from housing units would become the opportunity cost for the land, if the land is engaged for production of crop. This cost is valuable tool for a manager to determine whether or not to invest in additional fixed assets or inventory. An investment is said to be worthwhile if it promises to earn more than its opportunity cost.

Social cost: The sum of money which is just adequate when paid as compensation to restore their original utility level of all who lose because of the production of output. The social cost has been the opportunity cost to society (i.e. to all individuals to the society) rather than just one firm or individual.

Tangible asset: The term used for physical asset such as plant and machinery, which are distinguished from intangible assets.

Intangible asset: The term used for those assets which are of non physical nature like personal skill.

Shadow Price: It is defined as a price which would prevail in the economy if it were in perfect equilibrium under conditions of perfect competition or it is an opportunity cost of an activity or project to a society, computed where the actual price is not known or if known does not reflect the real sacrifice made.



Types of Agricultural projects

1. Water Resource Development Projects
2. Agricultural Credit Projects
3. Agricultural Development Projects
4. Agro-industries Commercial Development Projects

1. Water Resource Development Projects: These projects are aimed at bringing about overall agricultural development by bringing water to the project area, providing drainage and reclaiming soil salinity, for example: irrigation projects, ground water projects, project for land reclamation, drainage projects, salinity prevention and flood control.

2. Agricultural Credit Projects: These are also called “on lending projects”. The projects in which credit is provided to the farmers for farm investment in increasing agricultural production, raising their standard of living and the economy as a whole are called agricultural credit projects. These projects need to be defined in terms of farm investment and investment on agro-industries and ancillary industries, such as investment programmes on livestock, machinery, etc. All the financial institutions i.e. commercial banks, co-operatives and regional rural banks acts as the “credit houses” in the implementation of some agricultural projects.

3. Agricultural Development Projects: The projects aiming at improving upon the farm economy of individuals and regional development as a whole are known as agricultural development projects. Here, diversified cropping systems approach as well as farming systems approach is followed for bringing about the development of agriculture e.g. protected cultivation project.

4. Agro-industries Commercial Development Projects: Projects concerned with processing services to farming like supply of equipment/machinery, storage, market development, development of cooperative farms etc; are cited under this category.

Characteristics of Agricultural Projects

1. **Time Frame:** It is an activity with a specific starting and ending points to accomplish (achieve) the stated objectives.
2. **Time Sequence:** It has a well defined time sequence of investment and production activities together with the benefits.
3. **Operational area and clientele:** The projects normally have a specific geographic location or area of concentration and specific clientele group in the region.
4. **Administrative structure:** A project will have a partially or wholly independent administrative structure and set of accounts funded through a specifically defined financial package.
5. **Externality:** Most agricultural projects are characterized by the existence of externalities defined as an uncompensated spill over or side effects which possess two properties:
 - (i) **Interdependency:** One persons behavior creates a cost or benefit to the other persons, and
 - (ii) **Lack of compensation:** The one who creates benefits is not completely rewarded for it, nor is the one who creates cost made to pay for it. An externality is revealed in terms of divergence between the private cost and the social costs of a project.
6. **Risk and Uncertainty:** The products of most of the agricultural projects are characterized as collective goods also called as the public goods, possess intangible benefits and are subject to greater risk and uncertainty.

PROJECT CYCLE

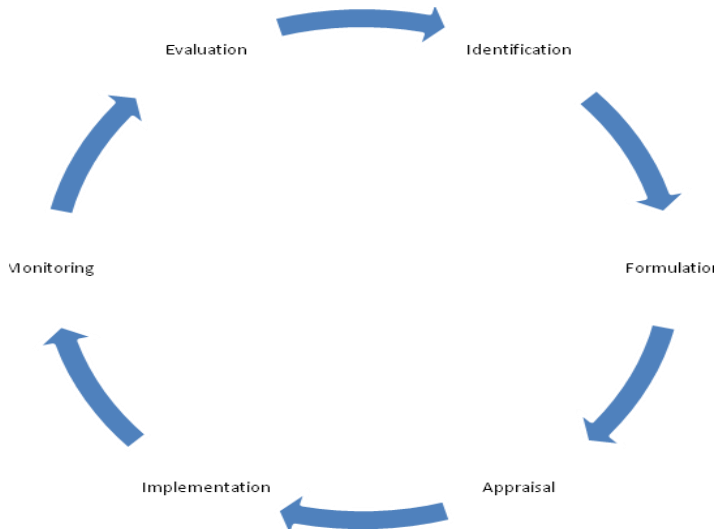
Definition of project cycle: A natural sequence in which the projects are planned and carried out is called as the project cycle.

Phases in Project Cycle

The important phases in project cycle are:

1. Conception or Identification

2. Formulation or Preparation
3. Appraisal or Analysis
4. Implementation
5. Monitoring
6. Evaluation



1. **Identification:** The technical specialists together with local leaders can identify the potential projects for an area. In fact, the technical specialists may identify areas where new investments may be profitable and can incorporate the suggestions of local leaders.
2. **Preparation/formulation:** The project can be prepared by a special team for the purpose with sufficient time and resources or by a consultant agency. The following points are considered while formulating the projects. The location and the site of project must be based on technical analysis and technical feasibility. The location of project depends upon physical resources, market conditions, marketing facilities, alternative investment prospects, administrative experience, farmers, objectives, technical skill, innovations, demand for products, etc. Due consideration is to be given to all the following aspects of formulation:
 - (i) technical aspects, (ii) institutional/ managerial aspects, (iii) organizational aspects, (iv) social and commercial aspects, (v) financial aspects, and (vi) economic aspects
3. **Appraisal or Analysis:** A careful review or appraisal of proposed project is must so as to determine its soundness before implementation. In fact the *ex-ante* appraisal or feasibility study is to be done to get enough information before advanced planning is

made. Appraisal provides an opportunity to re-examine the project proposal before huge investments are made. The appraisal team may even suggest for some additional information to be collected or project may be rejected, if serious flaw exists.

4. **Implementation:** The most important part of project cycle is implementation. Two aspects should be kept in mind before implementing any project. Firstly a better and more realistic project can be easily carried out and expected benefits are also realized. Secondly, project implementation must be flexible.
5. **Monitoring:** It is the timely collection and analysis of data on the progress of a project, with the objective of identifying constraints which impede successful implementation. This is highly desirable, particularly when projects fail, to be completed as per time schedule or in the process of attaining the set goals. It is imperative to get the feedback on the problems faced so that effective measures can be taken up to improve the deficiencies, which hamper the speedy implementation. Monitoring has to be done continuously to remove/offset various shortcomings that are faced from time to time with regard to various aspects of implementation.
6. **Evaluation:** An *ex-post* evaluation is essential for completed projects while at the same time concurrent to those of on-going. In fact, it provides systematic information pertaining to success or failure of a project. The concurrent evaluation is essential to know the weaknesses of on-going projects so that these may be corrected for greater success. However, the overall impact of a project can be assessed once it is over.

Operation of Agribusiness projects

An agri-business enterprise today operates in multi-dimensional scenario including government policies and procedures, pricing and supply of raw material; 'state-of-art', pricing and quality of technology and equipment; cost of availability of finance; and demand-supply parameters for the product/services. Each of these dimensions comprises dynamic elements. For example the policy issues and the basics of economic system are decided by the government; normally these issues remain constants for a reasonable period of time. On the other hand, the availability and pricing of raw materials and other products, and services required as input by the agribusiness projects are subject to a frequent change as a result of govt. policy, level of technology, and international and national policy. The nature of linkages among various factors affecting agribusiness is given here. The very nature of linkages is both pro active and reactive and the intensity of dynamism with the dimension and scenario as a whole, are rather complex and not subject to high level of accuracy in prediction. It is in this world of uncertainty and risk that agribusiness projects are formulated, evaluated, selected and implemented.

Types of project proposals: A profit motivated agribusiness comprising several interlinked activities could itself be termed as a project. But there are several types of capital expenditure projects which agri-business enterprises can undertake. These projects could broadly be classified as:

- 1 New projects
- 2 Expansion
- 3 Modernization
- 4 Diversification, and other

Each of these project types would essentially involve a multiplicity of activities starting from establishment of the specific objective and following it up with activities which may include acquisition of land, raising of funds, and commissioning of the project.

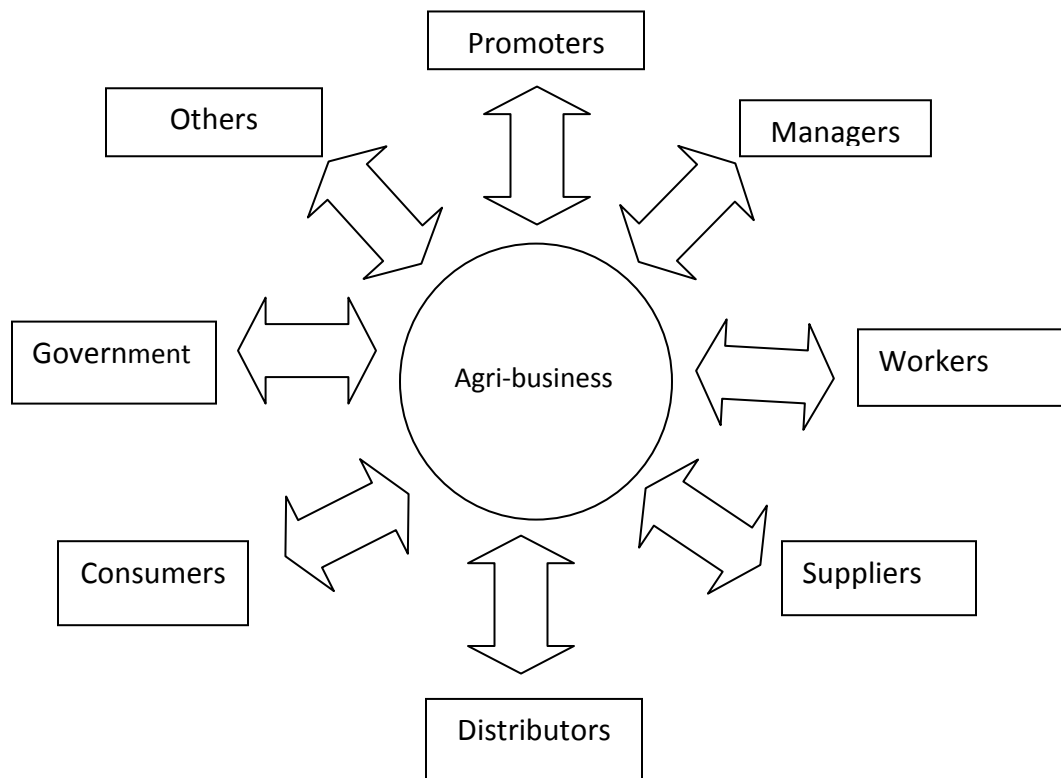


Fig: Nature of linkages among various stake holders of agri business projects

In the context of agri business, project is an enterprise. An enterprise may be described simply as a business or an undertaking involving investment, production, marketing and cost-benefit returns to the entrepreneur. A project plan is a blue print describing the multidimensional consideration, which go into making of a successful enterprise. This project plan helps the entrepreneur to know

- 1) what activities to initiate, when
- 2) banker/ the Govt. could decide what support to give, when and how

PROJECT MANAGEMENT

It is nothing but management of a project which involves planning, organizing, staffing, controlling and coordination of a number of interrelated activities with limited resources viz., men materials, money and time.

Here there is need to have integration of different departments, at levels below the top management for effective communication, coordination and control. The individual (or group) who has been given the responsibility of integrating the activities and function of various departments and outside organization involved in the project work is called project manager or project coordinator. Developing on the authority that is given to the person responsible for the project, the project organization may take one of the following three forms.

1. Line and staff organization
2. Divisional organization
3. Matrix organization

PROJECT

Project is a specific investment activity with a specific starting and an ending point, intended to create capital assets that produce benefits over an extended period of time. Project is a combination of human and non-human resources pooled together in a temporary organization to achieve a specific purpose. Project is an “ONESHOT”, time limited, member directed, major undertaking, requiring the commitment of varied skills and resources.

Characteristics of a project

1. It is non-routine, non-repetitive undertaking often plagued with uncertainties.
2. It involves coordination of the efforts of persons drawn from different departments and contributions of outside agencies and
3. The relationship in a project setting is dynamic, temporary and flexible.

Project objectives and policies

Well defined objectives and policies to be finalized before starting of a project. It serves a framework for the decisions to be made by the project manager. A clear articulation of the priorities of management will enable the project manager to take appropriate actions.

STEPS IN PROJECT PREPARATION

1. Feasibility analysis
2. Techno – economic analysis
3. Project design and network analysis

4. Input analysis
5. Financial analysis
6. Social cost benefit analysis
7. Project appraisal

Feasibility analysis

It is the first stage in developing a project. Here through examination of pre-investment possibilities are made. It is important to design the future course of the project. Internal and external constraints should be studied in this stage.

Techno – economic analysis

Here demand potential and right technology is identified. Optimum size of the project, methodology, market share, researches and alternative technology are to be identified.

Project design and network analysis

In this stage evaluation of time and resources should be done. It studies the interrelationship of the activities it is the basis for development of financial and cost benefit analysis of the project.

Input analysis

Quantity and quality of input analysis during the construction phase and subsequent phases are analyzed.

Financial analysis

It involves project cost, estimation of the project operating cost and estimation of project fund requirement. Comparison of other investment alternative was done. Uncertainties should be accounted. Success depends on reliable data used in the project.

Social cost benefit analysis

It is very important in view of what is the benefit to the society / country in terms of employment, health and education.

Project is considered if

1. Technical configuration is fully defined.
2. Techno-economic viability of the project is appraised and approved.
3. The cost estimate is found.
4. Financial arrangement has been made.
5. Pre project activities have been completed and 'zero data' is fixed.

Constraints in projects formulation

Internal

1. Managerial skill of individual
2. Advanced country's project may differ for developing countries.
3. Physical inventories and infrastructures like land.

External

1. Men, material and situation outside the project
2. Government regulation, law etc.
3. Non availability of technical persons
4. Resource mobilization

Feasibility report

It is the report prepared to present and in-depth technical commercial analysis for the consideration of financial institutions and other authorities for taking investment decisions.

Feasibility report contains

1. Raw material survey
2. Demand study
3. Technical study
 - a) product pattern
 - b) process selection
 - c) plant size
4. Location study
5. Project capital cost estimate and source of finance
6. Profitability and cash flow analysis and
7. Social cost benefit analysis

PROJECT CYCLE (STAGES)

1. Conception phase
2. Definition phase
3. Planning and organizing phase
4. Implementation phase
5. Project clean up phase

Conception phase

It is the first state of the project, idea of the project is born. Serious problem of the previous on or new idea has been taken as conception stage.

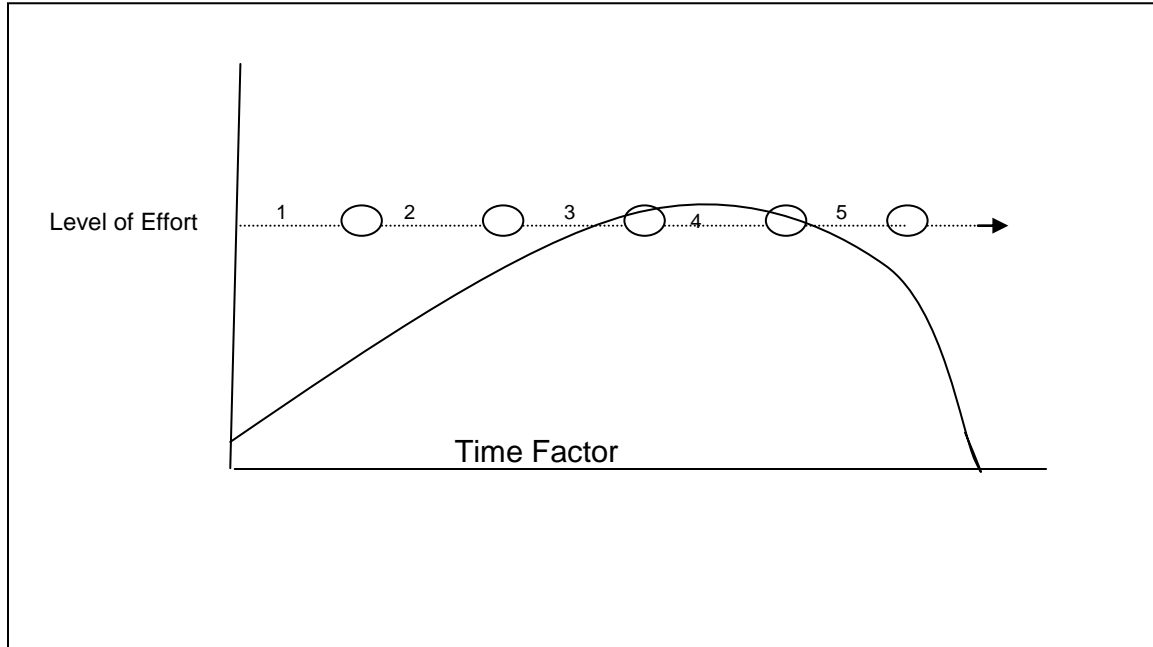


Fig. 1 Stages in Project cycle

Definition phase

Development of already generated idea has taken up in this stage. Efforts will be taken to give a shape to the project. Material requirements, financial analysis and implementation schedule was worked out.

Planning and organizing phase

It is the stage of 'take off smoothly'. In this phase, there is identification of infrastructure, finance, licensing, project manager and work packages.

Implementation phase

In this phase assembling all the resources are being taken. Trial run was conducted. Almost 80% of the project work will be done in this stage.

Project clean-up phase

It is the transition phase. Handling over for regular production work is being taken in this stage. Project accounts are closed and settled for men and materials. Phased manner of decision in manpower is taking place in this stage of project.

ASPECTS OF PROJECT FORMULATION/ PREPARATION

1. Technical Aspects
 2. Institutional/ Managerial and Administrative Aspects
 3. Organizational Aspects
 4. Social and Commercial Aspects
 5. Financial Aspects
 6. Economic Aspects
1. **Technical Aspects:** The technical appraisal of proposed project should be done by the competent technical staff and it should not be done in hurry. For instance the technical appraisal of proposed minor irrigation project should contain aspects such as the rate of recharge of underground water, the number of wells to be sunk in the area including existing wells, spacing/location of new wells, depth up to which wells are to be sunk, deep/shallow wells required, suitability of underground water for irrigation purpose, the cropping pattern, season-wise discharge of water from the well, etc. The technical analysis may also determine the potential yield in the project area, the coefficient of production, etc along with the marketing and storage facilities required for the successful operation of the project and the processing system needed.
 2. **Institutional/ Managerial and Administrative:** To avoid opposition, the local institutions may also be duly involved right from planning to implementation levels. All concerned agencies/institutions should have an opportunity to comment upon the proposed project and their views may be fully incorporated. Ample provisions for managers and supervisors for getting latest information about the progress of project, special monitoring staff and training arrangements needed may also be looked into. The managerial ability of existing staff may be assessed before making huge investments.
 3. **Organizational Aspects:** Organizations refers to the process of putting the priorities in an orderly form. Prepare the organizational hierarchy of the implementing agency. The availability of staff at various cadres, demarcation of authority and linking of authority and responsibility, etc, are expected to be dealt with, under this aspect.
 4. **Social and Commercial Aspects:** A proposed rural development project, besides employment and income generation also considers the provisions made for improved rural health services, better domestic water supplies, increased educational opportunities especially for rural women and children, etc. Moreover the project sites may be chosen in such a way that it should have notable scenic value and/or preserving the unique wildlife habitats. The backward and forward linkages of proposed project such as the supply and demand relationships pertaining to output, the credit requirements for marketing input

and output, timely as well as quality supplies of modern inputs to adopt new technology/cropping patterns, an efficient marketing channel for supply of inputs and the procurements of equipment and supplies should also be examined. Besides, the supplies may be made not only in time but at fair price and with proper specifications.

5. **Financial Aspects:** The financial aspects deal primarily with sources of raising financial assistance and terms and conditions of obtaining finance from the credit agencies. The implementing agency should be in a position to estimate financial requirements and anticipated returns through farm planning and budgeting. Once the incremental income is arrived at, the repayment capacity duly giving considerations/margins for risk and uncertainty can be worked out.
6. **Economic Aspects:** The economic analysis is directed towards determining whether the project is likely to contribute significantly to the development of economy as a whole. The point of merit is to whom the project is going to benefit i.e. to one section of society or the entire area of the project. The indirect effect like, the income distribution, needs to be assessed. Under income distribution, the purpose is to know whether income inequalities are going to be narrowed down or widening up as a result of proposed projects. Overall it is expected from the project to bring largest contribution to the national economy.

Distinction between Economic and Financial Analysis

Sr. No.	Economic Analysis	Financial Analysis
1.	Economic analysis is complimentary to financial analysis.	Financial analysis is complimentary to economic analysis
2.	Economic aspects/analysis deals with society.	The financial aspect/analysis deals with individuals owners/participants of projects.
3.	Interest on capital is not deducted from the gross return analysis because it is a part of the total return to the capital available to society as a whole.	Interest paid to external supplier of money is deducted to derive the benefits streams available to the owners of the projects.
4.	In economic analysis taxes and subsidies are treated transfer payments. In fact, the income generated by a project includes taxes which project bear in the production and also sales taxes which buyer pay while purchasing the products or outputs. These taxes which form part of the total project benefit, are transferred to the government that acts on behalf of society as a whole, therefore, are not treated as costs. But a government subsidy to the project is a cost to the society. Therefore it is an expenditure of resources	Such adjustments are not necessary in the financial analysis.
5.	In economic analysis taxes and subsidies are adjusted to reflect	In financial analysis, taxes are

	<p>more accurately the social and economic values. These adjusted prices are called “shadow prices” or accounting prices.</p>	<p>usually treated as a cost and subsidies as a return. <u>In this analysis, market prices are normally used which takes into account taxes and subsidies.</u></p>
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Criteria for Selection of Agricultural Projects

1. **Work Selection Criterion:** According to this criterion we are to examine the immediate needs of the project area. Efforts be made to directly or indirectly increasing prospects of agricultural production, income and employment
2. **Priority criterion:** According to this criterion it is examined that the project implemented falls under priority area or not
3. **Social criterion:** This criterion considers the direct employment prospects, ecological balances, externalities, pollution, etc.
4. **Financial criterion:** According to this criterion it is determined whether the required amount of capital is supplied or not for the implementation of the project. In case the execution is delayed, additional capital requirements are to be assessed.
5. **Supply criterion:** This is concerned with available resources, physical inputs, labor availability and other resources. Supply of skilled labourers and unskilled labourers and technical personnel are to be evaluated for the completion of the project on time.
6. **Implementation criterion:** According to this criterion the organizational capabilities and managerial abilities of technical personnel are judged.
7. **Project benefits criterion:** As per this, both tangible and intangible benefits must be correctly assessed and evaluated. In this process the benefits accrued / earned due to forward linkages and backward linkage need to be given specific weightage.

IDENTIFICATION OF PROJECT COSTS AND BENEFITS

In economic analysis of agricultural projects we compare costs and benefits and determine which among the alternative projects have an acceptable return. Thus, we not only identify the costs and benefit streams but these are also priced. The costs and benefits are identified and valued “with” the proposed project and it is compared with the situation “without” project to determine the net incremental benefit. This approach is entirely different to that of “before” and “after” approach where changes in production without project are not taken into account and leads to erroneous statement of benefits. In fact, there may be progress even without the project and it would be inappropriate to attribute all the progress to the projects, as if the normal development process had come to a halt. The cost and benefits of a proposed project can be categorized as follow:

- i. Tangible costs and benefits or Primary costs and benefits

- ii. Intangible costs and benefits of agril. projects or secondary costs and benefits

Identification of project costs

The various types of costs involved in the project are:

1. **Project costs:** These include the value of the resources used in maintaining and operating the projects.
2. **Associated Costs:** The cost that is incurred to produce immediate products and services of the projects for use and sale.
3. **Primary Costs or Direct costs:** These include costs incurred in construction, maintenance and operation of the projects.
4. **Secondary or Indirect costs:** Value of goods and services incurred in providing indirect benefits from the projects such as houses, schools, hospitals etc.
5. **Real cost and Nominal costs:** The costs worked out at current market prices are known as nominal costs, whereas if costs are deflated by the general price index, these are termed as real costs.
6. **Deflating:** It is the process of making allowances for the effect of changing price levels. A rise in price level means a reduction in the purchasing power of money.

Table Computation of real wage indices from wages and price index

Year	Current Wages (Rs) (CW)	Price Index (PI) No.	Real wages = (CW/PI)*100	Real Wage Index
2001	200	100	$200/100 \times 100 = 200$	100.00
2002	240	160	$240/160 \times 100 = 150$	75.00
2003	350	280	$280/350 \times 100 = 125$	62.50
2004	360	290	$290/360 \times 100 = 124$	62.00

7. **Social costs:** These are technological externalities (outside) and technological spillover accrued (added) to the society due to presence of projects i.e. pollution problems, health hazards, salinity conditions etc.
8. **Shadow prices:** It is defined as a price which would prevail in the economy if it were in perfect equilibrium under conditions of perfect competition.

In general the economic analysis determines remunerations to labour and other inputs either at market prices or at shadow prices provided that much amount of resource is transferred from its present use to the project. In economic analysis the market prices are adjusted to more accurately reflect the social or economic value. These adjusted prices are called the shadow or accounting prices.

Tangible (Physical) costs of Agricultural Projects

- (i) **Land:** The location of land and area required for a proposed project is not so difficult to identify but problem again exists in its valuation, as structure and pattern of land market is not so sound as for other goods and services. So opportunity cost be used (sale & purchase)
- (ii) **Labor:** Both skilled and unskilled labours are not difficult to identify but problem may be in valuing them i.e. it may require the use of shadow price. In fact, the valuation of family labor in developing countries may involve complexities as their opportunity cost is zero.
- (iii) **Physical goods:** The items like fertilizer, pesticides, concrete for irrigation channel are not difficult to identify but technical problem occurs in planning and designing the quantity as well as their time of use. So the quantity and time of application be assessed properly.
- (iv) **Contingency Allowance:** The huge investment in a proposed project is usually made under certain assumptions such as no modification in the design no adverse phenomena such as floods, bad weather etc. Besides, in general, the project cost estimates also assume no relative changes in domestic or international prices. These assumptions may not hold true in real practice. Therefore, provisions of some allowances i.e. cost be made to meet out the situation leading losses due to flood, hailstorm, bad weather etc.
- (v) **Direct Transfer Payments:** The shift of goods and services from one entity in a society to another which do not reflect changes in national income is generally considered as the direct transfer payments. Taxes, subsidies, loans and debt services (the payment of interest + principal) are examples of direct transfer payments in an agricultural project. Under economic analysis the payment of taxes, should not be considered as a cost to the society but subsidy is. In economic analysis taxes remain a part of the overall benefit stream of the project. Subsidies are direct transfer payments which flow in opposite direction from taxes. A farmer, who purchases fertilizers and pesticides at subsidized rate, may reduce his total costs and can therefore, increase his net profit. However, cost of fertilizer in use of society's real resources remains the same. The raw material needed to produce the fertilizer reduces the national income available to the society and hence in economic analysis of agricultural projects the full cost of fertilizer should be considered.
- (vi) **Sunk Costs:** These are the costs incurred in the past upon which a proposed new investment is based. If the considerable amount has already been spent on a project, the future returns to future costs of completing the project would be quite reasonable.

Tangible Benefits of Agricultural Projects:

These benefits can arise either due to increased value of production or from reduced costs.

1. **Increased Production:** The most common benefit of an agricultural project is the increased physical yield e.g. an irrigation project provide assured water so that farmers get high crop yields through increased use of input (water). Thus the total production on a farm increases which might be consumed by the farm family. The returns to agricultural investment will be, however, underestimated if home consumed production is not considered.
2. **Quality Improvement:** The quality of product also improves due to the agricultural project for e.g. Intensive Cattle Development Program not only benefitted Indian farmers in terms of increased milk yield but also by improving breed of their animals.
3. **Change in time of sale:** The storage facilities available due to proposed projects i.e. cold storage for perishable commodities like milk plant, etc. may permit the beneficiaries to sell their product even in a lean period to fetch higher prices. Thus benefit from such project investments may arises due to the change in its 'temporal' value.
4. **Changes in product form:** The projects of agricultural processing industries expect benefits due to change in their form of agriculture produce e.g. paddy sold to rice miller who sell polished rice, oilseeds sold to oil miller, maize sold to cattle feed industries and fruits & vegetables to processing industries provide benefit due to changes in product form
5. **Cost reduction through mechanization or transport:** The "customs service project" in an area may reduce the cost of labor on the one hand and timely performance of agricultural operations during the peak period. The total production may not increase but benefits results due to trimming the cost. The better rural link roads or highways may reduce the transportation costs from producers to ultimate consumers.
6. **Losses avoided:** The benefits may arise due to avoidance of losses. In fact such benefit streams are not easy to identify. A project for drainage in flood affected area or lining of canal water to check the seepage are common examples.

INTANGIBLE COSTS AND BENEFITS OR SECONDARY COSTS AND BENEFITS

The secondary costs or benefits in project analysis act as vehicle to account for the value added which arise outside the project but results due to project investment. In shadow pricing every item is called either at its opportunity cost or at a value determined by the consumer's willingness to pay for that item.

There can also be “technological spillover or technological externalities”. Adverse ecological effects and side effects of irrigation development are the common examples. In case the technological externalities are significant i.e.; identified and valued, these may be considered as a direct cost of the project or cost of avoiding them may be included as project costs.

Most common examples of **Intangible benefits** in agricultural projects may include: (1) creation of new job opportunities, (2) better health and reduced infant mortality as a result of more rural clinics, better nutrition, (3) reduce incidence of water-borne diseases due to improved rural water, (4) reduced salinization due to lining of canals to reduce seepage, (5) scenic value due to irrigation dam and afforestation projects, (6) better social life due to integrated rural development program, etc. Such intangible benefits are real and reflect true values but cannot be valued monetarily. In fact, these benefits are important to be identified and may also be quantified whenever possible.

Intangible costs do exist in agricultural projects. These costs may be: (1) increasing ecological imbalances, (2) loss in scenic values, (3) increased pollution, (4) harmful effects on human health and incidence of disease problems due to excess use of fertilizers, insecticides and pesticides under HYVP, etc, again although valuation is impossible yet intangible costs may be carefully identified and if possible quantified.

Pricing of Project Costs and Benefits

It is essential to find out the appropriate market prices both for inputs and outputs so as to arrive at the cost and benefits streams. The various aspects to be considered while searching for appropriate market prices are as under.

1. Point of first sale and farm gate price

The market price for agricultural commodities in the project area may be determined on the basis of “point of first sale” i.e. the farm gate price which means whatever farmers receive due to sale of their farm produce. However, these commodities when processed and delivered in the market by paying marketing charges may give the increased value. Thus, the price of the commodities sold in nearby market may be considered as farm gate price representing the point of first sale. A new truck purchased to perform this task, may be entered as a cost incurred to realize the marketing benefit in the project. The procurement price/ support price announced by the Govt. of India is called as the “Farm Harvest Price”. The prices fixed by cooperative sugarcane union/co-op milk union, Govt. agencies/ marketing boards extra also serve as farm gate prices. Indeed, the farm gate price is the best price at which farm produce is to be valued.

2. Pricing of intermediate good

An intermediate good is primarily produced as an input to be used for producing another good. The imputed prices may be avoided for intermediate goods. In an irrigation project the value of agricultural produce is considered at its point of first sale, irrigation water being the intermediate good.

3. Some intricacies about market prices

Sometimes confusion arises in determining the value for land and labour. As net benefit from the project increases the family's income or wage, in effect, also increase. Therefore, the incremental net benefit will reflect the increased return to family labour.

As seasonality exist in prices of agricultural commodities, a good starting point is the farm gate prices at the peak of harvest season i.e., lowest price in the cycle. The quality of a product has strong bearing on its price. In many agricultural projects the objectives is to raise both quality and total output. For instance the dairy farmer of ICDP and Anand Pattern milk union Ltd. would follow clean milk production and other standard of the fluid milk market to command a higher price or reduced time for delivery may hold down sucrose inversion in sugarcane or better pruning would increase the average size of the oranges. In such cases the proper price is to select is the average price expected for the quality to be produced.

PROJECT EVALUATION TECHNIQUES

The project evaluation process essentially involves some important steps, viz. data collection, data collation and estimation of cost-benefit and profitability of the project and comparing it with required rate of returns to decide acceptance of the project. Data collection may be made both from secondary sources or published documents viz. company balance sheets, government publications, publication of independent research bodies or industry associations as well as from primary sources like the industry and market.

Once the data and information is collected the next step is to eliminate the irrelevant and retain only the significant information which can be utilized for making the projections about cost and profitability of the project. Once the basic data are collected and collated, an estimate may be prepared of the cost of project starting from the cost of the land, and building, and going through elements like plant and machinery, duties and taxes, cost of miscellaneous fixed assets, permanent working capital needs, estimated pre-operative expenses and contingencies to arrive at an estimate of total cost of the project.

Once the cost of the project is estimated, it is necessary to make certain assumptions as regards the schedule of implementation, capacity build-up of production, cost of raw material, other related costs, realizable selling price, etc to arrive at the returns and the profitability of the project. A comparison of the 'estimated' and 'required' profitability will form the basis of selection for a project.

Predicting Future Prices

Determining future prices is a matter of judgment. To project future prices one should work out the trend in past market prices and the same trend can also be assumed for the near future. Moreover, due consideration may also be given to the inflationary trend, in case it exists.

(1) Compounding/ Future value of present money

The process by which the present cost/investments are made to grow with time to make it comparable with future returns is called compounding. The future value of present investment in the project is calculated by using the well known formula of compound interest.

$$A = P [1 + r]^t$$

(2) Discounting/ Present value of future money

The process of computing the future revenues/returns to make it comparable with the present is called discounting. Discounting is the inverse procedure of compounding

$$PV = \frac{R}{[1 + r]^t}$$

where, A is the future value of the present sum invested in the project

P is the principal amount invested in the project

r is the interest rate in percentage

t is the number of years or project life in years

PV is the present value/worth of future money

R is money value (Returns) in future

The rationale behind this process is that a sum to be received in future is some what less now, because of time distance assuming of positive interest rate. **A present sum is compounded to know the future value and future sum is discounted to know the present value of future return.**

Project Evaluation Techniques

A project under consideration can either accepted or rejected once project cost and benefits are identified, priced and valued. Following discounted/ undiscounted measures are applied to evaluate the agricultural project.

I Undiscounted Measures: These are the methods in which the data are used as these are some with some simple manipulations, without making explicit allowances for taking into consideration the time element involved rigorously.

- i Ranking by inspection .
- ii Proceeds per unit of outlay.
- iii Payback period (PBP)

II Discounted Measures: These are the methods which rigorously take into account the time element associated with the cost and return streams.

- i Net present worth (NPW)
- ii Benefit cost ratio (BCR)

- iii Internal rate of return (IRR)
- iv Profitability Index

There is no single best technique for estimating the project worth, some are better than other and some are especially deficient. In fact these financial and economic measures of project investment are only the tools of decision- making. Undiscounted measures like PBP, ranking by inspection, proceeds per unit of outlay, average annual proceeds per unit of outlay and average income on book value of the investment may also be used in assessing the project worth.

1 Undiscounted Measures

(i) Ranking by inspection

It is based on the size of costs and length of the cash-flow stream. Suppose if the two projects are with the same investment and the same net value of production, but with difference in the length of the period, then the project with longer duration is preferred to the one with shorter time period. This leads to bias in the choice obviously due to the absence of more elaborate and appropriate analysis.

(ii) Proceeds per rupee of outlay

This is worked out by dividing the total returns with the total amount of investment, and a given project is ranked based on the highest magnitude of the parameter.

(iii) Payback Period

It is the length of time period from the beginning of the project that equates the net value of incremental production streams to the initial capital investment i.e, The present value of total cash inflows from an investment equals (recovers) the total cash out flows. According to the criterion, the project that has the shortest payback period is preferred.

Steps in the computation of PBP

Step 1: Compute year wise total cost including initial investment.

Step 2: Workout net returns by subtracting total costs from gross benefits (Gross Returns – Total Cost)

Step 3: Compute cumulative net returns over the years and identify the year where cumulative net returns turns zero or become just positive.

Decision Rule: In case of multiple projects, project having the shortest PBP is preferred.

The major drawback with undiscounted measures is that for the same data of the project, we get different rankings; hence, choice process becomes useless. Rankings by these methods are inconsistent and incompatible.

II Discounted Measures

(i) Net present worth (NPW)

Sometimes it is referred to as Net Present Value (NPV) and is simply the present worth of cash flow stream. It represents the present worth of incremental net benefit i.e. the income stream generated by an investment. The net present worth (NPW) can be calculated in the following steps as per formula given:

NPW = Discounted benefits – Discounted costs

$$NPW = \sum_{t=1}^n \frac{B_t}{(1+r)^t} - \sum_{t=1}^n \frac{C_t}{(1+r)^t}$$

OR

$$NPW = \sum_{t=1}^n \frac{B_t - C_t}{(1+r)^t}$$

where, NPW is the net present worth

B_t is the year wise benefits

C_t is the year wise costs

t is the number of years

r is the discount rate.

Steps in the computation of NPW

- i Choose an appropriate rate of discount (r). Generally prevailing commercial interest rate is taken as a discount factor.
- ii Compute the net benefits (NB_t) by subtracting the yearly total cost (C_t) from gross benefits (B_t) as follow: NB_t = B_t - C_t
- iii Work out the net present worth (NPW) of net benefits by deflating the net benefits. Find out the sum of yearly values.
- iv Accept the project whose NPW is higher.

Decision making rule

- (a) If NPW > 0; accept investment, (b) If NPW < 0; reject investment, (c) If NPW = 0; be indifferent

- i For single project, the NPW should be positive
- ii For multiple projects rank the project in descending order according to the values of NPW and implement accordingly depending upon availability of funds.

(ii) Benefit Cost Ratio ((BCR))

The ratio derived by dividing the present value of benefits, by the present value of cost is known as benefit cost ratio (BCR). In fact, this ratio measures the return or benefit per units of cost or investment. While ranking the projects depending upon the B-C ratio, the most common procedure of selecting project is to choose the projects having B- C ratio of more than one. Finally, the given project is opted for implementation, among alternatives based on the highest B – C ratio. BCR is calculated as:

$$\sum_{t=1}^n \frac{B_t}{(1+r)^t} \quad \text{Discounted benefits}$$

BCR or B-C Ratio=..... =

$$\sum_{t=1}^n \frac{C_t}{(1+r)^t} \quad \text{Discounted costs}$$

where, B_t is the benefit in the t-th year
 C_t is the cost in the t-th year
 r is the interest discount rate.
 t is the lifespan of the project years.

Decision criterion: (a) If $BCR > 1$; accept investment, (b) If $BCR < 1$; reject investment, (c) If $BCR = 1$; be indifferent

(iii) Internal Rate of Return (IRR)

It shows the marginal efficiency of capital or return generating capacity of investment. It (IRR) is the rate (R) at which the Net Present Worth (NPW) is equal to zero. In other words at this rate the present value of returns on investment and the present value of cost incurred are equal with the result that the net present worth become zero. Such a rate of interest (R) can be calculated by trial and error method by using discount rates.

$$\text{If } \sum_{t=1}^n \frac{B_t}{(1+R)^t} > \sum_{t=1}^n \frac{C_t}{(1+R)^t} \text{ Try higher value of R}$$

$$\text{If } \sum_{t=1}^n \frac{B_t}{(1+R)^t} < \sum_{t=1}^n \frac{C_t}{(1+R)^t} \text{ Try lower value of R}$$

Try to locate the value of R where benefits equal to PV/PW of total costs.

$$\sum_{t=1}^n \frac{B_t}{(1+r)^t} = \sum_{t=1}^n \frac{C_t}{(1+r)^t} \text{ such that}$$

$$\sum_{t=1}^n \frac{B_t}{(1+r)^t} - \sum_{t=1}^n \frac{C_t}{(1+r)^t} = 0$$

However, this is a laborious task. There is alternative method to estimate the IRR which involve the following **steps:**

Steps in the computation of IRR

Step 1: Find out R_1 (lower discount rate) at which NPW is just positive.

Step 2: Locate R_2 (higher discount rate) at which NPW is just negative.

Step 3: Calculate IRR as follow:

[Internal Rate of Return] = [Lower Discount Rate] + [Difference between the two discount rates]

[Net present worth of the cash flow at the lower discount rate/Absolute difference between net present worth's of the cash flow at the two discount rates]

$$\text{IRR} = R_1 + (R_2 - R_1) \left[\frac{NPWR_1}{NPWR_1 - (NPWR_2)} \right]$$

Decision: (a) If $\text{IRR} > \text{Required Rate of Return (RRR)}$; then accept the investment (b) If $\text{IRR} < \text{Required Rate of Return (RRR)}$; then reject the investment, (c) If $\text{IRR} = \text{Required Rate of Return (RRR)}$; then be indifferent

If for all investments $\text{IRRs} > \text{RRRs}$; select the highest one ranking their preferences

iv Profitability Index (PI): It is defined as the ratio of net present worth/value of the cash flows to the initial capital investment/expenditure (C_0). Here an attempt is made to relate the NPW of

the cash flows of the project to the total capital requirement (C_r) for a project through “Profitability Index”. Assuming that all the capital expenditure/investment is incurred in year zero, the profitability index (PI) is worked as follow.

$$PI = NPW / C_0 = 1 / C_0 \sum_{t=1}^n \frac{NB_t}{(1+r)^t}$$

Table Estimation of Profitability Index (Say original amount of investment in a project is Rs 60,000)

Year	Net Benefits (NB _t)= B _t - C _t	DF 12%	NPW = [B _t - C _t /(1+r) ^t] (Rs)
1	14,500	0.8929	12,947
2	14,900	0.7972	11,878
3	16,600	0.7118	11,816
4	18,700	0.6355	11,884
5	19,000	0.5674	10,781
6	20,000	0.5066	10,132
			NPW = $\sum [B_t - C_t / (1+r)^t]$ = 69,438

Therefore, $PI = NPW / C_0 = \text{Net Present Worth} / \text{Original amount invested}$
 $= \text{Rs } 69,438 / \text{Rs } 60,000 = 1.1573$

Appropriate Selection of Choice Indicator

As regards discounted measures, the problems lies with the choice of an appropriate discount rate. Ranking of acceptable alternative projects is not possible with NPW because it is an absolute measure, but not relative. A small but highly attractive project may have a small NPW than a large but less acceptable project. Similarly B-C ratio is mostly used to evaluate social project but not private projects (Gittinger).

In general IRR method is preferred for the following obvious seasons.

Merits of IRR

- 1 It is an unambiguous (having only one meaning) estimate
- 2 It is consistent with intuition
- 3 Its estimate is unique and it accounts for all cash flows associated with projects and time value of money
- 4 It has got wider applicability

Limitation of IRR

- 1 A precise IRR is obtained with narrow difference in the two discount rates assumed.
- 2 Complications are involved in the computation of IRR.

UNIT 2

SENSITIVITY ANALYSIS OF PROJECT INVESTMENTS

The economic evaluation of agricultural projects assumes that both cash inflow and cash out flows are known with certainty. However, in real world these assumptions may not hold true and project profitability may be, thus questioned. Therefore, the economic analysis of agricultural projects is to be done under changing circumstances **which is termed as sensitivity analysis**. The economic analysis of agricultural projects carried out under the changing circumstances (i.e. for costs, returns, yields, etc.) is called sensitivity analysis. Since the project appraisal techniques stated earlier like NPW, BCR, IRR, etc give estimates under the assumption that the data used remain unchanged over a length of time. But in reality this is not a valid assumption because our estimates of cost and returns go awry (distorted) over time due to changes in prices of agricultural inputs / output. Under these conditions our estimates of economic analysis will be misleading.

The sensitivity analysis of the project appraisal includes the following points:

- 1 Consideration of the length of the period over the existing one.
- 2 Changes (increasing or decreasing) in the prices of goods and services by certain proportions of the project say by 10%, 20%, 30 %, 40%, 50% etc.
- 3 Changes (increasing or decreasing) in the levels of costs say by 10%, 20%, 30%, 40 % etc.
- 4 Changes (increasing or decreasing) in the yield level of crops and livestock, and
- 5 Delay in the implementation i.e. varying gestation period.

The agricultural projects are usually sensitive to changes in the factors such as (i) price, (ii) delay in implementation, (iii) cost overrun, and (iv) yield.

1 Prices: The worthwhileness of agricultural projects should be tested for different alternative future prices of the project output or various shadow prices may be assumed while applying various discounted measures of a project. In case, shadow prices are not easy to establish then the market prices may be considered for economic analysis.

2 Delay in implementation: Failure of anticipate rate of adoption of new practices by the beneficiaries or under-estimation of the proposed new techniques affects the implementation of agricultural projects. For example the farmers may fail to adopt new practices as rapidly as we anticipate, they may find it harder to master new techniques than we had thought, or other technical difficulties may be underestimated. The projects implemented may also be delayed due to unavoidable administrative problems as well as ordering and receiving of the new equipments/materials. Therefore, the testing of effects of such delays on various discounted measures of proposed project investment form an important aspect of sensitivity analysis.

3 Cost overruns: A project under proposal with attractive returns may become marginally acceptable or even unacceptable, in case costs rise significantly in the early phase of implementation. Usually, the cost estimates, i.e., prices actually paid for supplies and equipment,

etc., are quite uncertain. Quite often, the project analysts become more optimistic about the implementation schedule and input prices used in the project. In fact, the sensitivity analyses of agricultural projects caution the project investment decision –makers about firm cost estimates before they take the final decision, even though firm estimates may delay the start of a project.

5 Yields: Similarly, the project analysts are usually quite optimistic about the potential yields of agricultural project. The application of sensitivity tests for different discounted measures of project worth (specially for lower yields) will, therefore, not only provide the alarming information or warning signals before implementing the project but would also thrust upon other essential infrastructural development.

The various methods/ techniques of sensitivity analyses to be used in project analyses are discussed below:

Techniques of Sensitivity Analysis

- 1 Straight forward method
- 2 Switching value
- 3 Probability approach
- 4 Certainty equivalent approach

1 Straight forward method

In the methods, the sensitivity of proposed project is analysed by considering certain percentage cost over-run, i.e., the discount rate is adjusted to account for the degree of risk involved, or decline in the price of output. In general, the projects tend to be more sensitive to cost over-runs (which occur only in the project life) than to the price changes that occur latter. Therefore, risky projects may have slightly higher discount rate as compared to the projects with little or no risks. The determination of risk premium is though quite essential so as to compensate the risk involved in proposed projects yet it is not an easy task. In fact a given proportionate change in a major cost or return item would usually have a more than proportionate effect on the discounted measures of project worth. Moreover, the sensitivity analysis of proposed project investments is quite helpful for planner and policy- maker to make the estimates of loss in opportunities to generate the wealth (due to delay in implementation) or to redesign them for less sensitive in delays.

2 Switching-value

A variation in sensitivity analysis is called the “**switching value**”. In straight forward method an important element of the project is allowed to change by certain amount or percentage and the project worthwhileness is tested. However, a switching value determines the extent of unfavorable change in an element before the project meets its minimum level of acceptability, as indicated by the discounted measures of project worth. Afterwards, those who feel to proceed with the project can ask themselves the magnitude of change that will occur.

(i) One switching value test can be to determine the net present worth at assumed levels of benefit short-fall. Suppose the net present worth still turns out to be positive at 20 per cent

benefit shortfall (with 10 per cent opportunity cost of capital) and it becomes negative at 30 per cent shortfall. Therefore, the project analyst should interpolate between positive and negative net present worth, just like interpolation of the internal rate of return, so as to determine the shortfall essential to make the net present worth zero.

(ii) Another switching value method, determines the maximum delay in benefit before net present worth of a project falls to zero. Let the benefit is delayed by three years and net present worth is still positive (at 10 per cent opportunity cost of capital) and the same becomes negative in case benefits are delayed for 4 years. Therefore, the project analyst can report that “benefits would have to be lagged by more than 3 years without lagging costs so that rate of return falls below the opportunity cost of capital”.

3 Probability approach

In this approach the probabilities are attached to the range of possible outcomes and expected annual cash in-flow is worked out as in Table:1 Based on these expected value information, the standard deviation and coefficient of variation are worked out to know the degree of risk attached with IRR and NPW methods. As per Table 2, the project II possesses higher values of NPW and IRR along with the lowest co-efficient of variation. Therefore, it is safer to accept project II due to relatively being less risky.

$$\text{Expected annual cash flow} = \text{Mean} = \bar{E} = \sum_{i=1}^6 P_i E_i = \text{Rs } 2910$$

$$\text{Variance} = \sum_{i=1}^6 P_i (E_i - \bar{E})^2 = 108400$$

$$\text{S.D} = \sqrt{\sum P_i (E_i - \bar{E})^2} = \text{Rs. } 329.24$$

NPW (with 12% discount rate, Rs.11000 initial outlay, Rs.2200 salvage value and Rs.2910 expected annual cash flow) = Rs.2079

$$\text{C.V} = 329.24 / 2,079 = 0.16$$

Table 1 Probability approach to manage the risk involved in Project (A)

Sr.No.	Annual cash flow in Rs (E _i)	Probability (P _i)	P _i E _i (Rs.)	(E _i - \bar{E})	P _i (E _i - \bar{E}) ²
1.	2400	0.1	240	-510	26010
2.	2600	0.1	260	-310	9610
3.	2800	0.2	560	-110	2420
4.	2850	0.2	570	-60	720
5.	2900	0.2	580	-10	20
6.	3500	0.2	700	590	69620
Total			2910		108400

Table 2 The degree of risk attached with projects

Particulars	Project I	Project II	Project III
NPW(12%)	2079	2345.94	178135
I.R.R.	17.98	18.76	17.18
C.V	0.16	0.14	0.16

4 Certainty equivalent approach

The uncertain cash flow income streams can also be converted to its equivalent certain amounts. **A certainty equivalent is the amount exchanged with certainty that makes the decision maker indifferent between this exchange and some particular risky prospect.** Therefore, to each cash flow figure a question is asked, “How much certain income a person would be willing to exchange for this larger and uncertain income”? The third column of Table 3, indicates the certain amount of cash flows which a project manager would be willing to accept for the uncertain amounts of column 2. Thus, the data in column 4 represents the certainty equivalent coefficients as obtained by dividing column 3 by column 2. Consequently, the NPW of an uncertain cash flow stream can be converted to the NPW of certainty equivalent cash flow (NPW_c) by the following formula:

$$NPW_c = \sum_{i=1}^n \frac{C_i E_i}{(1+r^*)^i}$$

Where

C_i = certainty equivalent coefficients

E_i = Uncertain cash flows

r* = risk-free discounted rate

The risk-free rate of return is considered because risk has already been taken into account by converting cash flows to the certainty equivalents.

Table 3 Certainty equivalent approach for measuring risk in project investments

Year (1)	Cash flow (Rs) (2)	Certainty equivalent (Rs) (3)	Certainty equivalent coeff. (4)
0(Initial outlay)	-11000	-11000	1.00
1	3600	3375	0.94
2	3100	2810	0.91
3	2900	2680	0.92
4	2800	2610	0.93
5	2700	2565	0.95
6	2750	2650	0.96
Salvage value	2200	1900	0.86

Trading Account

An account similar to a traditional bank account, holding cash and securities and is managed by an investment dealer is called trading account.

Though trading accounts are traditionally thought to hold only stocks, a trading account can hold cash, foreign cash, securities and a number of other types of investments. Investors who use a number of trading strategies or have a number of brokerage accounts may separate their accounts in order to avoid confusion, one account may be a registered account for their retirement savings; another account may be a buy-and-hold account for their long term stocks; another may be a margin account; and another may be a trading account used for conducting day trading activities.

FINANCIAL STATEMENTS

There are four financial statements:

Balance sheet

Income statement

Statement of owner's equity

Statement of cash flows

UNIT 3

TOOLS OF PLANNING

The tools of planning are as follow:

1. Gantt Chart
2. Net Work Techniques

Gantt Chart

It is nothing but a bar chart or multiple activity charts. It is a pictorial device in which the activities are represented by horizontal bars on the time axis. The left-hand end of the bar shows the beginning time, the right hand end shows the ending time. The length of the bar indicates the duration of the activity. A number on the bar shows the manpower required for performing the activity.

Advantages

1. It is simple to understand
2. It can be used to show progress
3. It can be used for manpower planning

Disadvantages

1. It can not be used for complex project
2. It can not easily cope with frequent changes or updating

Network Techniques

These are more sophisticated techniques, which are also called as arrow diagram. In these techniques, a network diagram represents the activities, events and their interrelationship. The basic net work techniques are programme Evaluation and Review Techniques (PERT) and Critical Path Method (CPM).

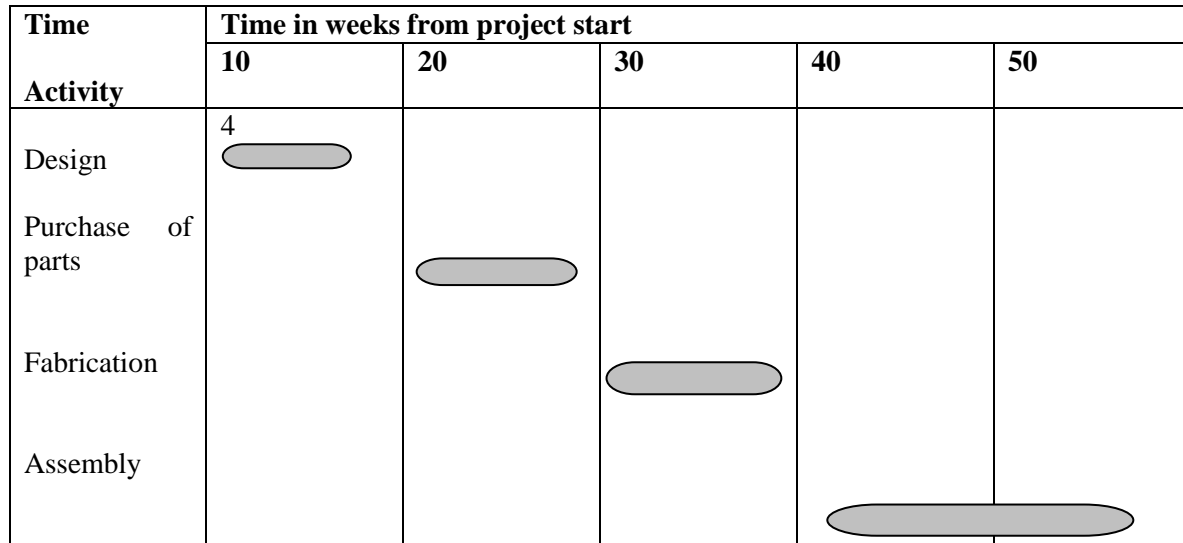


Fig. 2 Gantt chart-Fruit Processing Plant

Network Techniques for Project Management

Once a project is selected, the focus shifts to its implementations. This involves the completion of numerous activities (project components) by employing various resources-man, materials, machines, money and time-so that a project on paper is translated into concrete reality. The activities of a project have inter-relationships arising from physical, technical and other considerations.

For the proper planning, scheduling and control of the activities of a project, given their inter-relationships and constraints on the availability of resources, network techniques have been found quite useful.

Application of these Techniques

- Research and Development Programme
- Construction of an agro industry
- Planning and launching a new product
- Training of manpower
- Starting a new venture

Terms used in networking techniques

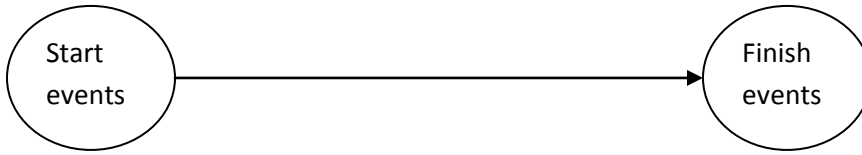
Activity- All projects may be viewed as being composed of operations or tasks called activities, which require the expenditure of time and resources for their accomplishment. An activity is depicted by a single arrow (\rightarrow) on the project network. The activity arrows are called arcs. The activity arrow is not scaled; the length of the activity time is only a matter of convenience and clarity and does not represent importance of time.

Predecessor activity – Activities that must be completed immediately prior to the start of another activity are called predecessor activities

Successor Activity – Activities that cannot be started until one or more of the other activities are completed, but immediately succeed them are called successor activities.

Concurrent Activity – Activities which can be accomplished concurrently are known as concurrent activities. It may be noted that an activity can be a predecessors or successor to an event or it may be concurrent with one or more of the other activities.

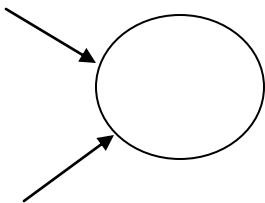
Event – An event represents a specific accomplishment in the project and takes place at a particular instant of time, and does not, therefore, consume time or resources. An event in a network is a time oriented reference point that signifies the end of one activity and the beginning of another. Events are usually represented in the project network by circles (O). The event circles are called nodes. Therefore, the major difference between activities and events is that activities represent the passage of time whereas events are points in time. All activity arrows must begin and end with event nodes as shown below:



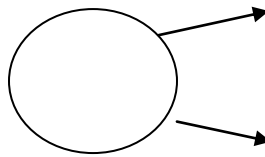
Merge event: When more than one activity comes and joins, the event is known as merge event.

Burst event - When more than one activity leaves an event, the event is known as a burst event.

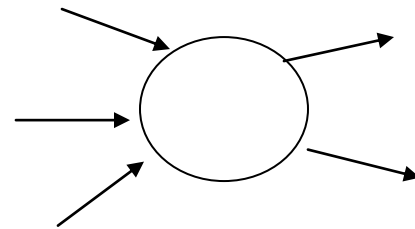
Merge and burst event – An activity may be a merge and burst event simultaneously as with respect to some activities it can be a merge event and with respect to some other activities it may be burst event.



Merge event

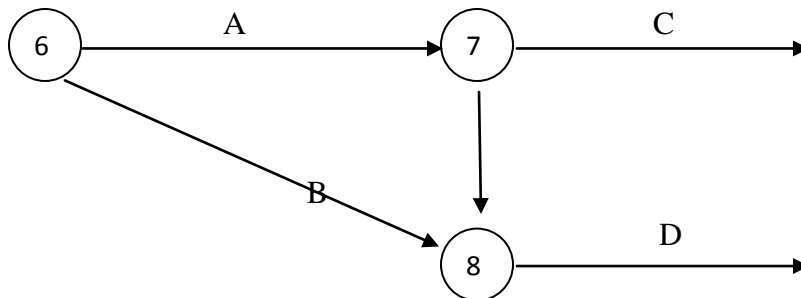


Burst event



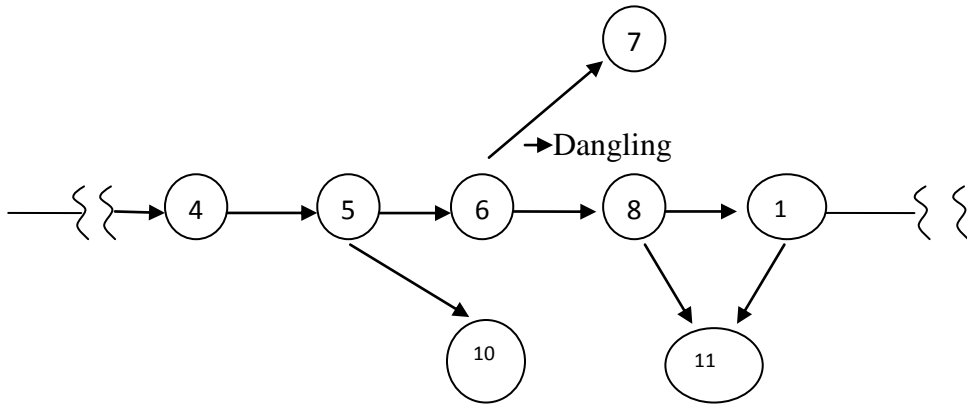
Merge and burst event

Dummy activity – In most projects many activities can be performed concurrently or simultaneously. It is possible that two activities could be drawn by the same beginning and end events. In situations where two or more activities can be performed concurrently the concept of dummy activity is introduced to resolve this problem. Therefore, there will be only one activity between two events. As a result of using the dummy activity, other activities can be identified by unique end points. Dummy activities consume no time or resources. By convention, dummy activities are represented by a dashed arrow on the project network and are inserted in the network to clarify activity pattern

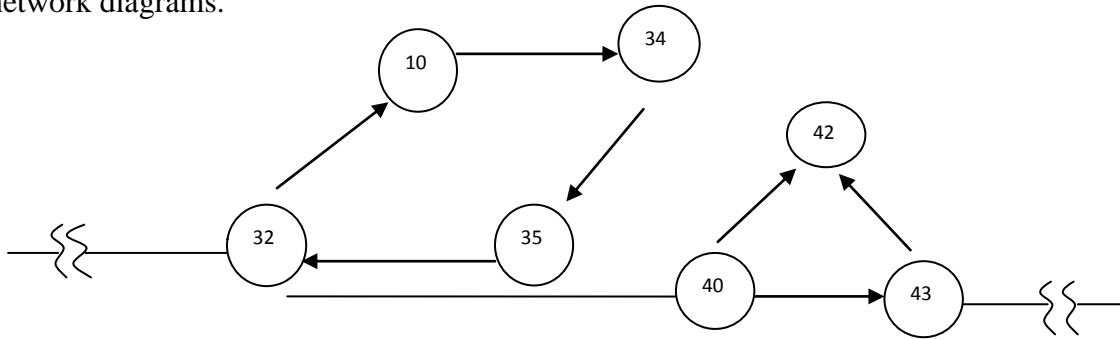


Common Errors in Network Diagramming – there are 3 types of errors which are common in Network diagramming. 1 Dangling 2 looping and 3 Redundancy (only in AOA diagrams)

Dangling - To disconnect an activity before the completion of all activities in a project network diagramming is known as dangling.



Looping – Looping is also known as cycling error in a network diagram. Drawing an endless loop in a network diagram is known as error of looping. This is also in both AOA and AON network diagrams.



Redundancy – To provide unnecessary the dummy activity in network logic is known as the error of redundancy. It is only in AOA network diagrams.

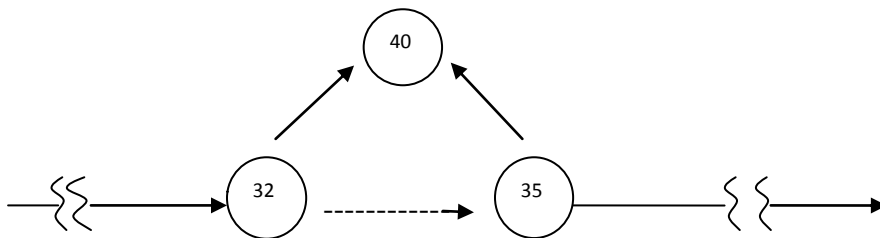
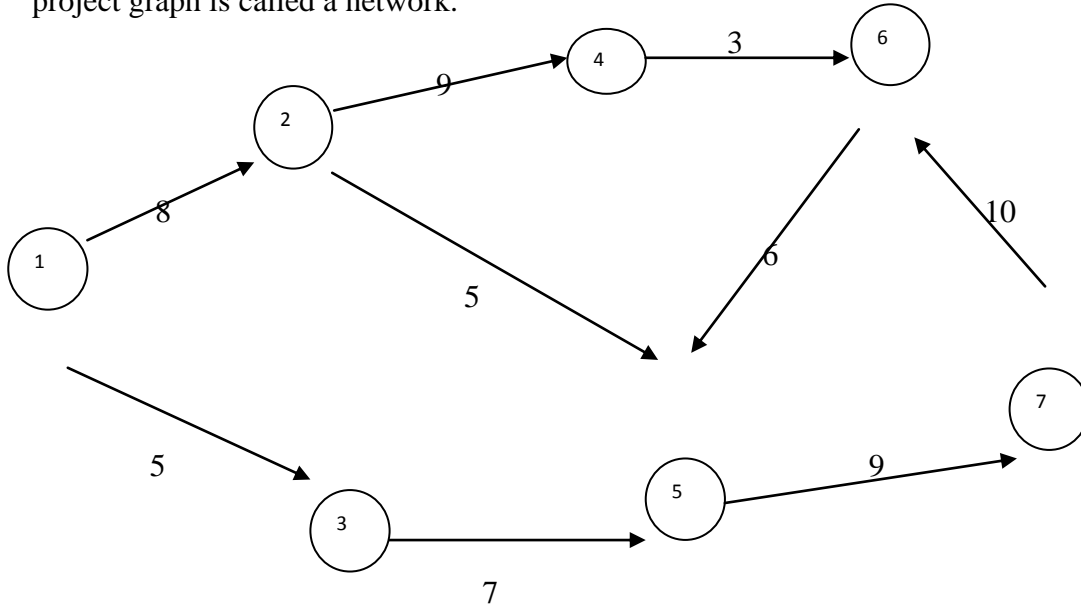


Fig: Redundancy Error

Network – depicting or the Showing of various necessary operations (activities or jobs or tasks) to be completed in the project and the ordering in which sequence these are to be performed in a project graph is called a network.

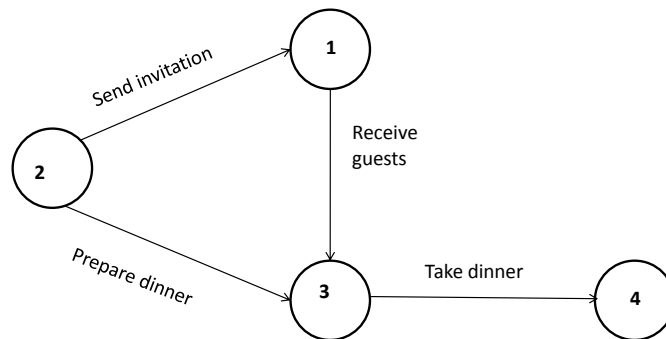


Network Diagram - Normal

Basic to Pert as well as CPM is the network diagram.

A network is a graphical diagram consisting of certain shape or arrangement configuration of arrows and nodes for showing the logical sequence of various tasks (or activities) to be performed to achieve project objectives.

A simplified network diagram for a dinner project is shown as below.



UNIT 4

CRITICAL PATH METHOD (CPM)

Rules for Network Construction

- Each activity must have a preceding and a succeeding event. The pair of preceding and succeeding events numerically denotes an activity.
- Each event should have a distinct number. Normally events are so numbered that the number at the head of the arrow is greater than that at its tail.
- There should be no loops in the project network.
- Not more than one activity can have the same preceding and succeeding events. To ensure that each activity is uniquely numbered it may be necessary sometimes to introduce dummy activities.

A dummy activity is an imaginary activity which can be accomplished in zero time and which does not consume resources. A dashed arrow represents it. It may also be used to represent a constraint necessary to show the proper relationship between activities.

Glossaries normally used are

(Arrow (or) Arc)

→	:	Activity
-->	:	Dummy activity
Node (o)	:	Event
O O	:	Network
t_o	:	Optimistic time
t_m	:	Most likely time
t_p	:	Pessimistic time
t_e	:	Expected time
		$t_o + 4t_m + t_p$

Expected time (t_e) = -----

6

Slack for an event is the difference between its LOT and EOT where

LOT = Latest Occurrence Time for an event

EOT = Earliest Occurrence Time for an event

Critical Path

Critical path starts with the beginning event, terminates with the end event and is marked by events, which have a zero slack. This is obviously the path on which there is no slack no cushion. Critical path is the longest path from the beginning event to the end event.

Table : Total float represents float under most favourable conditions

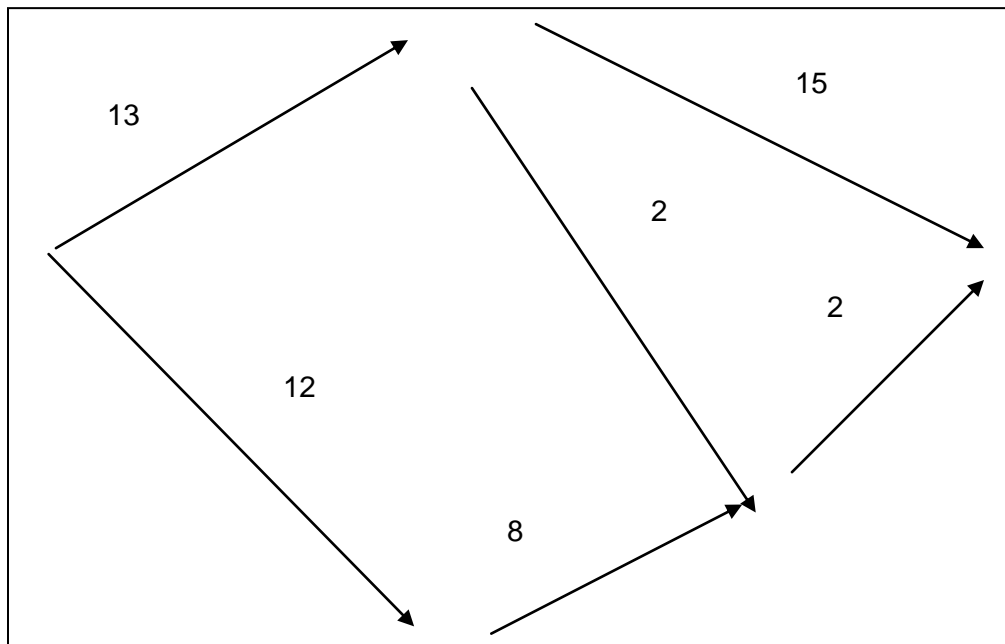
Time Activity	Optimistic	Most Likely	Pessimistic	Expected time
A (1-2)	9	12	21	13
B (1-3)	6	12	18	12
C (2-4)	1	1.5	5	2
D (3-4)	4	8.5	10	8
E (2-5)	10	14	24	15
F (4-5)	1	2	3	2

Free Float of an activity is the extra time available to complete the activity if all activities commence as early as possible.

Independent Float of an activity is the extra time available to complete the activity when the activity is started at the LOT of its preceding event and completed by the EOT of its succeeding event. Independent float represents the float under most adverse conditions.

Critical Path Method (CPM)

This model was developed for projects, which are relatively risk free. CPM approach is ‘deterministic’. The principal focus of CPM is on variations in activity times as a result of changes in resource assignments. These variations are planned and related to resource assignments. CPM focuses on time-cost relationships and it seeks to determine the project schedule, which mini9mizes total cost. There is a trade off between cost and completion date for large projects. Most used in construction works.



Network Diagram

Assumption Underlying CPM Analysis

The cost associated with a project can be divided into two components as direct costs, which are incurred on direct material and direct labor. Indirect costs consist of overhead items like indirect supplies, rent, insurance, managerial services etc. Activities of the project can be expedited by crashing which involves employing more resources. Crashing reduce time but enhances direct cost because of factor like overtime payments, extra payments and wastage. A downward sloping straight line can reasonably approximate the relationship between time and direct activity cost. Indirect costs associated with the project increase linearly with project duration.

Procedure

CPM analysis is concerned with the relationship between total direct cost and project duration since indirect cost increase with duration.

1. Obtain the critical path in the normal network. Determine project duration and direct cost.
2. Examine the cost time scope of activities on the critical path obtained and crash the activity, which has least scope.
3. Construct the new critical path after crashing as per step two. Determine project duration and cost.
4. Repeat step two and three till activities on the critical path (which may change every time) are crashed.

Table 1 Normal and crash time and cost.

Activity	Time in weeks		Variable cost		Slope $\Delta \text{ cost}$ = ----- $\Delta \text{ time}$
	Normal	Crash	Normal (Rs.)	Crash (Rs.)	
1-2	8	4	3000	6000	750
1-3	5	3	4000	8000	2000
2-4	9	6	4000	5500	500
3-5	7	5	2000	3200	600
2-5	5	1	8000	12000	1000
4-6	3	2 1/2	10000	11200	2400
5-6	6	2	4000	6800	700
6-7	10	7	6000	8700	900
5-7	9	5	4200	9000	1200
			45200	70400	

Note: Fixed cost is Rs. 2,000/ week

The project network with normal duration is shown in Figure 3

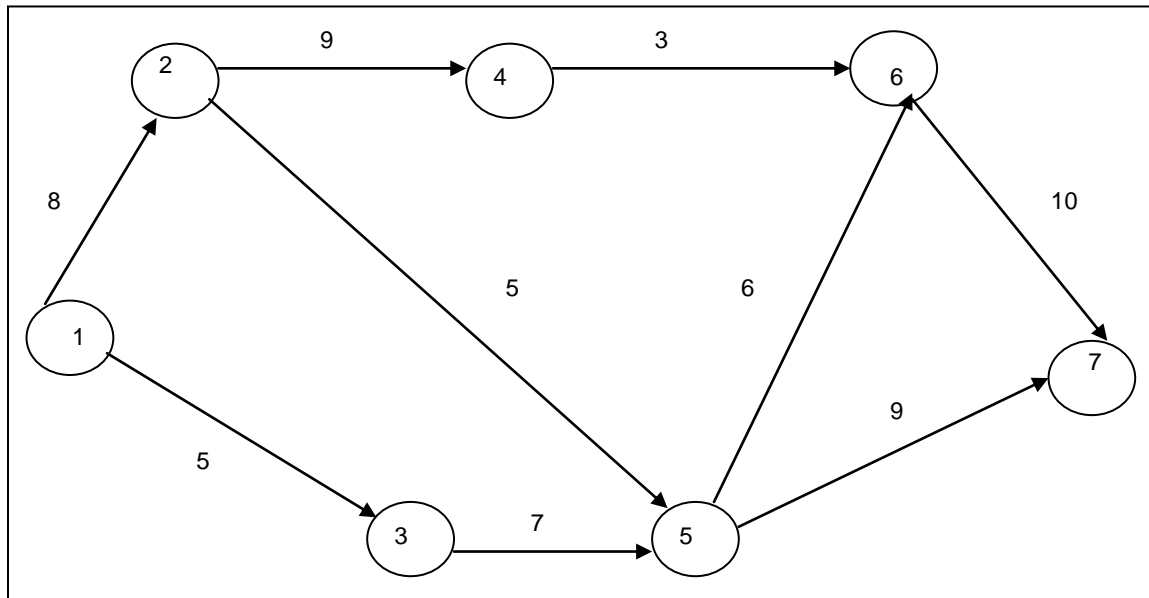


Fig. 3 Network Diagram-Normal

The critical path in the all – normal network is (1-2-5-6-7). The project duration is 30 weeks and the total variable cost is Rs. 45,200. Examining the time – cost slope of activities on the critical path we find that activity (2-4) has the lowest slope; in other words, the cost to expedite per week is the lowest for activity (2-4). Hence activity (2-4) is crashed. The project network after such crashing is shown in Figure 20.4.

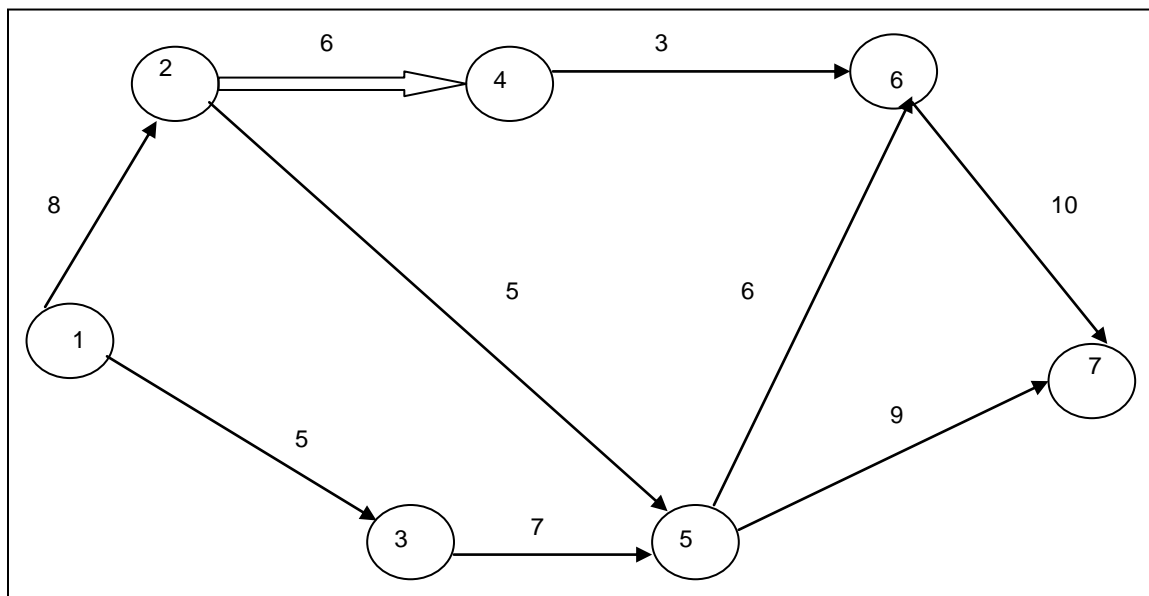


Fig. 4. Network Diagram-Crashed

As per Figure 20.4 the critical path is (1-2-5-6-7), with a length of 29 weeks, and the total variable cost is Rs. 46,700.

Looking at the time – cost slope of the activities on the new critical path (1-2-4-6-7), we find that the activity (5-6) has the lowest slope. Hence this activity is crashed. The project network after such crashing is shown in Figure 20.5. As per this figure the critical path is (1-2-4-6-7) with a length of 27 weeks and the total variable cost is Rs. 49,500

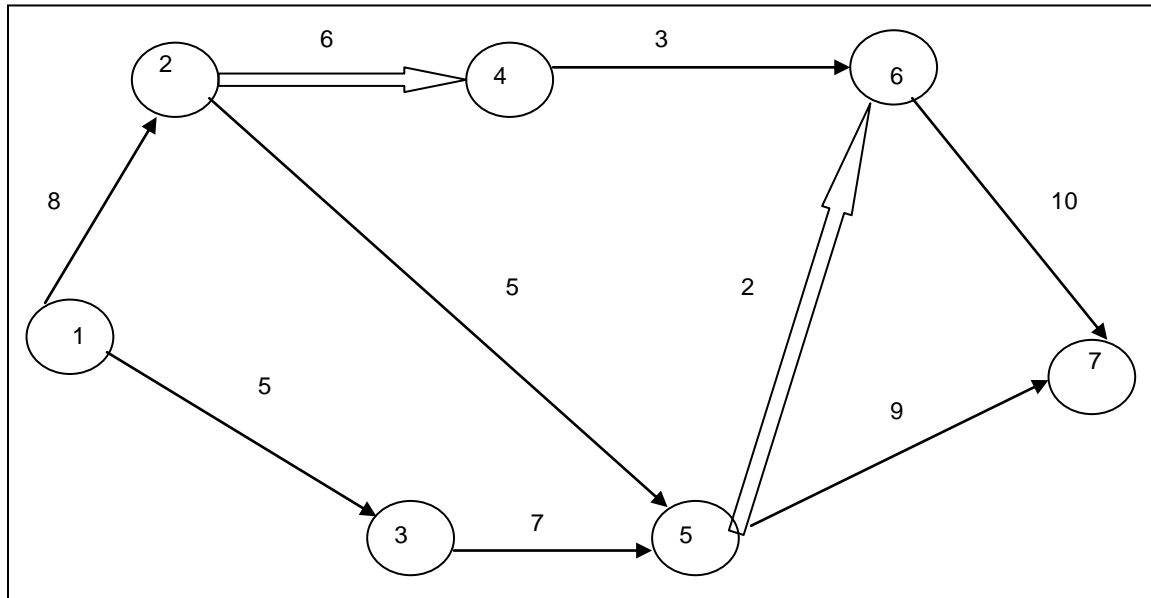


Fig. 5. Network Diagram-Crashed

Comparing the time cost-slope of the non-crashed activities on the new critical path (1-2-4-6-7) we find that the activity which costs least to crash is (1-2). Hence this is crashed. The Project network after such crashing is shown in Figure 20.6. As per this figure the critical path is (1-3-5-6-7) with a length to 24 weeks and the total variable cost is Rs. 52,500

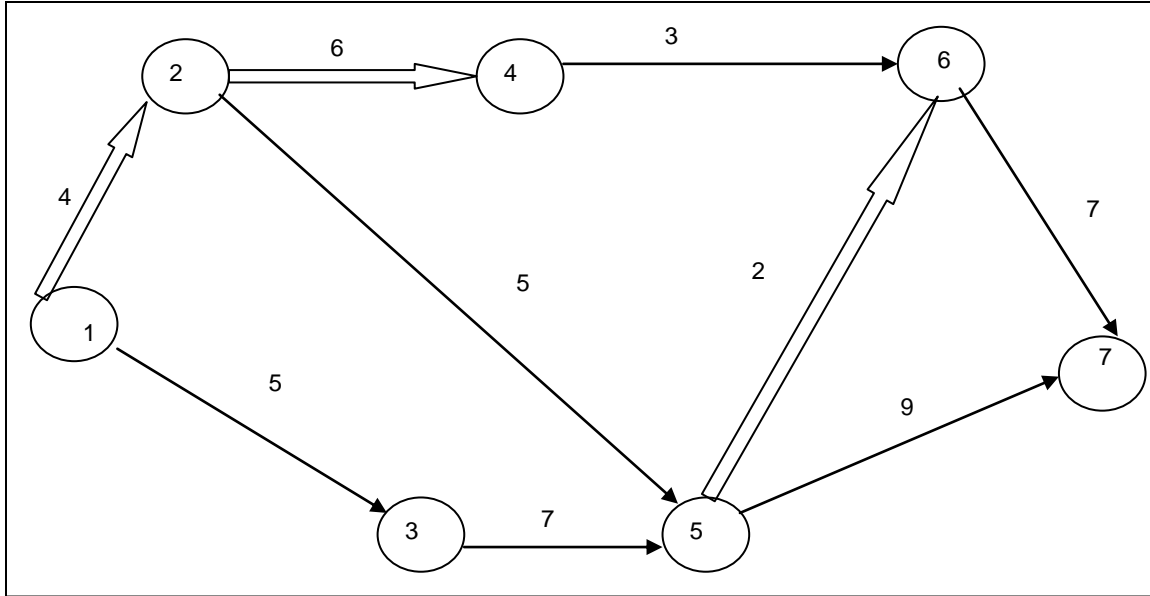


Fig. 6 Network Diagram-Crashed

Looking at the time – cost slope of the non-crashed activities on the new critical path (1-3-5-6-7), we find that activity (6-7) has the lowest slope. Hence it is crashed. The project network after such crashing is shown in Figure 20.7. As per this figure there are two critical paths (1-3-5-6-7) and 9(1-3-5-7), both with a length on 21 weeks, and the total variable cost is Rs. 55,200.

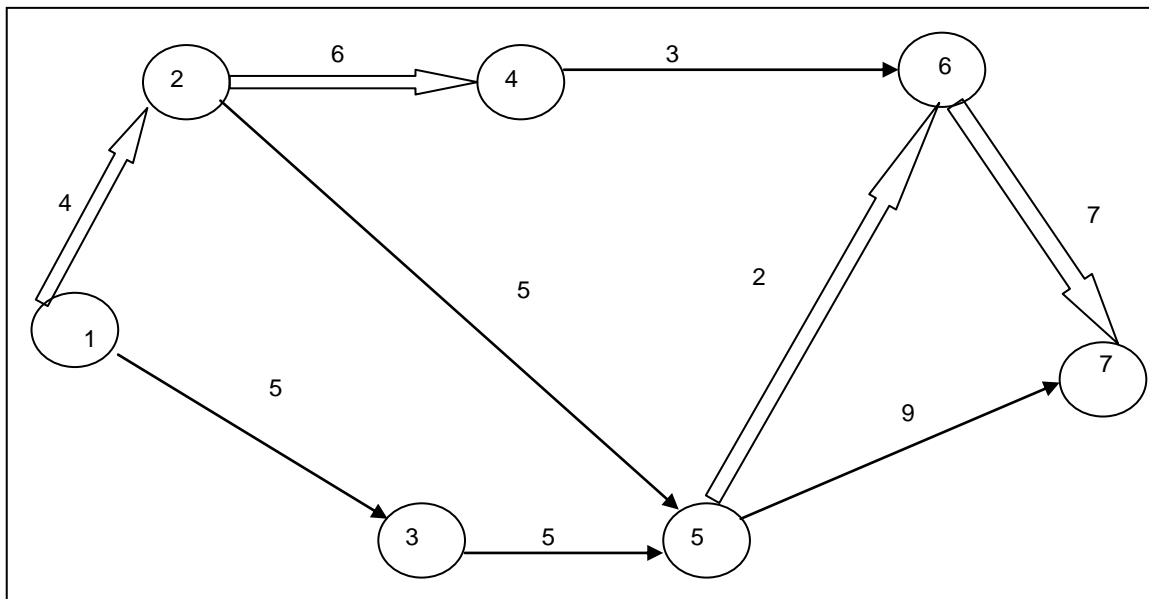


Fig 7 Network Diagram-Crashed

Fig. 7

Considering the time –cost slope of non-crashed activities on critical path (1-3-5-6-7) and (1-3-5-7) we find that activity (3-5) which is common to both the critical paths is the least costly to crash. Hence, it is crashed. The project network after this crashing is shown in figure 20.8. As per this figure, the critical path is (1-2-4-6-7) with a duration of 20 weeks and the total variable cost is Rs. 56,400

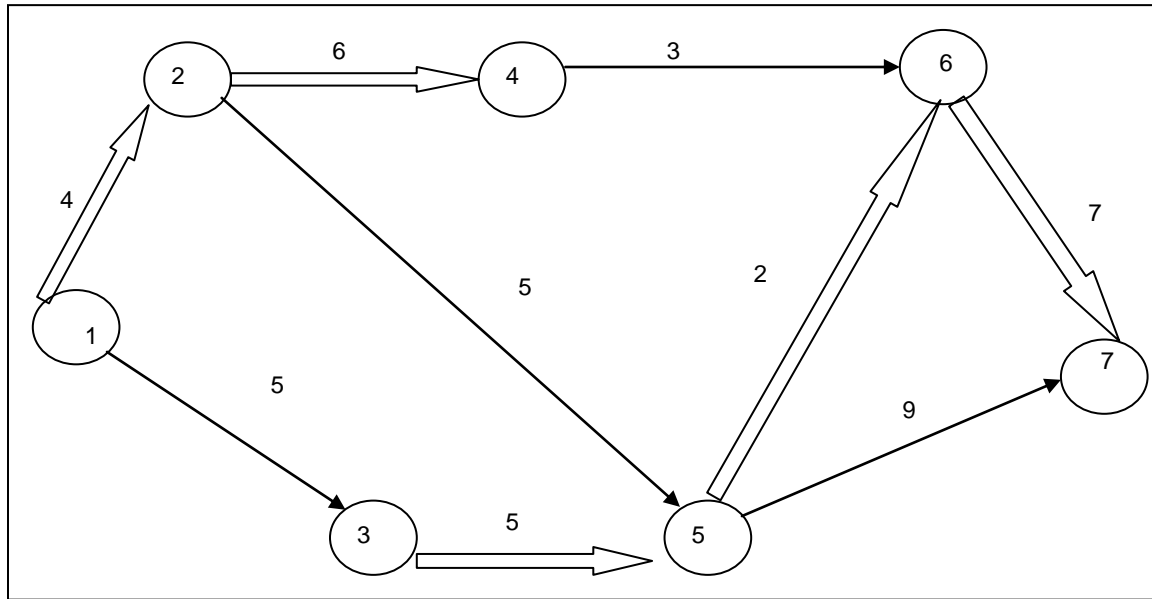


Fig. 8 Network Diagram - Crashed

Looking at the new critical path (1-2-4-6-7) we find that the only non crashed activity is (4-6). Crashing this gives us the project network shown in Figure 20.9. As per this figure, the critical path again is (1-2-4-6-7) with a duration of 19 ½ weeks and the total variable costs is Rs. 57,600.

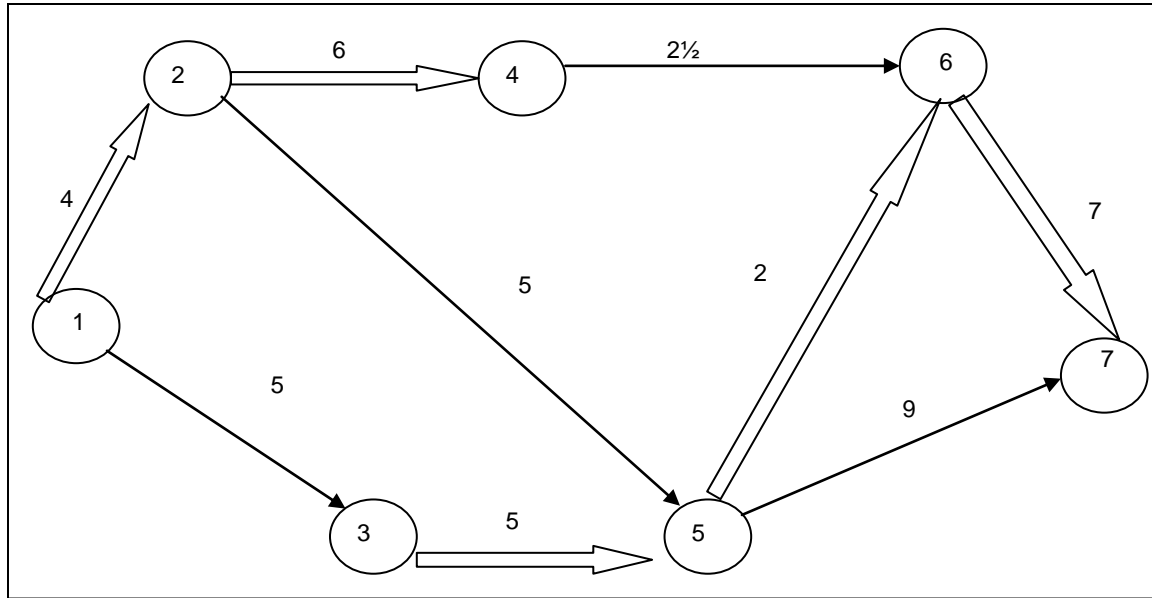


Fig. 9. Network Diagram - Crashed

Since all the activities on the critical path (1-2-4-6-7) are crashed, there is no possibility of further time reduction. Hence let us now look at the time-cost relationship. Table 20.2 shows this. From table 20.2 we find that the total cost is minimized for the project schedule represented by Figure 20.9 in which the activities crashed are (1-2), (2-4), (3-5), (5-6) and (6-7). The information provided in Table 20.2 is useful for decision making.

Table 2. Project duration and total cost.

Exhibit	Activities crashed	Project duration in weeks	Total variable cost	Total fixed cost (2000/week)	Total cost
			Rs.	Rs.	Rs.
1	None	30	45200	60000	105200
2	(2-4)	29	46700	58000	104700
3	(2-4) and (5-6)	27	49500	54000	103500
4	(1-2), (2-4) and (5-6)	24	52500	48000	100500
5	(1-2), (2-4), (5-6) and (6-7)	21	55200	42000	97200
6	(1-2), (2-4), (3-5), (5-6) and (6-7)	20	56400	40000	96400
7	(1-2), (2-4), (3-5) (5-6) and (6-7)	19 ½	57600	39000	96600

If the objective is to minimize the total cost of the project, the pattern of crashing suggested by Figure 20.8 is optimal. If the objective is to minimize the project duration then the pattern of crashing suggested

by Figure 20.9 is optimal. In real life situations, however, both the factors may be important. In addition, factors like strain on resources and degree of manageability are also important. The final decision would involve a careful weighing and balancing of these diverse factors, some quantitative. In any case, information along the lines provided in Table. 10 provides useful input for decision making.

Advantage of Network Techniques

1. They can handle inter-relationship among project activities
2. They identify the activities which are critical to the completion of the project on time and indicate and float (or spare time) for other activities.
3. They can handle very large and complex and
4. They can be easily computerized updated.

Drawbacks

Being more complicated than the traditional bar chart, they are not easily understood by the project personnel and They do not define and operational schedule which tells who does what and when.

Unit Summary

Project Management is nothing but management of a project which involves planning organizing, staffing, controlling and coordination of a number of interrelated activities with limited resources viz., men, materials, money and time. Project is a specific investment activity with a specific starting and an ending point, intended to create capital assets that produce benefits over an extended period of time. Project cycle included phases of conception, definition, planning and organizing, implementation and project clean up. Tools of planning are explained with Gantt chart and network techniques of Programme Evaluation Review Technique and Critical Path Method.

UNIT 5

TIME ESTIMATION

Once the logic and detail of the network have been established, time estimates must be assigned to each activity. Generally, three time values are obtained for each activity:

1 Optimistic time (t_o)

2 Most likely time (t_m)

3 Pessimistic time (t_p)

1. **Optimistic time (t_o):** It is the time required if no hurdles or complications arise in performing the project activity.
2. **Most likely time (t_m):** It is the time in which the project activity is most likely to be completed. This estimate takes into consideration normal circumstance, making allowance for some unforeseen delays.
3. **Pessimistic time (t_p):** It is the time required if unusual complications and for unforeseen difficulties arise while performing the project activity.

Obtaining time Estimates

Time estimates should be obtained by the PERT planner from persons who are responsible for estimation. The following points should be borne in mind while obtaining the time estimates.

1. Time estimates should be obtained by skipping around the network rather than by following a specific path. If estimates are obtained by following one path, there is a tendency for the person providing the estimates to add them mentally and compare them with a previously conceived notion of the time of the total path.
2. The estimates of t_o , t_m and t_p should be defined independently of each other.
3. The time available for completing the project should not influence the estimates of t_o , t_m and t_p .
4. It should be made known that t_o , t_m and t_p are estimates and not schedule commitments.
5. The estimates of t_o , t_m and t_p should include allowances for occurrence which are generally considered as random variables (weather conditions, administrative delays, etc) but not for occurrences that are normally not considered as random variables (flood, wars, etc.)

Average time

Once the three time estimates for each activity are obtained, the expected value of activity durations is calculated. The expected value, t_e is usually obtained by the formula:

$$t_e = \frac{t_o + 4t_m + t_p}{6}$$

Where t_e = weighted Arithmetic average time

t_o = optimistic time

t_m = most likely time

t_p = pessimistic time

Determination of the critical path

Once the network diagram with single time estimates has been developed, the following computational procedure may be employed for determining the critical paths, event slacks, and activity floats.

1 Calculation of earliest occurrence time (EOT) for each event

An event occurs when all activities leading to the event have been completed. In the network diagram shown below (Fig 1) for example, event 4 occurs when activities (2 – 4) and (3 – 4) are completed. Obviously activity (2 – 4) cannot begin unless event 2 occurs, which in turn requires the completion of activity (1 – 2). Likewise activity (3 – 4) cannot begin unless event 3 occurs which in turn requires the completion of activity (1 – 3). Thus we find that event 4 occurs when activities (1 – 2), (2 – 4), (1 – 3) and (3 – 4) are completed. In other words, event 4 occurs when paths (1 - 2 - 4) and (1 - 3 - 4) are completed.

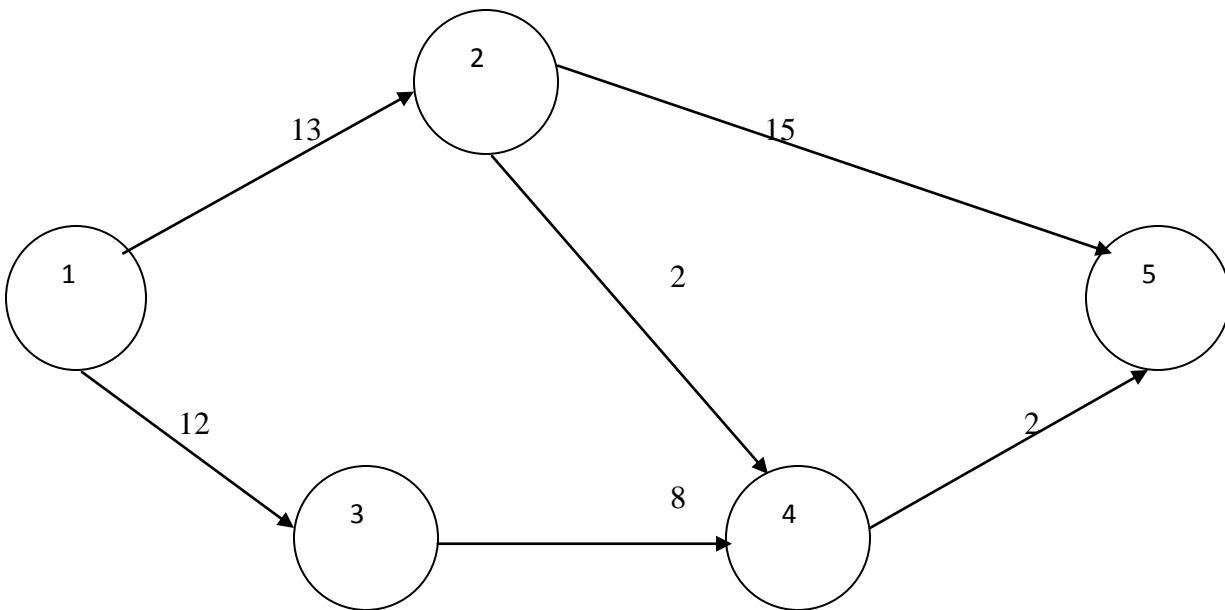


Fig 1 Network Diagram

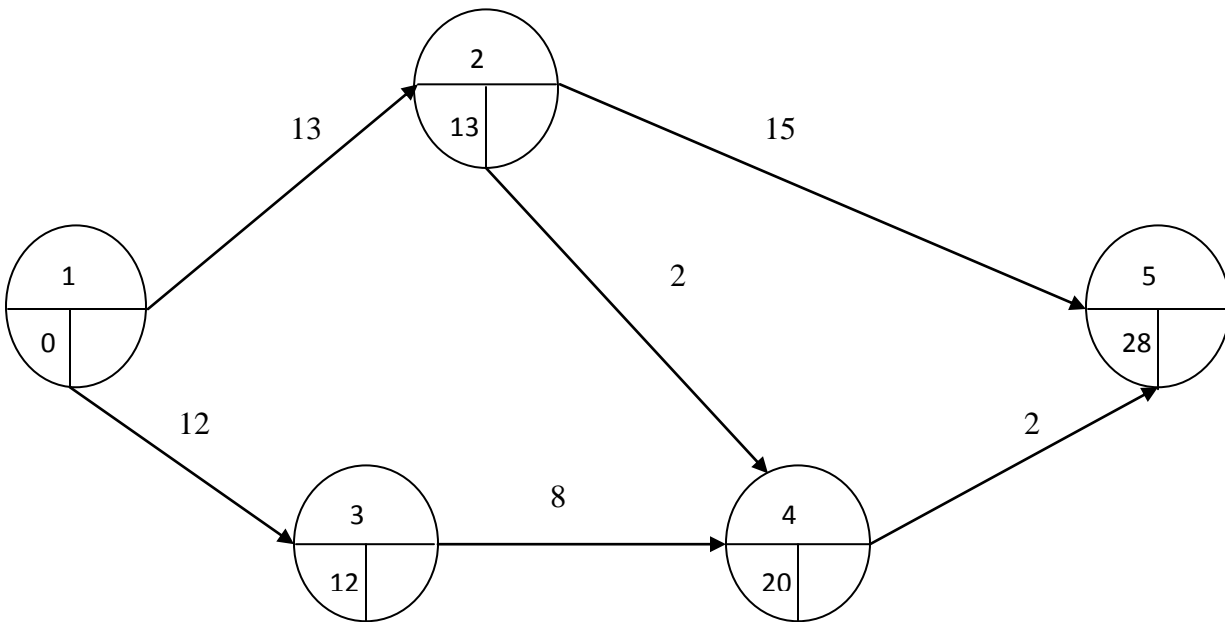


Fig 2 Representing EOT

The EOT of an event refers to the time when the event can be completed at the earliest

Looking at event 4 we find that since the paths leading to it viz (1 - 2 - 4) and (1 - 3 - 4) Take 15 and 20 weeks respectively, the EOT of event 4 is 20 weeks. In general terms, the EOT of an event is the duration of the longest path (from the beginning event whose EOT is set at 0) leading to the event. The EOTs of various events in our illustrative project are shown in Fig 2. It may be noted that in Fig 2 and subsequent figures an event is represented by a circle. The upper half of the circle denotes the event number, the left quarter in the lower half denotes EOT and the right quarter in the lower half denotes the latest occurrence time (LOT).

The EOT of end event obviously represents the minimum time required for completing the project. To obtain the EOT of various events, we start from the beginning event and move forward towards the end event. The computational procedure wherein we start from beginning event and move forward towards the end event is called forward pass. This computational procedure is referred to as the forward pass. In this computation we assume that each activity starts immediately on the occurrence of the event preceding it. Hence the starting and finishing time for various activities obtained from this computation are the earliest starting time (EST) and the earliest finishing time (EFT).

The general formula for EOT is:

$$EOT_{(i)} = \text{Max} [EOT_{(k)} + d_{(k, i)}]$$

Where $EOT_{(i)}$ = Earliest occurrence time of event i
 $EOT_{(k)}$ = Earliest occurrence time of event K (k) precedes I and there may be several K's)

$d_{(k, i)}$ = duration of activity (k, i) the max should be all activities (k, i) leading to

event node i

Similarly, formulae for EST & EFT are :

$$\boxed{\text{EST}_{(i,j)} = \text{EOT}_{(j)}} \quad \text{-----} \quad \textcircled{2}$$

$$\boxed{\text{EFT}_{(i,j)} = \text{EOT}_{(j)} + d_{(i,j)}} \quad \text{-----} \quad \textcircled{3}$$

Where $\text{EST}_{(i,j)}$ = earliest starting time for activity (i, j)
 $\text{EOT}_{(i)}$ = earliest occurrence time of event (i)
 $\text{EFT}_{(i,j)}$ = earliest finish time for activity (i, j)
 $d_{(i,j)}$ = duration of activity (i, j)

Calculation of the latest occurrence time (LOT) for each event

The LOT for an event represents the latest allowable time by which the event can occur, given the time that is allowed for the completion of the project (Occurrence of end event). Normally the time allowed for the completion of the project is set equal to the EOT of the end event. In other words the project is supposed to be completed at the earliest possible time. This means that for the end event the LOT and EOT are set equal. The LOT for various events is obtained by working backward from the end event. Therefore, the computational procedure wherein we start from end event and move backward towards the beginning event is called backward pass. The LOT for event 4 in our example is equal to the LOT for event 5, the end event minus the duration of the activity (4 - 5) which connects event 4 with 5. Since the LOT for event 5 is 28 weeks and the duration of activity (4 - 5) is 2 weeks The LOT for event 4 is 26 weeks (28 - 2). This represents the latest time by which event 4 should occur to enable the project to be completed in 28 weeks. Likewise, the LOT for other events can be calculated by moving backward. The LOT for various events is shown in the right quarter of the lower half of the event nodes) in Fig 3.

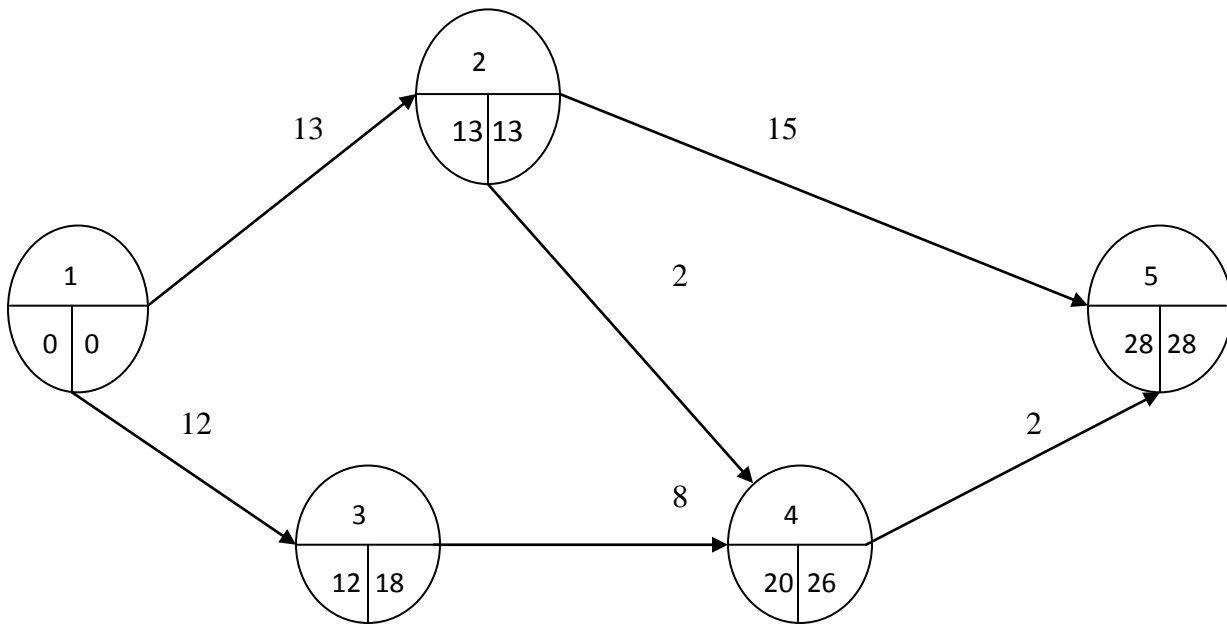


Fig 3: Representing LOT

The general formula for LOT is:

$$\text{LOT}_{(i)} = \text{Min} [\text{LOT}_{(j)} - d_{(i,j)}] \quad \text{---} \quad \textcircled{4}$$

Where $\text{LOT}_{(i)}$ = Latest occurrence time for i

$\text{LOT}_{(j)}$ = Latest occurrence time for j

(j follow i and there may be several j,s)

$d_{(i,j)}$ = duration of activity (i,j) the minimization shown there is done with respect to all activities (i, j) starting from i

Given the Lot for various events we can calculate the latest finishing time (LFT) and Latest Starting Time (LST) for various activities using the formulae:

$$\text{LFT}_{(i,j)} = \text{LOT}_{(j)} \quad \text{---} \quad \textcircled{5}$$

$$\text{LST}_{(i,j)} = \text{LFT}_{(i,j)} - d_{(i,j)} \quad \text{---} \quad \textcircled{6}$$

Where $LFT_{(i,j)}$ = Latest finishing time for activity (i,j)

$LOT_{(j)}$ = Latest occurrence time for event (j)

$LST_{(i,j)}$ = Latest starting time for activity (i,j)

$d_{(i,j)}$ = duration of activity (i,j)

Calculation of Slack for the event

The slack for an event is the difference between its LOT and EOT:

Slack = LOT - EOT

7

Obtaining the Critical and Slack paths

The critical path starts with the beginning event, terminates with the end event and is marked by events which have a zero slack. This is obviously the path on which there is no slack, no cushion. Other paths are slack path with some cushion. The critical path for the above example (project) is (1 – 2 – 5) and is indicated by double arrows fig 4. The critical path is the longest path from the beginning event to the end event. Since the end can be reached i.e., project can be completed, only when this Longest path is traversed, the minimum time required for completing the project is the duration on the critical path. The duration on critical path of our project is 28 weeks, this is the minimum time required for completing the project. (It is already indicated by the EOT of event 5, the end event).

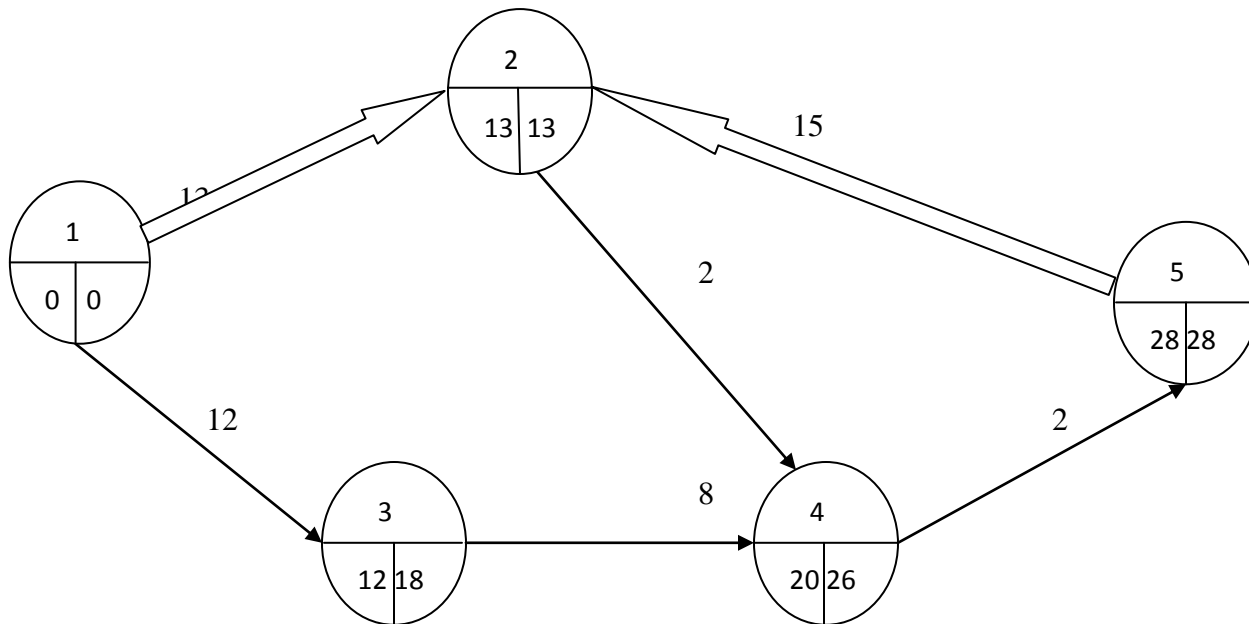


Fig 4: Representing Critical and Slack paths

Computation of activity floats

Given the estimates of activity time and event slack activity floats can be calculated.

There are three measures of float:

1. Total float
2. Free float
3. Independent float

In making under standable above floats let us consider an activity (2 – 4) as below:

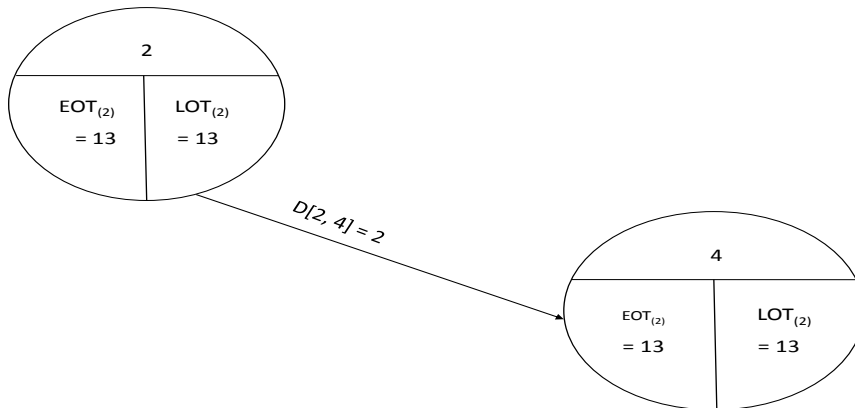


Fig 5 Representing activity (2 – 4) with EOT, and duration

1 Total Float: The total float of an activity is the extra time available to complete the activity if it is started as early as possible, without delaying the completion of the project.

Total float for activity (2 – 4) is equal to:

$$TF_{(i,j)} = LOT_{(j)} - EOT_{(i)} - d_{(i,j)}$$

For example

$$\text{Total float for activity } 2-4 \text{ is } TF_{(2,4)} = \frac{\text{Latest occurrence time for event 4}}{LOT_{(4)}} - \frac{\text{Earliest occurrence time for event 2}}{EOT_2} - \frac{\text{Duration of activity (2-4)}}{d(2-4)}$$

$$TF_{(2,4)} = 26 \text{ weeks} - 13 \text{ weeks} - 2 \text{ weeks}$$

$$TF_{(2,4)} = 11 \text{ weeks}$$

2 Free float: Free float of an activity is the extra time available to complete the activity when the activity is started at the EOT of its preceding event and completed by the EOT of its succeeding event. The free float for activity (2 – 4) is :

$$FF_{(i,j)} = EOT_{(j)} - EOT_{(i)} - d_{(i,j)}$$

For example (2- 4) activity

$$FF_{(2-4)} = EOT_{(4)} - EOT_{(2)} - d_{(2-4)} \\ = 20 - 13 - 2 = 5 \text{ weeks}$$

3 Independent float: The independent float of an activity is the extra time available to complete the activity when the activity started at the LOT of its preceding event and completed by the EOT of its succeeding event. The independent float for activity (2 – 4) is

$$IF_{(i,j)} = EOT_{(j)} - LOT_{(i)} - d_{(i,j)}$$

For example for (2-4) activity

$$IF_{(2-4)} = EOT_{(4)} - LOT_{(2)} - d_{(2,4)} \\ 20 \quad - 13 \quad - 2 \quad = 5 \text{ weeks} \\ \text{weeks} \quad \text{weeks} \quad \text{weeks}$$

UNIT 6

PROGRAM EVALUATION AND REVIEW TECHNIQUE (PERT)

PERT

It is a probability model, which includes uncertainty. It is mostly used in R & D.

Steps involved in PERT

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 of project duration and the probability of completion in a given time.

Measures of Variability

Variability in PERT analysis is measured by variance or its square root the standard deviation. Variance of a set of numbers is the average squared difference of the numbers in the set from their arithmetic average. 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.

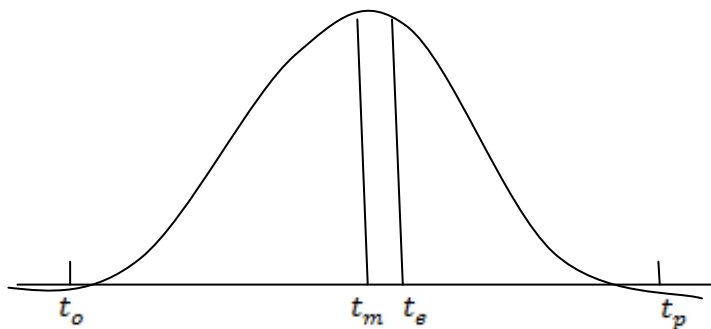
For determining the standard deviation of the duration of an activity we require the entire probability distribution of activity distribution. We, however, have only three values from this distribution: t_p , t_m and t_o . In PERT analysis, a simplification is used in calculating the standard deviation. It is estimated by the formula

$$\sigma_T = \frac{t_p - t_o}{6}$$

Where σ_T = standard deviation

t_p = Pessimistic time

t_o = Optimistic time



PERT time estimates- Beta distribution

Variance is obtained by sq σ_T

The standard deviation and variance of the activities on the critical path of our example are shown below:

SD and Variance of Activity Duration on critical path

Activity	t_p	t_o	$\sigma_T = \frac{t_p - t_o}{6}$	Variance = σ_T^2
(1-2)	21	9	2	4.00
(2-5)	24	10	2.33	5.43

$$\sigma_T = \sqrt{(4 + 5.43)} = 3.07$$

Assuming that the probability distributions of various activities on the critical path are independent, the variance of the critical path duration is obtained by adding variances of activities of the critical path.

Variance (Critical path duration σ_T^2) = Sum of the variances of activity durations on the
Critical path

This means Standard deviation (Critical path duration σ_T^2) =
= [Sum of variances of activity duration on the critical path]^½

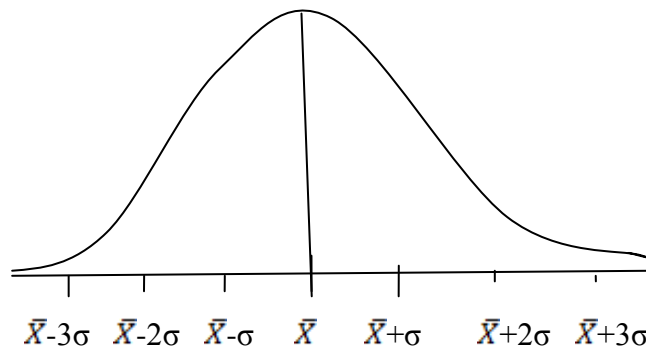
The standard deviation of the critical path duration for our illustrative project is:

$$(4 + 5.43)^{\frac{1}{2}} = 3.07$$

Now we know that the mean and standard deviation for the critical path duration for our project are 28 weeks and 3.07 weeks respectively.

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 distributed with mean and standard deviation obtained by the method described above.

A normal dist 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 $\pm 1\sigma_x$	0.68
Mean $\pm 2\sigma_x$	0.95
Mean $\pm 3\sigma_x$	0.99

Probability of completion of the project by a specified date:

Armed with information about mean (\bar{T}) and standard deviation (σ_T) for critical path duration, which is normally distributed, we can compute the probability of completion by a specified date or scheduled time (D/ST) as follows:

1. Find $Z = \frac{D-T}{\sigma_T}$ or $\frac{ST-T_{or\ t\ e}}{\sigma_T}$

$$Z = \frac{X - \mu}{\sigma}$$

2. Obtain cumulative probability up to 'Z' by looking at the probability distribution of the standard normal variate.

Cumulative probability up to 'Z' for Standard Normal Distribution

Z	Cumulative probability	Z	Cumulative probability
-3.0	0.001	0.2	0.579
-2.8	0.003	0.4	0.655
-2.6	0.005	0.6	0.726
-2.4	0.008	0.8	0.788
-2.2	0.041	1.0	0.841
-2.0	0.023	1.2	0.885
-1.8	0.036	1.4	0.919
-1.6	0.055	1.6	0.945
-1.4	0.081	1.8	0.964
-1.2	0.115	2.0	0.977
-1.0	0.159	2.2	0.986
-0.8	0.212	2.4	0.992
-0.6	0.274	2.6	0.995
-0.4	0.345	2.8	0.997
-0.2	0.421	3.0	0.999
0.0	0.500		

The above procedure is illustrated for our project example which has $\bar{T} = 28$ weeks and $\sigma T = 3.07$ weeks. The probability of completing this project by certain specified dates is shown below.

Table: Probability of completion by the specified date

Specified date (D)	$Z = \frac{D - T}{\sigma T}$ $Z = \frac{ST - \bar{T} \text{ or } te}{\sigma T}$	Probability of completion by D or scheduled date
20	$\frac{20 - 28}{3.07} = -2.60$	0.005
25	$\frac{25 - 28}{3.07} = -1.0$	0.159
30	$\frac{30 - 28}{3.07} = 0.60$	0.726

UNIT 7

ENTREPRENEURSHIP DEVELOPMENT

I Concept and Meaning

The Entrepreneur term was introduced for the first time by the French Economist J B Say in 1800. According to him the entrepreneur shifts economic resources out of an area of lower productivity into an area of higher productivity and greater production. But J B say's definition does not tell us who is Entrepreneur. As per Schumpeter, 1961 "an entrepreneur is a dynamic agent of change: or catalyst who transforms increasingly, natural and human resources into corresponding production possibilities". Whatever be the definition, the basic underlying concepts seems to have remained the same. The entrepreneur always searches for a change, responds to it and exploits it as an opportunity. Thus entrepreneurs are people who have the ability to search and evaluate business opportunities, arrange the necessary resources to establish the venture and to initiate appropriate action to make the business successful. Entrepreneurs are persons who start their own new and small enterprises.

On the other hand **Entrepreneurship** is the character practice skill of an entrepreneur in organizing, managing and assuming the risk of a business.

II Definition

Entrepreneur is the person who thinks, organizes and operates the business and is responsible for losses and gains from the business. Entrepreneur is an innovator who introduce something new into the economy which may be a new method of production not yet tested by branch of manufacture concerned or a product with which consumers are not familiar with or a new market hitherto unexplored or other similar innovations.

Entrepreneurship refers to the process of identifying/innovating ideas, product and services; mobilizing resources, organizing production/services and, finally, marketing them covering the risk with constant strive for growth and excellence.

Definition of Entrepreneurship given by National Knowledge Commission, 2008

"Entrepreneurship is the professional application of knowledge, skills and competencies or entrepreneurship is of monetizing a new idea by an individual or a group of people by launching an enterprise or diversifying from an existing one (distinct from seeking self employment as in a profession or trade), to pursue growth while generating wealth, employment and social good"

III Factors influencing entrepreneurship

The emergence of entrepreneurs in a society depends upon closely inter linked social, religious, cultural, psychological, political and economic factors.

(1) Family set up and society

In the first place, individuals who for some reasons, initiate, establish maintain & expand new enterprise and generate entrepreneurship in society. It is observed that entrepreneurs grow in the tradition of their families and society, and internalize certain values and norms from these sources.

(2) Religious, social and cultural taboos

In the second place, religious, social and cultural factors also influence the individual for taking up entrepreneurial career. In some countries there is religious and cultural belief that high profit is unethical. This type of belief inhibits growth of entrepreneurship.

(3) Psychological factors

Thirdly, the psychological factors like high need for achievement, determination for unique accomplishment, self confidence, creativity, vision, leadership; etc promote entrepreneurship among individuals. On the other hand psychological factors like security orientation, conformity and compliance, high need for affiliation; etc inhibit promotion of entrepreneurship.

(4) Political system

Fourthly, the political system and also the political stability of a country influence the growth of entrepreneurship. The political system, which promotes free market, individual freedom and private enterprise, will promote entrepreneurship.

(5) Economic policies of the state or government

Lastly, the economic policies of the government and the other financial institutions and opportunities available in a society play a crucial role in exerting direct influence on entrepreneurship.

IV Why there is need for promotion of entrepreneurship and small business?

Entrepreneurship promotes small business in the society. Why is so much significance attached to small businesses is a question that is being asked time and time again. Not so many years ago the conventional wisdom was that concentration and economies of scale were essential for industrial survival. Now economists, businessmen and governments accept that small firms have a crucial role to play in the economy. Small businesses are an essential part of our future economic prosperity and also create urgently needed new employment opportunities.

V Essential entrepreneurial traits/qualities/characters

An entrepreneur possesses a complex personality. Certain personality characteristics make him quite different than an ordinary human being. Some of the characteristics, which constitute his personality, are inborn in him and some are acquired in the process of socialization. However, it has been proved that most of the entrepreneurial traits can be further developed in an individual if they are present in him to some extent in latent form, by well structured training and development programs. The important entrepreneurial traits are as below.

(1) Risk taking ability

Entrepreneurs are moderate risk takers. They enjoy the excitement of a challenge, but they do not gamble. Entrepreneurs avoid low risk situations because there is a lack of challenge and avoid high-risk situation because they want to succeed. They like achievable challenges. They do not tend to like situation where the outcome of a pursuit (occupation) depends upon a chance and not on their efforts. They like to influence the outcome of their occupation by making more efforts and then having a sense of accomplishment. A risk situation occurs when an entrepreneur is required to make choice between two or more alternatives whose potential outcomes are not known and must be evaluated in advance, with limited information. A risk situation involves potential gain potential loss. The greater the possible loss, the greater the risk involved. Entrepreneurs get great satisfaction in accomplishing difficult but realistic tasks by applying their own skills. Hence low risk situation and high-risk situation are avoided because these do not satisfy the entrepreneurs. In short, the entrepreneur likes a difficult but achievable challenge. As the size of business expands, the problem and opportunities become more numerous and complex. Business growth and development require an entrepreneur not to be afraid of making decision and taking certain risks. Most people are afraid to take risk because they want to be safe and avoid failure whereas an entrepreneur always takes calculated risk and is not afraid of failure.

(2) Self confidence

A man with relevant knowledge, skills and information and having successful experience in the past possesses greater degree of self confidence. A person attempting simple to complex tasks and utilizing feedback for corrective measure has greater chances of success and in the process may built up self -confidence. A man with self -confidence has clear thoughts and well defined goals to achieve in his life. An entrepreneur gets into business or industry with a high level of self, confidence. He is able to evaluate his competences and capabilities in a realistic manner. He can set realistic and challenging goals. He is confident of achieving these goals. He possesses a sense of effectiveness, which ultimately contributes to success of his venture. He puts forward his case confidently and gets needed help from concerned agencies.

(3) Optimistic nature

Untapped entrepreneurial opportunities lie in a state of uncertainty. Different people evaluate these opportunities differently. An entrepreneur exhibits positive and optimistic attitude toward such opportunities. The entrepreneur approaches his task with the hope of success and not with a fear of failure. In the process of accomplishing his task he may fail also but the failure experience does not change his thinking. He is always optimist in his outlook. This positive outlook develops a drive in the entrepreneur to attempt new things and innovate. He is able to visualize the hidden opportunities in the environment and translate them into business realities.

(4) High need for achievement

The need to excel, known as achievement is a critical factor in the personality of an entrepreneur. People with high need for achievement have desire for success in competition with others. They try to accomplish challenging tasks. They know their own strengths and weaknesses; the facilitating factor and constraints in the environment and the resources needed to accomplish their tasks. Entrepreneurs, by and large, have been found to be people with a high drive, high activity level and goal orientation. They take external help whenever needed and feel happy on accomplishment of their task.

(5) Self reliant or need for independence

Studies conducted on entrepreneurs indicate that their need for independence is the prime characteristics that has tempted them to start their own business. These entrepreneurs do not confine themselves to routine jobs and practices. They set their own challenging goals and make efforts to achieve these goals. They do not wait for direction from others and choose their own course of action. They are masters of their own activities and take full responsibility of outcome of their actions. The independence provides opportunity for trying out new ideas and helping them achieve their life goals.

(6) Need for power

High need for achievement leads one into launching an enterprise but may not be adequate to contribute to its success. Once an entrepreneur starts his enterprise and wants to manage it successfully, he also need to influence people, a drive or move which sells his ideas and taking lead in the process of establishing and expanding his organization. Such drive to influence people and to lead them to implement his ideas may be called as need for power. The entrepreneurs, especially in the initial stages, reflect moderate need for the power. This helps them in becoming successful enterprise builders. However, they do not develop emotional bonds with people they work with; their need for affiliation is low.

(7) Creativeness/innovativeness

Entrepreneurs are highly creative people. They always try to develop new products, processes or markets. They are innovative, flexible and are willing to adopt a change. They are not satisfied with conventional and routine way of doing things. They involve themselves in thinking and finding new ways of doing the things in a better way. They do original thinking and come out with solutions of many problems. Their thinking is divergent and are in look-out for new scientific theories and knowledge for improving products and processes.

(8) Foresightedness

Entrepreneur has great vision. He is able to perceive the opportunities in the environment, which other people are unable to see. He is future oriented. He is intelligent and resourceful person. Knowing the present and the past he is able to predict the future events about the business more accurately than other people. He is able to anticipate problems, which his business is likely to face and keeps himself, prepared for these events.

VI Entrepreneurial philosophy

Success as an entrepreneur to a great extent depends on his willingness to accept responsibilities for his own work. He must learn a great deal about himself if he intend to pursue goals, which are compatible with what, he most want in life. Even though the risk of failure is always present, therefore, entrepreneurs take risk by assuming responsibilities for their actions. Failure must be accepted as a learning experience. Some entrepreneurs succeed only after experiencing some failures. Learning from past experience will help to channel their actions to obtain more positive results, and success will result from persistent efforts.

Pursue goals related to people skills and abilities. Therefore, accept yourself as you are and try to emphasize your strengths and remove your weaknesses. If you purse your goals honestly and sincerely, you are likely to achieve positive results. Being goals oriented will bring out your best qualities. Acceptable results are more important than the perfect results and do no waste time in achieving perfection.

VII Judging your entrepreneurial skills as career

You should look at your personal qualities in a realistic manner. Your responses to the following questions will give some indication of your entrepreneurial abilities and the type of person you are:

- 1) Does your work require you to be self-reliant?
- 2) Are you usually self motivated to achieve goal?
- 3) Do you work well with other people?
- 4) Within a group of people, do you usually assume a leadership role?

- 5) Do you take advantage of opportunities to expand your knowledge through reading and attending educational courses?
- 6) Are you able to communicate well with others?
- 7) Are you a good listener?
- 8) Does your accomplishment indicate that you are growing personally and professionally?
- 9) What goals do you want to achieve and are these goals challenging?
- 10) Do you make decisions easily and confidently?

CONCLUSION

An important feature of being entrepreneurial is that you provide something of value to others. The greater the need, people have for your product or service, the greater your reward will be. If you work to improve their lives, you will be serving the needs of society as a true entrepreneur.

VIII Development of entrepreneurial attitudes

Thinking about the following factors will help you to develop entrepreneurial attitude towards your career.

- 1) Select a career, which will allow you freedom to express yourself creatively as well as permit personal and professional growth. Don't underestimate your own abilities and talents.
- 2) When setting out on your career, pattern your activities after successful person who are in same kind of occupation-techniques for achieving success.
- 3) Develop positive traits.
- 4) Know as much about your chosen career, as possible to become expert in that area.
- 5) Always try to improve. Be satisfied with past accomplishments, but look to future to create new goals as a source of self improvement.
- 6) Because everything is constantly changing you must change also. Accept change and use it to motivate yourself to achieve higher level goals.
- 7) Be action-oriented. It is the action that you are able to take advantage of new career opportunities, which will lead to further success.
- 8) Have a good understanding of your personal strengths and weaknesses. Rather than spending time on eliminating weaknesses, highlight and use your strength.
- 9) When personally involved, accept responsibilities for seeing that the activity will be successful.
- 10) Be able to combine the unique qualities of individuals working for you to obtain maximum benefits.
- 11) Show confidence in yourself and your employees.
- 12) Have a good self image.

- 13) Making decision is an essential quality of successful entrepreneurs. In most cases, decisions have to be made with limited facts and information.
- 14) Live in the present and waste no time in remembering past failures. Look to the future to provide rewarding and satisfying experiences.

CONCLUSION

The biggest assets to sustaining entrepreneurial ability are a positive attitude. In addition, determination or firm decision, experiences, persistence (continue in spite of obstacles or objections) and just plain hard work are essential to being a successful entrepreneur.

IX Role of an entrepreneur

1. **Taking initiative:** The entrepreneur takes the initiative to start the business. He has to make decision with regard to production and marketing.
2. **Choosing right location for business:** He has to set up the business where production and marketing facilities available.
3. **Performing innovation:** The entrepreneur has to introduce new scientific findings, machines and tools.
4. **Coordinating activities:** The entrepreneur has to co-ordinate, direct and supervises the work of other factors of production.
5. **Combating risk and uncertainties:** The entrepreneur has to face risk and uncertainties and provide necessary alternatives.

X National Entrepreneurship Development Board (NEDB)

Initially established as National Science and Technology Entrepreneurship Development (NSTEDB), in 1982 by the GOI under the aegis of Department of Science and Technology with aim to convert “**job seekers into job generators**” through science and technology interventions. The national Entrepreneurship Development Board (NEDB) is the apex body for entrepreneurship development in the country. It devises and recommends to the Government, schemes for promotion of entrepreneurship for encouraging self-employment in small scale industries and small business. The Board also recommends suitable facilities and incentives for entrepreneurship training. The Board may appoint committees for specific purpose and also invite persons to meetings of the Board, as and when necessary.

Broad Objective

The main objective of NEDB scheme is promotion of entrepreneurship for encouraging self employment in small scale industries and small business. Another component of this programme is to develop Entrepreneurship and Business Development Centres (EBDCs) to be developed in selected colleges/universities/organizations has been included in the NEDB scheme to motivate

students to take up entrepreneurship as a career option with the objective to promote self employment and to create job opportunities.

XI Objectives of National Entrepreneurship Development Board (NEDB)

1. **Evolving decadal perspective plan:** To seek to evolve a ten years perspective plan of resource development and support services, required by micro, tiny, small and medium scale entrepreneurs to lead a national drive by the concerned governmental agencies both Central and State Government, R&D institution, entrepreneurship promoting institutions and all others interested in supporting the cause of entrepreneurship ventures.
2. **Designing and monitoring the plans:** To emphasize priorities and design and monitor the implementation of Action Plans thereby helping the area to deal with the business environment of 21st Century.
3. **Identifying constraints and suggesting remedies:** To identify & remove entry barriers for potential entrepreneurs (first generation and new entrepreneurs). To focus on existing entrepreneurs in micro, tiny and small sector and identify and remove constraints to survivals, growth and continuously improve performance.
4. **Provision of facilities for consolidation and growth:** To facilitate the consolidation, growth and diversification of existing entrepreneurial venture in all possible ways.
5. **Promoting skill up-gradation:** To support skill up -gradation and renewal of learning processes among practising entrepreneurs and managers of micro, tiny, small and medium enterprises.
6. **Sensitization:** To sensitise to support agencies in the area of entrepreneurship about the current requirement of growth.
7. **Performing role of catalyst:** To act as catalyst to institutionalise entrepreneurship development by supporting and strengthening state level institutions for entrepreneurship development.

Dynamics of Entrepreneurship

Entrepreneurship is the character practice and /or skill of an entrepreneur. An entrepreneur is a person who organizes manages and assumes the risk of a business. Accordingly, entrepreneurship refers to identifying/innovating ideas, product and services; mobilizing resources, organizing production/services and, finally, marketing them covering the risk with constant strive for growth and excellence.

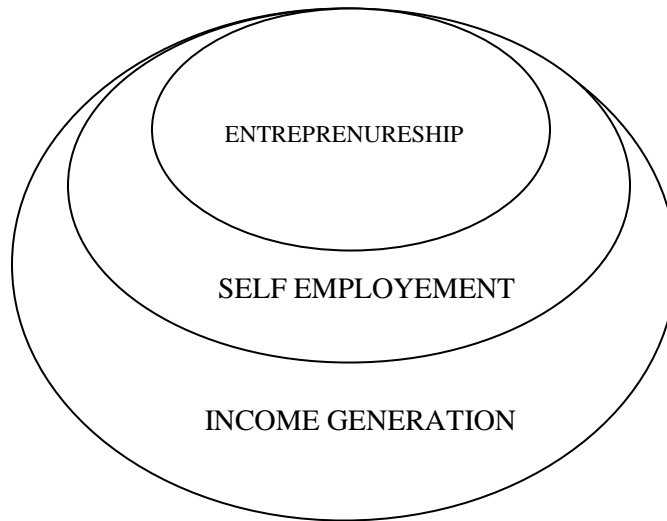
Stages in Growth

In the context of employment generation, the three terms i.e. entrepreneurship, self employment and income generation are often used interchangeably. Although there are a lot of commonalties among these concepts, yet the three terms are not the same. Self employment refers to full time involvement in one's occupation or pursuits in which one may or may not

have to take any risk to mobilize inputs and other resources to organize total production and services or to market the product and services. Income generating activities on the other hand are often part time and casual and practiced for the purpose of raising additional income. The functions of entrepreneurs, as explained earlier, suggest that all entrepreneurs are self employed and income generating persons. But all self-employed and income generating persons may not necessarily be self employed.

Accordingly, all the three may be useful means for employment generation but they all they in term of their scope and impact with others.

The three, however, can be viewed as initial, middle and terminal stages in entrepreneurship growth process.



Development Process

Experiences have shown that two major factors have played significant role in developing entrepreneurship. One of than is the development of human factor-the entrepreneurship himself, another major factor is the development of environment where entrepreneurial activities can flourish and grow.

The human factor refers to the attitude, desire and motivation of an individual, his capability to perceive the environment changes and opportunities as well as his ability to solve the problems which he likely to face. The training is effective in developing all these aspects of human factor provided it is planned well with balanced emphasis on all the aspects. Training has played crucial role for all such strategies in initiating and accelerating the process of entrepreneurship development. The Training targets, however, have been both entrepreneurs and promoters of self employment/entrepreneurship.

An analysis of the entrepreneurship development process (that helps in the emergence of people option for entrepreneurial career) reveals that it follows a sequence of development of individual personality, capabilities and abilities.

The first generation of entrepreneur requires developing:

- a) Entrepreneurial quality/motivation;
- b) Capability for enterprise launching/resourcing;
- c) Ability for enterprise management; and
- d) Sense of responsibility to the society the promotes/supports them.

a) Entrepreneurial quality motivation

Generally, we find people opt for wage earning career, society, by and large, spreads and popularize such orientation. Social institution such as the family as well as school more or less support development of qualities likes conformity and compliance which are not conducive to the growth of entrepreneurial values. As a result of this, creativity, risk taking perseverance, innovativeness and problem solving orientation which are some of the accepted entrepreneurial qualities are not encouraged. Whenever efforts are made to induct people to entrepreneurial career, such entrepreneurial qualities are generally found lacking or dormant. These are required to be aroused to an extent that people may start option for entrepreneurial career. This is a basic requirement and much needed force which drive people to their new ventures. Left to themselves such qualities and motivation will be developed in only very few. Accordingly, as part of the planned programme of entrepreneurship development, the inputs have to be thought out and administered effectively to ensure development of the minimum entrepreneurial qualities/ motivation adequate enough to drive them to entrepreneurial pursuits.

b) Capability of Enterprise Launching/ Resourcing

This opportunity exists in the society but not all of us are sensitive to it. Most of us in the society can perceive only the apparent and traditional openings for earnings. Similarly, resources are also available but very few make the efforts to make use of these. Together with economic insight for sensing opportunities in the area, prospective entrepreneurs may have to develop capability for selecting suitable project, formulating project report, arranging plant machinery etc. and availing facilities and resources relevant to the launching for their enterprises. These are to be developed through training interventions.

c) Ability of Enterprise Management

The enterprise may be small or big, but it demand good management abilities in its owner/ manager. Various factors of management such as production, marketing, financial management, etc. are crucial for enterprises. These have direct influence on the results and, are therefore,

necessary determinants for sustenance of an enterprise. The management inputs to the potential entrepreneurs also raise their expectancy for success. However, the intensity of these inputs may vary depending upon the size of enterprise that is selected by an entrepreneur/ self-employed person.

d) Social Responsibility and Entrepreneurial Discipline

The entrepreneurs who are developed and promoted at the social cost have certain responsibility to the society that promotes and supports them. The Government and other public institutions that invest on them also expect something in return. In order to sustain the efforts of developing entrepreneurship, it is necessary that a sense of responsibility towards the society in general and towards the entrepreneurial movement in particular needs to be developed among the potential entrepreneurs need to follow certain discipline which is useful for entrepreneurial career. Such discipline may cover subjects like repayment behavior, response to tax and statutory requirements, progressive outlook towards labour and above all care for ecology and environment. These aspects related to individual behavior, ability and capabilities follow a logical sequence of development which ultimately drives prospective youth to actual self-employment/ entrepreneurial career.

Developing Entrepreneurial Motivation

1. What is Motivation?

Motivation refers to the urge of drive in an individual towards a particular behavioural pattern. Motivation is why people do what they do.

2. What is Entrepreneurial Motivation?

Motivation in general is an important determinant for entrepreneurial growth. However under the broad spectrum of motivation, certain social motives have been found to be significantly related to entrepreneurial behavior such as a need for achievement, power, affiliation, dependency extension etc.

Among all these motives three categories of social motives, the need for achievement, power and affiliation are directly relevant for the development of entrepreneurship.

3. Achievement Motivation

Achievement Motivation or the need for achievement ('n Ach') is the 'urge to improve'. It is a desire and effort to accomplish something difficult. Also it is a disposition to achieve something excellent.

4. Significance of Achievement Motivation

It is responsible for economic growth of a nation

- essential ingredient of entrepreneurship
- major factor in assessing entrepreneurial awareness

II. The Need For Achievement (n.Ach):

Need for Achievement is the need to excel or to do well in a particular task indication are-

1. Competing with a self imposed objective standard.
2. Meeting or surpassing a self-imposed objective standard.
3. Seeking unique accomplishment.
4. Using feed back.
5. Taking Moderate, Calculated risks.
6. Involvement in advancing one's business- where the individual is involved in attaining a long term business goal.
7. Planning to overcome personal and environmental business or other obstacles.

II. The Need for Affiliation (n.Aff):

Need for affiliation exist when there is some evidence of concern about establishing, maintaining or sustaining affective relationship with others.

1. Concern for achieving goals related to group or community work.
2. Concern for restoring an affective relationship with others.
3. Concern about the disruption of a positive personal relationship.
4. Concern for people in the work situation.
5. Concern the people in spare-time activities.

III. The Need For Power (n.Pow):

Need for Affiliation exists when an individual's goal is to influence others. Indicators are-

1. Outperforming someone else, irrespective of any objection or self-imposed standard.
2. Showing strong concern thought powerful actions.
3. Doing things that arouse strong positive or negative emotions in others.
4. Demonstrating concern for reputation or position.

5. Achievement Motivation:

Achievement Motivation is a desire to do well. It is an inner feeling to do better.

Who is an achievement motivated person?

1. He who competes with his own goal.
2. He who competes with other.
3. He who wants to achieve something unique.
4. He who has long-term involvement with a quality goal.

Characteristics of a person with high need for achievement

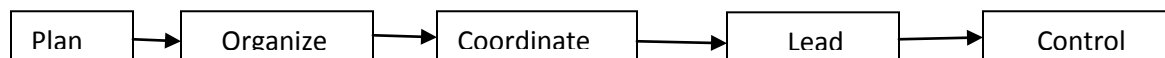
1. He likes to take personal responsibility
2. He like to moderate risk.
3. He wants to know the result of his efforts.
4. He tends to persist in the face of adversity
5. He tends to be innovative.
6. He demonstrates interpersonal competence.
7. He is oriented towards the future.
8. He strives to make each moment count.
9. He tends to be mobile.

Small Business Management

Management is the specific organ of our business enterprise whose purpose is to guide the organization towards achieving the goals of your firm. Management consists of two elements:

- i. A practical element, which means knowing the business profession, trade or service you are engaged in; and
- ii. A managerial element which can be defined as planning, organizing, Leading , Coordinating and controlling the activities of people working with you; and their equipment to achieve the stated enterprise goals.

The Process of Management: Consists of five main steps mention in (ii) above and shown in the diagram below:



- To Plan means to examine the future, set goals and determine how to achieve them.
- To organize means to arrange and assign work amongst people in the enterprise.
- To Direct or lead means to motivate others to perform the assigned task.
- To Coordination means to integrate and bind the activities and efforts of people to acjive enterprise goal ,
- To Control means to see that everything occurs as it should (as per plan) more detailed description of these terms follows.

Planning is the first of managerial functions. It consist of three logical steps

Setting objectives: Deciding what you want to achieve.

Outlining procedures: Deciding how you will achieve these objectives.

Responsibilities: Deciding what people and skills a needed to meet objectives.

PLANNING is a matter of answering question such as:

- What is to be done? (goals, result, objectives)
- What will it be done? (determine time frame)
- Where will it be done?(determine location)
- Who will do it? (Responsibility to individuals)
- How will it be done? (determine procedures and methods to achieve objectives and goals)

ORGANIZING is a process that also involves a number of steps:

- Determine all the work that needs to be done. It might be a list of all the activities that need to be performed in setting up and running a business unit.
- Dividing the work in a manner that it can be logically and comfortably be performed by individuals. Assign people to jobs according to their experience and qualifications. For example, a higher secondary pass with commerce can be assigned to handle cash and routine accounting entries. A commerce Graduate may be asked to handle books of account, Balance sheet and P/L accounts etc. A Chartered Accounts may be given the responsibility of arranging, managing and allocating Finance for the unit.

Aggregating the work means to put people, performing similar or related activities together in the form of a group or department, in the above example we could call it the Finance and Accounting Section.

Leading- By leading or directing, you are setting a direction for your enterprise so that all concerned work toward achieving organizational goals. As a good leader you should be able to identify and satisfy the needs of your employees and motivate them towards better performance. Your guiding philosophy should be “Do as I do”, not” Do as I say”!

Coordinating- Thought coordination you will ensure that there is no overlap of duties; No jobs are left done, and that the left hand knows what the right hand is doing.

Controlling- Though control, you continuously check actual results against desired results and make changes in work orders, methods or materials etc. This brings operations in line with plans.

KEY TERMS

Management: The process of planning, organizing, leading, coordinating and controlling the activities of people and using other resources to achieve them.

Planning: The process of setting goals and determining how to achieve them.

Organizing: Arranging resources, people, money, plant and machinery to put the plan into action.

Leading: Telling people what to do and why to do it.

Coordination: Ensuring no overlap of duties. Everyone should work together to achieve unit goals.

Controlling: Checking how the plan is working, Take action to put things right when they go wrong.

ENVIRONMENTAL SCANNING-SENSING BUSINESS OPPORTUNITIES

1. The Need.
2. Entrepreneur's perspective.
3. What is an opportunity available.
4. Process- Generating ideas –Short listing-Final Selection.
5. Steps in idea generation.
6. Factors for short listing.
7. Final Selection-Govt. Policy-SWOT Analysis
8. Types of product
9. Types of markets/customers.
10. Interplay of markets Survey and product Selection
11. Financial criteria.
12. Product Evaluation. (stability, Growth, Marketability, Enterprise related factors, production capability).
13. Other criteria

Steps in Setting up a Small Industrial Enterprise

The various steps involved in setting up a business enterprise will be most complex when it relates to an industrial unit. The step in setting up a small industrial enterprise shall be:

1. Deciding to go into business
2. Analysing Strengths/weaknesses
3. Product Selection
4. Market survey

5. Form of ownership
6. Location
7. Machinery and Equipment
8. Project Report
9. Finance
10. Power Connection
11. Installation of Machinery
12. Recruitment of Manpower
13. Raw Materials
14. Production
15. Marketing
16. Quality

1. Deciding to go into business: This is the most crucial decision a youth has to take, shunning wage-employment and opting for self-employment/entrepreneurship.

2. Analysing Strengths/weaknesses: Having decided to become an entrepreneur the young person has to analyze his/her strengths/weaknesses. This will enable him/her to know what type and size of business would be most suitable. This will vary from person to person.

3. Product Selection: The next step is to decide what business to venture into, the product or range of products that shall be taken up for manufacture and in what quantity. The level of activity will help in deciding size of business and form of ownership. One could generate a number of project ideas Through environment scanning , short list a few items , closely examine each one of these and zero on to a final product /s.

4. Market survey: It is easy to manufacture an item but difficult to sell. so it is prudent to survey the market before embarking up on production and satisfy the product chosen is in demand changes in product design required, determining demand supply gap, extent of competition, your potential share of the market , pricing and distribution policy etc.

5. Form of ownership: A firm can be constituted as proprietorship, partnership, limited company, (public or private) cooperative society etc. This will depend upon the type purpose and size of your business. One may also decide on the form of ownership based on recourses on hand or from the point f saving on taxes.

6. Location: This next step will be to decide on the place where the unit is to be located. Will it be hired owned? This size of plot and covered and the last one identified. This will be useful in determining the machinery and equipment to be installed.

7. Machinery and Equipment: Having chosen the technology, the machinery and equipment required for manufacturing the chosen product/s have to be decided, suppliers identified and then

costs estimated. One may have to plan well in advance for machinery and equipment especially if it has to be procured from outside the town, state or country that is, have to be imported.

8. Project Report: The economic viability and technical feasibility of the product selected has to be established through a project report. A project report that may now be prepared will be helpful in formulating the financial, production, marketing and management plans. It will also be useful in obtaining finance, shed, power, registration, raw material quotas etc.

9. Finance: Money is no problem for setting a small scale industry. But an entrepreneur has to take certain steps and follow specific procedures to obtain it. A number of financial agencies will give loans on concessional terms. Under TRYSEM and SEEUY Schemes entrepreneurs are also eligible for subsidies which avoid the need for margin money.

10. Power Connection: The site chosen should either have adequate power connection or this should be arranged now.

11. Installation of Machinery: Having arranged finance, work shed, power etc. the next step is to procure the machinery and begin its installation.

12. Recruitment of Manpower: Once machines are installed manpower will be required to run them. So the quantum and type (skilled, semi-skilled, unskilled, administrative etc.) of labour have to be determined, sources of getting desired labour identified and labour/staff recruited. Possibly, the labour has to be trained either at the entrepreneur's premises or in a training establishment.

13. Raw Materials: The labour will require raw materials to work upon the installed machines. The raw materials required may be available indigenously or may have to be imported. Government agencies can assist if the raw materials required are scarce or imported.

14. Production: The unit established should have an organizational set up. That is, the structure of the man power proposed to be employed must be determined. This ensure smooth and effective running of the unit . There should not be any wastage of man power; material or machine capacity installed. If the items produced are exported then the product and its packing must be attractive. Production of the proposed items should be taken up in two stages.

- a) Trial Production
- b) Commercial Production

Trial production will help teaching problems confronted in production and test marketing of the product/s. This will reduce chance of losses in the eventuality of mistakes in project conception. Only after successfully launching the product at test market stage should commercial production be commenced.

15. Marketing: Having manufactured the product, the stage comes to sell it. This is called marketing. Various aspect like how to reach the customer, distribution channels, commission structure, pricing, advertising/publicity etc. would have already been decided upon at market survey/ project formulation stage.

Like production, marketing should initially be attempted continuously, that is, in two stages:

- a) Test Marketing.
- b) Commercial marketing

Test Marketing will save the enterprise from going into disrepute just in case product launched is not well accepted in the market. It will also assist in carrying out modification/ characteristics/ feature of the product.

Having successfully test marketed the product/s commercial marketing can be undertaken.

16. Quality: After or, at times, before marketing the product, quality certification like BIS, 'Q' mark, Agmark, 'Del-in' etc. depending upon the product/s the entrepreneur should evolve his/her own quality control parameters. Quality, after all, ensures long-term success.

Market Survey & Analysis

1. Introduction

The objectives of all project activity is optimization of sales with a view to maximize profits. A product that is manufactured must be sold, for production without adequate sales is an invitation to loss of money as well as morale. The absence of sales, or its inadequacy, may also result in the disruption of the production-sale-profit chain due to blockage of space, finances and goods. Further, it is not enough to merely sell; the sales must be profitably made Sales organized to match production, must be gain fully done, otherwise it may result in financial loss to the company. The volume and the price of sold products thus must be such as to produce a profitable relationship between production and sales.

To be able to project the desired volume of sales, at the desired price level, one must, however, know and understand the market in which the sales are likely, or are programmed, to take place. The knowledge of the market arms the entrepreneur with relevant data, Which may be useful in forecasting the probable sales levels and in formulating the desired market strategy. It is this knowledge of the market, its nature, its conditions and the trends, that market survey may provide.

Market survey is a survey of the market, present or potential, to find out what goes on in the market that may be relevant for the marketing of company products. It is "the survey of the market to find the supply and demand of a particular product, its equivalents and substitutes,

along with the price, specifications and other related aspects that are likely to determine or affect its supply or the demand, present or prospective'. It is not merely the gathering of information, or the collection of data from any market place, but a systematic survey of the relevant and concerned market, with a view to obtain relevant and related information concerning sellers, buyers and consumers of products. It is not only concerned with the nature and characteristics of similar products, their prices, specifications and quality, but of all competing products, equivalents and substitutes, whose presence or entry in the market is likely to affect the company product performance. A market survey is thus a systematic and organised collection of all information about products in the market, and often conditions prevailing there in, necessary to provide a fair idea about the availability and consumption of particular products and services to enable the company to fix its marketing objectives and plan its marketing operations.

A market survey is a necessary element of any project, and its knowledge an essential feature for the success of any industrial venture. A project report attempts to establish the economic viability of the proposed project, which in turn is based on sales volume- price relationship. And the selling competence & capacity of an entrepreneur can be effectively enhanced through a comprehensive knowledge of his present or prospective market. A good market survey is, more often, than not, a prerequisite for a successful project.

2. Survey Objectives

A market survey may have any, or all, of the four following objectives:

1. To mirror the market and its conditions;
2. To prepare the company for emerging situations;
3. To fulfil the survey mission; and
4. To establish the product marketability.

(1)To mirror the market: The basic objective of a market survey is to mirror the market. It attempts to present a company with a reliable and accurate picture of those conditions of features in the market which the survey is undertaken. An objective appreciation of the market conditions is inherent in such an effort.

(2) Preparing for emerging situations: The second objective is to prepare the company for emerging situations, by forecasting market trends. Market conditions are never stagnant; they change often offering opportunities, for advancements or leading to depressions. A market survey attempts to predict the likely happenings, so that a company could ready itself to meet the situations

(3) To fulfil mission: The third objective is to fulfil its mission concerning any of the marketing aspects with which it is charged. A company may like to obtain reactions to its products or services, or it may decide to know about the impact of its consumer-credit policy. The survey

attempts to collect relevant and adequate data, to authoritatively comment on such business matters.

(4) Establishing marketability: And the fourth objective is to establish the saleability of the product or services proposed to be undertaken under the project. The market survey finds the demand supply gap, or the likely unfilled demand in future, and thus provides the basis on which the project may be undertaken. If a product cannot be sold, the project may not be saleable.

In the course of business, a company may propose to have an assessment of any, or many, of the following aspects:

1. General market condition and trends;
2. Available products, their characteristics and potential
3. Demand and supply situation and gap;
4. Experiences of company products and services;
5. Performances of company sale strategy and efforts;
6. Consumer or client response; and
7. Miscellaneous matters concerning marketing.

Without a good and reliable understanding of market conditions and trends; it may not be possible to foresee the future potential of demand, and to forecast the future performance of company products. Without a sound knowledge of the nature, character and behaviour of competing products in the market, and their prices quality and range, it may not be possible to decide a sales strategy effective enough to counter the market competition.

Without a fair information of demand and supply situation in market, and the factors, that effect, or are likely to affect, the market mechanism, it may not be feasible to make an assessment of the market potential and the market share that the company may be able to harvest for its products. A knowledge and understanding of the market thus is one of the important objectives of a market survey.

A market survey may also be undertaken to make an assessment of company's performance in the market. Without a periodical appraisal of the distributional arrangements it may not be possible to know about the reason for shortages in some places and surpluses in some, nor to tone up the organisational net work.