MODULE 1

Management

Definition

1. George R Terry, management is distinct process consisting of planning, organizing, actuating & controlling performance to determine & accomplish the objectives by the use of people & resources.

2. Management is that function of an enterprise, which concern itself with the direction, & control of various activities to attain the business objectives.

Nature & characteristics of management

1. Management is an activity: Management is a process of organized activity, which is concerned, with the efficient use of resources of production. Resources include materials, money & people in the organization.

2. It is a purposeful activity: It is concerned with the achievement of an objectivity these functions such as planning, organizing, staffing, directing & controlling

3. It is concerned with the efforts of a group: management is concerned with management of people & not the direction of thugs. It inspires & motivates works to put forts their efforts to the maximum extent.

4. Management is getting things done: Management is the art of getting things done their & with people in formally organized groups.

5. It applies economic principles: Management is the art of applying the economic principles that underlie the control of men & materials in the enterprise under consideration.

6. Involves decision-making: Management in the decision making process & the decisions are involved in all the functions of management.

7. It Co-ordinates all activities & resource: It is concerned with the Co-ordination of all activities & resources it's various functions to attain the stated objectives.

8. It is a universal activity: It manager irrespective of the enterprise in which they are working & their place in the organization shuttered make use of the management principles.

9. IT is an integrating process: It integrates men, machines & materials for carrying out the operations of the enterprise & for achieving the stated objectives.

10.It is concerned with direction & control: It in concerned with the direction & control of various activating the enterprise to attain the business objectives.

11.It is intangible: It is abstract & cannot be seen with the eyes. It is evidenced by the quality of organization & results such as increased productivity.

12.Management is both science & an art: It has developed certain principle & laws which are applicable of to any group activity.

13.It is a proffers ion: Because there are established principles of management which are being applied in practice.

14.It is an interdisciplinary approach: Management as a body of discipline takes the help of other social sciences.

15. It is an economic resource: There are five factors of production land, labor, capital, management. The entrepreneur establishes the organization as owner & it is the management which transforms these resources these in to productive process.

16.It is a system authority: As management is a process of directing men to perform a task, authority to extract work from others, it is implied in the busy concept of management.

17.It is dynamic, not static: Management adopts itself to the social changes & also introduces in methodology.

Objectives of Management

1. Proper utilization of resources: the main objective of management is to use various resources of the enterprise in most economical way. The proper use of men, machines, money will help a business to earn sufficient profits to satisfy various in assets.

2. Improving performance: Management should aim at improving the performance of each & every factor of production. The fixing of objectives of various factors of production will help them in improving their performance.

3. Mobilizing best talent: The management should try to employ person in various fields so that better results are possible. The employment of specialists in various fields will be increasing the efficiency of various factors of production. There should be a people environment which should encourage good persons to jay the enterprise.

4. Planning for future: No management should feel satisfied with today's work if it has not thought of tomorrow future plans should take in to consideration what should we do next. Future performance will depend upon present planning.

Scope of management

Management is an all pervasive function since it is required in all types of organized Endeavour. The following activities are covered under the scope of management

1. Planning
2. Organization
3. Staffing
4. Directing
5. Co-coordinating
6. Controlling

Administration V/S management

Administration is different from management: Admin is higher level activity while mar is a lower level activity. It is concerned with the determination of overall objectives & policies of the enterprise while management with planning, coordinating & controlling of business activities for attaining the enterprise objectives. Admin is part of management: management is the generic term for the total process of an executive control involving responsibility for effective planning & guidance of the operations of an enterprise. Administration is the part of management which is concerned with the installation & carrying out of the procedures by which the program me is laid done & communicated & progress of activities is regulates & checked against plans.

Basic difference	Administration	Management
Nature of work	It is primary concerned with determination of objectives & polices It is thinking function	It is dues the implementation plans & policies, Doing function.
Scope	It takes major decision	It takes the decision within frame work of administration.
Level of authority	IT is a top level function	Lower level function
Status	It consist of owners of an enterprise	It consists of managerial personal with specialize knowledge who may be employees.
Nature of organization	It is used in relation to good military, educational & fuliginous organization.	It is making in business forms.
Influence	Its decisions are influenced by external factors such as social, political labor	The influence by internal factors such as values, beliefs, opinions.

Roles of management

Manager is any organization plays variety of roles responding to a particular situation. The three important roles played by a manager are interpersonal roles. Decision roles & information roles.

a) **Interpersonal roles:** These includes figure head, leader & liaison roles in the figurehead role, the manager perform some duties that are casual & informal ones like, receiving and greeting visiting dignitaries, attending to social functions of employees entertaining customers by offering parties & winches etc. As a leader manager motivates direct & encourages his subordinates He also reconciles the needs with the goals of the organization.

b) **Decision roles:** There are four decision roles played by a manager. They are resource provider arbitrator entrepreneur & negotiator. As a resource allocator, the manager divides the work, provides required resources & facilities to carry out the allocated work and delegates requires authority among his subordinates He decides who has to do what & who gets what. As an entrepreneur, a manager continuously looks for new ideas & lies to improve the organization by going along with changing work environment. He also acts as a negotiator negotiates with employees & lies to resolve any internal problems like trade agreements strikes & grievances of employees.

c) **Information role:** A manager plays as monitor, spokesman and disseminator. A manager monitors his environment & collects information their personal contacts with colleagues & subordinates. As a spokesman, he communicates the information/goals of organization to his staff& the progress of work to his superiors. He also communicates the performance of company to shareholders & the rules & responsibility to his subordinates. As a disseminator, the manager passes some of the information directly to his subordinates & to his bosses. Manager is any organization plays variety of roles responding to a particular situation.

Level of management

Top management	Middle management	Supervisor management
Board of directors	Departmental heads	Senior Supervisor
Chairman	Decisional heads	Immediate Supervisor
Chief Executive	Schlock heads	Front Line Supervisor

The process of dividing authority & responsibility among the various executives is called the creation of level of management.

Top management: Head of organization

Functions of Top Management

- Determine objective of the organization. They relate to profit, business growth, survival, prestige, competitive pricing, marketing method.
- Frame the policy: To frame policies & check out plans to carry out the objectives & policies, policies may relate to different aspects of the organization.
- Organizational frame work: Top management determines the organization structure for the purpose of executing the plans
- Assemble the resource: Execute the plans; the resources of men, machines, materials & money have to assemble.
- Control the operations the organization: Top management also controls operations their budget cost & statistical quality control & accounting device.

Middle management: It consists of departmental divisional or sectional heads other executive officers attached to the different departments. This department is responsible for implementing policies & plans decided by management.

Functions of Middle Management

- To execute the various functions of organization so that the top management gets enough time to look after their responsibilities.
- To cooperate among themselves, with the top management & the supervisors so that the organization functions smoothly

- To achieve coordination between the different parts of organization
- To develop & train employers in the organization for better functioning & for filling up vacancies that may arise in future.
- To build company spirit where all are working to provide a product or service wanted by consumer.

Supervisory management: It consists of senior supervisors. The executives at this level are in direct touch with the workers & have to see the work is properly carried out. The effective implementation of the plans & policies, the quality of coordination ship quality of output & overall success of the organization very much dependent on the hard labor, discipline, loyalty of the personal at this level of management.

Functions of supervisors

- To issue order & instructions to the workers & to supervise & control their work.
- To plan activities of the section.
- To assign jobs to the workers
- To direct & guide the workers about work procedure.
- To arrange for the necessary tools, equipment, material etc.
- To solve the problems of workers
- To maintain discipline among the workers & to develop them the right approach to work.
- To inform the management about the problems of workers which are not solved at this level?
- To maintain good human relations.
- To build a high group morale among workers.

Planning

Planning: It is the scientific direction to managers to move is a direction by which objectives will be met with ease.

Uses:

1. minimizes the risk, reduces uncertainties surrounding business conditions.
2. Increases the degree of success
3. It establishes Co-ordinate effort in the organization.
4. It helps managers to organize people & resources properly. While planning - managerial function should be performed first.

How to plan:

1. Profit thinking & analysis of information.
2. Predetermined curse of action.
3. Objectives to be attained in the future.
4. Study of alternative courses.
5. Involves decision making.
6. Try to achieve better results.
7. Continuous process & integrated work.

Nature or characteristics of planning

1. Focus in objectives: Plan starts with setting up of objectives long term & short term objectives should be prepared. The main aim is to utilize the financial resources in the best possible manner. & take the best advantage of prevailing economic situation.
2. It is important in developing procedures to ensure consistency of actions. The procedures follow the formulation of policies & strategies etc.

3. It is an intellectual process: The intellectual process requires mental exercise, fore suing future developments, making forecasts & the determination of the best course of action.
4. Planning is a selective process: It involves careful study of analysis of various alternative courses of action. For alternatives to decide & make decision it requires to know what is to be done. How it is done, when it is to be done & by whom it is done.
5. Planning in pervasive: which is an activity to cover all the levels of enterprise. In the levels of management, the top level is concerned with strategically planning, middle & the cover are concerned with administrative & operational planning.
6. Planning is integrated process: It involves not only determination of objectives to formulate sound policies, programmer, procedures & strategies for the meeting these objectives.
7. Planning is directed towards efficiency: Planning is basically to increase the efficiency. Good plan is will give maximum output & profit at minimal cost. Planning is foundation.
8. Planning is flexible: Planning should be adaptable to the changes in the environment Kuntz & o, Donnell emphasizes on effective planning which requires continual checking on events & forecasts and redrawing of plans to maintain a course towards designated goal.
9. First function in the process of management: Planning is important filled of the process management. Manager takes the responsibility to organize staff direct & control them without planning.
10. It is a decision making process: Decision making is an integral part of planning; it is defined as the process of choosing among alternatives.

11. It is a continuous process: The manager should constantly monitor the progress of his plans. The must monitors within & outside the organization to determine if changes are required in his plans.

Essentials of Good plan

1. Clearly defined objective.
2. Simple
3. Comprehensive
4. It should be rationale & appropriate.
5. It should provide proper analysis & classification
6. It must be flexible.
7. Balanced
8. It must use all available resources & opportunities to the utmost before creating new authorities of new resources.
9. It should be flue from social & psychological biases of the planners as well as subordinates.
10. These should be proper co-ordination among short term & long term plans.

Advantages or benefits of planning.

The following points emphasis the importance & benefits.

1. Planning offsets future uncertainty & change
2. It helps manager in carrying out the future course of action & brings degree of certainty & order into the organization than would be present without planning.
3. It tackles increasing complexity in modern business. People in different field of specialization are required for running a business with complex machine.

4. It helps in co-ordination. Refined objectives well published policies, programmers & procedures help the management in the Co-ordination process.
5. It helps in exercising effective control
6. It helps in determine advance of the work done, person responsible to do it. The time to be taken to do the work & the costs incurred.
7. It helps in the proper utilization of companies resources:
8. It involves deciding in advance of what is to be done, where & by whom it is to be done.
9. It facilitates unity of action:
10. Under planning, policies, procedures & programmers are predetermined & every decision & action should be within the frame work of predetermined policies & procedures & programmes.
11. It helps in a rounding business Failures, Unity of action, Coordination of activities, economy in operation & offsetting of future uncertainty & change will avoid business failures.
12. Focuses attention on organization goals
13. Easy to apply & coordinate the resources of the organization more efficiently.
14. Improves competitive strength
15. It facilitates in discovering new opportunities & there by shape its own future.
16. Improves adaptability
17. It helps in coping up changing environment by anticipating the future events &b changing conditions prepare the organization to meet then & manage efficiently.
18. Guides decision making: It involves making a choice from the various available alternatives.
19. Secures economy in junction: It involves selection of the most profitable course

of action after evaluating the alternatives.

Disadvantages

1. Limitations of forecasts: because the information data available are not reliable. It cases the stab.
2. Rigidity: It restricts individual freedom, initiative & desire for creativity because of predetermined policies.
3. Time-consuming: IT takes time & hence delays action. It make it realistic sufficient time should be given to planning process.
4. Costly: It exercises lot of money for preparing estimates, collecting information & facts for analysis.
5. Influence of external factor: Like natural calamities, break-out of war, changes in political & economic situations limits the effectiveness of planning.
6. Limited scope: For organizations to change rapidly planning is limited especially for those engaged in publication of text books & fashionable articles manufacturing industry.
7. People's resistance: A new plan is simply not executed because of unwillingness or inability of people.

Planning process

Various steps:

1. Awareness of opportunities of problems:

    a. What business opportunities or problems are likely to come?
    b. What are the plans for exploiting the opportunities?
    c. Whether it is necessary to devise a new plan or is it sufficient to execute existing plan.
    d. By making changes in the plan, what is the benefit to the organization?

2. Collecting & analyzing information

To collect the information & data related to planning should be made & analyzed.

3. Determination of objectives:

Analysis & interpretation of data facilitates in determining the enterprise objectives. Objectives should be specific & clean.

4. Determining planning premises & constraints

Premises are planning assumptions on the basis of which planning takes place. Some premises like population growth & political environment are uncontrollable while some degree of control can be exercised on the technology used. Some constraints like government control affect the plans.

5. Finding out the alternative courses action

For every plan there are number of alternatives & hence all possible alternatives to work out a plan for achieving the desired objectives should be found out for then evaluation.

6. Evaluation of alternatives & selection

Alternatives are in reference to cost, speed, quality & select best course of action.

7. Determining secondary plans

This is to support the basic plan. For example, a number of secondary plans for purchasing of raw materials, acquisition of plant & machinery & aiming of workers have to be prepared for successful operation of the basic plan.

8. Securing participation of employees.

The successful execution of plan depends on the extent of Co-operation of the employees. Management involves employees in planning the communication.

Steps in planning:

- Step-1 Stating organizational objectives
- Step-2 List the alternative channels of reacting the objectives
- Step-3 Develop premises on which each alternative is listed
- Step-4 Select the best alternative which first in to organizational objectives.
- Step-5 Prepare a sound plan out of selected alternative This will be a master plan which contains various functional Plans.
- Step-6 Implement the designed plan

Types of plans

Planning can be classified in different forms.

1. Time

- Long range planning
- Medium range planning
- Short range planning

2. Managerial level

- Strategic
- Administrative
- Operational

3. Repetitiveness of operations

- Standing plan
- Single use plan.

4. Scope.

- Company wise or master plan
- Functional or departmental plan

A. Standing plans are to be used over & again to lead to the development of policies, procedures, methods, rules and strategies.
B. Single use plans are used in specific situations only to produce programmer & budgets.

Classifications based ·on the Scope and Degree of Details

Based on the scope & details, planning can be classified into 3 categories as follows

Strategic plans

Planning premises:

Planning premises are certain assumptions about the future on the basis of which the plan will be ultimately formulated planning premises are chital to the success of planning as they supply pertinent facts & infrastructure relating to the future such as Population trends general economic conditions, Production costs & pries, probable competitive behaviour, capital & material availability, Government control & so on.

Decision-making

Decision – making can be defined as the selection based on some criteria of over behaviours choosing alternative from two or more possible alternatives. To decide means to cut off or in practical content to come to a conclusion.

Importance of decision-making

Decision making permeates the all managerial functions management & decision-making are inseparable activities managers use the tool of decision-making for discharging their duties Decision-making is an importance tool in the management functions of direction & central. In direction, decisions relate to determine the course of action, deciding the type of motivation deciding the order & instructions to given, whereas inaction control, the decisions relate to deciding of standards control points procedures etc.

Decision-making is necessary in a business concern because there are many alternative courses of action to most business situations. For instance, for establishing a business, the entrepreneur may salute one of the forms of organization.

All management functions such as planning, organization direction & control are settled by managers with the tool of decision-making.

Classification of planning premises

1. *Internal & external premises*

Premises may exist within & without the company. Premises include forecasts, Policies & programmer of organization, capital investment in plant & equipment competence of management skill of the lab our forces;

- External premises are classified as baroness environment,
- Factors which influence the demand for the products of the enterprise
- Factors which affect the resources available to the enterprise.

2. *Tangible & intangible premises*

Tangible are those which can be quantitatively measured while intangible premises are those which being qualitative in character cannot be so measured.

3. *Controllable & non-controllable*

Planning premises are controllable some these one non- controllable Because of pressure of uncontrollable factors there is need for the organization to revise the plans periodically in accordance with current developments uncontrollable factors are strikes was natural calamities, emergency, legislation.

MODULE 2

RESOURCE MANAGEMENT

The basic objective of resource management is to supply and support the field operations so that established time objectives can be met and costs can be kept within the construction budget.

The completion of a construction project at maximum efficiency of time and cost requires the judicious scheduling and allocation of available resources. Manpower, equipment, and materials are important project resources that require close management attention. The supply and availability of these resources seldom can be taken for granted because of seasonal shortages, labour disputes, equipment breakdowns, competing demands, delayed deliveries, and a host of associated uncertainties. Nevertheless, if time schedules ·and cost budgets are to be met, the work must be supplied with the necessary workers, equipment, and materials as they are needed on the job site.

MANPOWER

It is estimated that the labour costs constitute from 25 per cent of the production costs to 40 per cent of the selling costs in manufacturing enterprise. The advantages of proper and efficient manpower are as follows:

1. It helps in discovering talented and competent workers and developing them to move up the corporate ladder.
2. It ensures greater production by putting the right man in the right job.
3. It helps to avoid a sudden disruption of an enterprise's production run by indicating shortages of personnel, if any, in advance.
4. It helps to prevent under-utilisation of personnel through overmanning and the resultant high labour cost and low profit margins.
5. It provides information to management for the internal succession of managerial personnel in the event of an unanticipated turnover.

MANPOWER PLANNING

Manpower planning is the process by which a firm ensures that it has the right kind of people and the right number of people at the right places at the right time, doing work for which they are economically most useful.

From this definition it is clear that manpower planning is a vital tool in the hands of management to control labour costs by avoiding both shortages and surpluses of personnel in an organisation. In large organisations, this function is performed by the personnel department.

CLASS OF LABOUR

In India, traditionally the construction industry has been labour intensive as the labour is cheap and easily available. In general, there are three categories of manpower involved in this industry consisting of the skilled/semiskilled, unskilled and managerial/technical workers.

A construction activity is a very complex process, made up of many different systems, such as the structural system, exterior enclosure system, and HVAC system. These systems can be broken down into many more subsystems and sub subsystems. In this way, a construction project is divided into numerous work packages. These work packages can then be assigned to and completed by an individual worker or a crew. A crew is a team of workers, which can be of the same trade or a composite of many different trades. Due to the diverse nature of the different tasks associated with all the building systems, many types of craftsmen from many different trades are required in a construction project.

IS 10302: 1982, Indian Standards on 'Unified nomenclature of workmen for civil engineering, published by its Construction Management Section. Committee includes around 95 categories of labours. The trade categories and crew sizes used for determining construction output also varies with various agencies publishing output planning norms.

List of types of workers that can be involved in a construction project are as follows

BUILIDING TRADERS

Carpentry Work

1. Shuttering carpenter
2. Furniture carpenter
3. Wood Polisher
4. Carpenter helper

Masonry Work

1. Concrete helper
2. Masonry Work
3. Concrete mason
4. Blockwork and plaster mason tiling mason
5. Marble mason
6. Mason helper

RCC Steel Work

1. Rebar fabricator
2. Rebar helper

Painting Works

1. Painter
2. Painter helper

Electrical works

1. Electrician
2. Cable jointer
3. Cable layer
4. Electrical helper

Plumbing and Sanitary Works

1. Plumber
2. Pipe fitter
3. Plumber helper
4. Unskilled Workers
5. General helpers

Mechanical Trades

1. Fitter
2. Machinist
3. Welder
4. AC mechanic
5. Sheet fabricator
6. Diesel mechanic
7. Auto electrician
8. Diesel mechanic
9. Petrol mechanic
10. Mechanic helper
11. Riggers

Drivers and Operators

1. Light vehicle drivers
2. Heavy vehicle drivers
3. Equipment operators

WAGES AND STATUTORY REQUIREMENT

Construction workers constitute one of largest categories of workers in the unorganised sector. The workers are hired as and when required and are retrenched on completion of the work. Construction labour leads a migratory life working on different sites. The economic conditions of construction labour is the worst on account of their poor bargaining power, illiteracy and the temporary nature of their employment.

Construction workers have no job security and are last trained. Although industrial training institutes have been set up in our country, their contribution towards training of construction workers is not enough. Construction workers are paid very low wages.

There are two methods of making wage payment to labour, namely the time rate system and the piece rate system. In the time rate system, a suitable rate of payment is fixed per unit of time for which labour is engaged on the work. In the piece rate system, payment is based on output or production of the work. In this system, payment is made at the agreed rate· for the actual quantum of work carried out by each labourer.

A number of trade unions are connected with the construction industry. These trade unions include the following:

1. All India Trade Union Congress (AITUC)
2. Indian National Trade Union Congress (INTUC)
3. Bhartiya Mazdoor Sangh (BMS)
4. United Trade Union Congress (UTUC)
5. Hind Mazdoor Sabha (HMS)
6. Centre of Indian Trade Unions (CITU)

The Trade Unions Act of 1926, as amended in 1987, conferred a legal and corporate status on registered trade unions and in certain respects defines the law relating to trade unions. This Act specifies certain activities as unfair practices on the part of recognized unions and certain other activities as unfair on the part of the employers.

The Labour Welfare Fund Act of 1965 was enacted to provide for the constitution of a fund to finance activities for promoting welfare of labour and for conducting such activities. The Labour Welfare Fund comprises of all fines realised from employees, unpaid wages of the workers including gratuity, bonus etc., grants and loans towards the fund and voluntary donations. The fund is used to carry on various activities conducive to the welfare of labour

The Payment of Wages Act of 1936, as amended in 1982, provides the regulation for payment of wages to certain classes of persons employed in industry anywhere in India. Wages refer to the remuneration which is paid by the employer to the employee in lieu of the services provided by the latter engaged in a production or related process. The Payment of Wages Act, 1936 defines wages as all remuneration (whether by way of salary, allowances or other-wise) expressed -in terms of money or capable of being so expressed which would, if the terms of employment, expressed or implied, were fulfilled, be payable to a person employed in respect of his employment or of work done in such employment.

The Minimum Wages Act, 1948 provides for fixation/ periodic revision of minimum wages in employments where labour is vulnerable to exploitation. The minimum wages system serves a useful purpose in preventing worker’s exploitation in terms of payment of unduly low wage and helps in reducing inequalities in the standard of living of different social groups of workers by statutorily prescribing minimum wage rates.

The main provisions of the Minimum Wages Act 1948 are as follows:

- Different minimum rates of wages may be fixed for:
    a) different classes of work in the same scheduled employment,
    b) adults, children and apprentices,
    c) different states and different localities.
- In fixing minimum rates of wages, advisory committees are set up which collect detailed information such as the cost of living index on which the minimum wage is based.
- If an employee is employed on any day for a period less than the required number of hours constituting a normal working day by the employer, he shall be entitled to receive a full day's salary except when the employee is unwilling to work for the full period.
- The minimum wages under this Act shall be paid in cash.to the employees with due notification.
- Every employer shall maintain a register indicating particulars of employees, wages paid to them and receipts given by them etc.
- The appropriate Government may employ suitable persons as Inspectors for the purposes of this Act.

The Workmen's Compensation Act of 1923, as amended in 1948, provides for payment of compensation to workmen for injury by accidents sustained during the course of employment. The Act covers· workers employed in hazardous jobs but does not include clerical and administrative staff.

The Contract· Labour (Regulations and Abolition) Act of 1970, as amended in 1986, was enacted with the object of regulating the employment of contract labour in certain establishments and providing for abolition 9f contract labour in certain circumstances. The Act incorporates provisions for improving the condition of contract labour. The Act is of special importance to the construction industry wherein works are generally executed on contract basis involving contract labour.

LABOUR PRODUCTION RATE OR PRODUCTIVITY

Productivity may be defined as the rate of transformation-of inputs into outputs in a productive operation.

In order that we may produce a product or provide a service, we must have resources in the forms of men, machine, materials, money etc. In a broad sense, productivity means goods and services produced in relation to the resources utilised in producing the same.

Labour productivity may be defined as the ratio of output and labour input. In other words, it is the productivity of an industry measured in terms of labour input. For the purpose of productivity analysis, the average product, rather than marginal, is considered relevant because the latter fails to reveal the actual and potential level of productivity in their representative character.

The input of labour may be taken as number of workers or man-hours worked during the period. This ratio may be computed for one worker or group of workers in a unit of work or for the plant as a whole depending on the need.

There is another way of measuring labour productivity. For a given worker or group of workers doing a job, the enterprise fixes certain target volume of output in a given day or period. The actual volume of output produced by the workers during that period is compared with the target or standard volume of output for assessing labour productivity. 1bis is a simple way to measure labour productivity, but it is not conforming with the definition of labour productivity as given above. In fact, this is a way to measure total productivity of the workers and not of the labour productivity alone.

FACTORS AFFECTING LABOUR OUTPUT OR PRODUCTIVITY

There are many factors that affect the productivity of labour in construction.

Here are some of the most recognized factors affecting labour productivity in the construction industry:

1) *Overtime:* Scheduling of extended work days or weeks exceeding a standard eight-hour work day or 40- hour work week lowers work output and efficiency through physical fatigue and poor mental attitude.

2) *Morale and Attitude:* Spirit of workers based on willingness, confidence, discipline, and cheerfulness to perform work or tasks can be lowered due to a variety of issues including increased conflicts, disputes, excessive hazards, overtime, over-inspection, multiple contract changes, disruption of work rhythm, poor site conditions, absenteeism, unkempt workspace, and so on.

3) *Work complexity:* A simple, familiar work, is easier to execute than an unfamiliar, complex one. The extra effort needed for the latter type of work, especially in the initial stages, may range from 10-100% of the normal expected productivity.

4) *Repetition of work:* While the first-time execution of an unfamiliar work needs extra effort and results in low output, the skill acquired in the process, when utilized over a period of time to execute similar works, improves productivity rate.

5) *Quality control:* Stringent quality control is sensitive projects, like in the construction of a nuclear reactor calls for frequent inspections, which involve elaborate documentation and is a time consuming task. They increase the non-productive time of workers and, in turn, reduces productivity by 10-25%.

6) *Equipment-intensive tasks:* The construction equipment executes works speedily, but it needs operators. The equipment-intensive tasks are less susceptible to productivity changes than the labour-intensive ones.

7) *Supervision:* An efficient and effective supervisor can get a higher productivity from labourers.

8) *Dilution of Supervision:* This occurs when supervision is diverted from productive, planned, and scheduled work to analyse and plan contract changes, expedite delayed material, manage added crews, or other changes not in the original work scope and schedule. Dilution is also caused by an increase in manpower, work areas, or project size without an increase in supervision.

9) *Labour availability:* The labour productivity also depends upon the employment opportunities available in the market. If jobs are plenty and labour is scarce, the labour productivity tends to become less. In scarce job situation, the overall productivity improves since the employers can then sort out labour with a light productivity.

10) *Mobilize/Demobilize:* This relates to moving resources on and moving off to projects as a result from changes or delays, causing work disruptions. Productivity may drop during these periods as time is lost when crews move from one area or work assignment to another.

11) *Errors and Omissions:* Increases in errors and omissions impact on labour productivity because changes are then usually performed on a crash basis, out of sequence, cause dilution of supervision, or any other negative impacts.

12) Start/Stop: This results from a work stoppage or suspension of work, which may cause a break in the schedule, usually triggering a start/stop of work activity. Stop-starts can have an impact on productivity and cost of a project.

Work scheduled or reassigned during holidays such as Festivals, New Year's, and so on are often impacted with stop-starts. Workers tend to discuss the time off and lose previous momentum with a drop in productivity before they get back in routine.

13) *Site Access:* This is a result of interferences to the convenient or planned access to work areas. This can be due to blocked stairways, roads, walkways, insufficient man-lifts, or congested work sites.

14) *Hazardous Work Area*: This is caused when working in an area that is classified as hazardous, requiring special safety equipment and clothing. Restrictions may limit time and exposure of workers to the area, resulting in less time on tools in the area.

15) *Climatic and weather conditions:* Performing work in a change of season, temperature zone, or climate change resulting in work performed in either very hot or very cold weather, rain or snow, or other changes in temperature or climate can impact workers beyond normal conditions. Since construction projects are. spread over several months or even years, it is necessary to adjust the effect of weather changes month-by-month on worker’s productivity as well as work execution.

16) *Role of management:* The project management has a key role to play in planning and controlling productivity. It.is responsible for specifying the weekly target of work to be accomplished by the workers as well as how the works are to be executed and using which resources.

CONSTRUCTION EQUIPMENTS

Construction equipment's are one of the very important resources of modem construction, especially in infrastructure projects. Such projects utilize equipment's for most of the works including earthmoving operations aggregate production, concrete production and its placement, and so on. In fact, one cannot think of any major construction activity without the involvement of construction equipment. There are different types of construction equipment's suitable for different activities in a construction project. The choice of construction equipment defines the construction method, which in a way leads to the determination of time and cost for the project. In order to select the right equipment to perform a specific task at the least cost, it is essential to know the features of a construction equipment including its rate of production and the associated cost to operate the equipment.

Plant, equipment, and tools used in construction operations are priced in the following three categories in the estimate:

a) *Small tools and consumables:* Hand tools up to a certain value together with blades, drill bits, and other consumables used in the project are priced as a percentage of the total labour price of the estimate.

b) *Equipment usually shared by a number of work activities:* These kinds of equipment items are kept at the site over a period of time and used in the work in progress.

c) Equipment used for specific tasks: These are capital items and used in projects such as digging trench or hoisting material into specified slots. This equipment is priced directly against the take-off quantities for the project it is to be used on. The equipment is not kept-on-site for extended periods like those in the previous classification, but the equipment is shipped to the site, used for its particular task, and then immediately shipped back to its original location.

EQUIPMENT PLANNING

Construction requires large quantities of materials handling, horizontally and vertically. In its simplest form, a construction operation is the moving of material from one location to another. Toe primary function of equipment is to handle and move varieties of materials around the construction site. For example, a construction site may need to be levelled, thus involving the excavation of soil material from one area and the transporting of the excavated material to fill in another location on-site. The complexity of an operation increases as the requirement for final placing or installation increases. An example is the erection of structural steel members in a structural steel frame building. The members are hoisted from the hauling unit or storage location on-site and are moved and placed at the desired final location on the building structure. Structural steel workers then bolt and weld the members in place. These examples illustrate how the primary function of equipment is to handle and move materials on a construction site.

Equipment planning must identify the work to be done and establish: i) Equipment lists and procurement schedules, ii) Equipment productivity and a desired construction schedule, and iii) Realistic cost estimates of equipment.

ESTIMATION OF PRODUCTIVITY FOR CONSTRUCTION EQUIPMENTS

Earthmoving Equipment Earthmoving may include site preparation; excavation; embankment construction; backfilling; dredging; preparing base course, subbase, and subgrade; compaction; and road surfacing. The types of equipment used and the environmental conditions will affect the man-and machine-hours required to complete a given amount of work. Before preparing estimates, choose the best method of operation and the type of equipment to use. Each piece of equipment is specifically designed to perform certain mechanical tasks. Therefore, base the equipment selection on efficient operation and availability. The basic relationship for estimating the production of all earthmoving equipment is:

Production = Volume per cycle x Cycles per hour

The terin "volume per cycle" should represent the average volume of material moved per equipment cycle. Thus the nominal capacity of the excavator or haul unit must be modified by an appropriate fill factor based on the type of material and equipment involved. The term “cycles per hour" must include any appropriate efficiency factors, so that it represents the number of cycles actually achieved (or expected to be achieved) per hour. The cost per unit of production may be calculated as follows:

Cost per unit of production = Equipment Cost per hour /Equipment production per hour

There are two principal approaches to estimating job efficiency in determining the number of Cycles per hour. One method is to use the number of effective working minutes per hour to

calculate the number of cycles achieved per hour. This is equivalent to using an efficiency factor equal to the number of working minutes per hour divided by 60. The other approach is to multiply the number of theoretical cycles per 60 - min hour by a numerical efficiency factor.

CLASSIFICATION OF CONSTRUCTION EQUIPMENTS

Earthwork Equipment

a) Earth cutting and moving equipment: Bulldozers, Scrapers, Front-end loaders, Motor graders.
b) Excavation and lifting equipment: Backhoes, Power Shovels, Draglines, Clamshells.
c) Loading equipment: Loaders, Shovels, Excavators.
d) Transportation equipment: Tippers, Dump Trucks, Scrapers, Conveyors.
e) Compacting equipment: Tamping Foot Rollers, Smooth Wheel Rollers, Pneumatic Rollers, Vibratory Rollers, Plate Compactors.

Concreting Plant and Equipment

a) Production equipment: Batching Plants, Concrete Mixer
b) Transportation equipment: Truck mixers, Concrete dumpers
c) Placing equipment: Concrete pumps, Conveyors, Hoist, Grouting equipment.
d) Concrete vibrating equipment: Needle vibrators, Plate compactors.

Material Hoisting Equipment

a) Hoists: Fixed, Mobile, Fork-lifts.
b) Mobile Cranes: Crawler-mounted, self-propelled rubber-tired, truck mounted.
c) Tower Cranes: Stationary, Travelling type.

Special Purpose Heavy Construction Plant and Equipment

a) Aggregate production equipment: Crushing plants, Rock blasting equipment, Screening plants.
b) Concrete paving equipment: Concrete paver finishers.
c) Pile driving equipment: Pile driving hammers.
d) Asphalt mix production and Placement equipment: Asphalt plants, asphalt pavers.
e) Tunneling equipment: Drill jumbos, Muck-hauling equipment, Rock bolters, Tunnel boring machines.

Mobilization and Demobilization Cost

Equipment moving and setup costs or mobilization costs, and dismantling or demobilization costs can be substantial and must be considered. This is the cost of moving the equipment from one job site to another. It is often overlooked because of the assumption that the previous job would have already paid for it. Regardless of these calculations, the costs of equipment mobilization and demobilization can be large and are always important items in any job where substantial amounts of equipment are used.

These costs include freight charges (other than the initial purchase), unloading cost, assembly or erection cost (if required), highway permits, duties, and special freight costs (remote or emergency).

Equipment Operator Cost

operator's wages are usually added as a separate item and added to other calculated operating costs. They should include· overtime or premium charges, workmen's compensation insurance, social ·security taxes, bonus, and fringe benefits in the hourly wage figure. Care must be taken by the companies that operate in more than one state or that work for federal agencies, state agencies and private owners.

SELECTION OF CONSTRUCTION EQUIPMENT

The selection of the appropriate construction equipment is an important part of job planning. The contractor has many different options to choose from, which makes the selection even more complicated. A planner has to choose the alternative that provides the best value from a. cost and schedule perspective.

(a) Site condition: Primary site condition (actors are: types of material to be handled, physical constraints onsite, and hauling distances.

(b) The Nature of the Work: Some factors relating to the nature of the work include payload, the total quantity of work, and the construction schedule. Payload has a direct relation to the capacity of the equipment selected.

(c) Size of the Equipment: Size of equipment should be such that it must be able to be used with other matching units. If the equipment selected is of larger size, that will remain idle for most of the time or sha1l work on part loads, which means production cost will be more. On other side, if the equipment is of smaller size than desired, the equipment will not be able to work with the matching equipment’s and hence other equipment’s will have to remain idle or to be allowed to work on part loads, which shall again be uneconomical.

(d) Standardisation: It is better to have same type and size of equipment’s in the project. It

means lesser spare parts reserve, more interchangeability of parts if required, easy for the operators to understand it, mechanics will be able to maintain and repair better as they become expert by handling similar type of equipment.

(e) Availability of Equipment: The equipment which is easily available in the market should be purchased. It should also be ensured that the equipment is of repute and is likely to be continued to be manufactured in future also. This is necessary for future standardisation and ensuring spare parts supply. It is easy to dispose of such equipment after completion of projects.

(f) Availability of Spare Parts: While selecting a particular type or make of equipment, it should be ensured that the spare parts will be available at reasonable price throughout the working life of the equipment. It should also be ensured that the downtime of the equipment for want of spare parts may not be more. This is all the more necessary in case of imported equipment's.

(g) Multipurpose Equipment's (Versatility): There are certain types of equipment's which ae not utilised fully. Therefore, if possible, they must be capable of performing more than one function for example, excavator with wheel loader bucket arrangement or with rock breaker attachment.

(h) Client-and Project-specific: The owner/client in a certain project may have certain preferences that are not in line with the construction company's preferred policies as far as equipment procurement is concerned. The schedule, quality and safety requirements demanded of a particular project may in some cases force the company to yield to the demands of the client.

(i) Labour Consideration: Shortage of manpower in some situations may lead to a decision in favour of procuring equipment that is highly automated.

(j) Use in Future Projects: When equipment completes only a part of their useful life in a project, it should be kept in view that the equipment can be used in future projects and may not become obsolete.

(k) Economic Considerations: The economic considerations such as owning costs, operating labour costs and operating fuel costs of equipment are most important in selection of equipment. Besides, the resale value, the replacement costs of existing equipment, and the salvage value associated with the equipment are also important.

(l) Reliability of the Equipment: Equipment selected for the project must be reliable one.

(m) Service Support: Service support should be available in the area of project where the equipment shall be used. Service after sales is a major criterion for selection of equipment.

(n) Operating Requirements: The equipment selected should be easy to operate and maintain, acceptable to the operator and should have lesser fuel consumption.

(o) Past Performance: If the equipment being purchased is of new make and model, it is desirable to enquire about its performance from other users, who are using this make and model. Reputation of the manufacturer, Warranty or guarantee offered by the manufacturer, use of standard components in the equipment, etc. also considered while. selecting equipment.

BASIC CONCEPT ON EQUIPMENT MAINTENANCE

Maintenance includes all labour (both direct md indirect), material, plant, and overhead required to sustain equipment in good serviceable condition; It includes periodic inspection, lubrication, servicing, repairs, and overhauls.

Objectives of Maintenance

1. To maximise availability of plant, equipment and machinery for productive purposes.
2. To extend the lifespan of plant, equipment and other facilities by minimising their wear and tear.
3. To ensure operational readiness of equipment at all times.
4. To reduce the cost of lost production due to breakdown.
5. To provide information to the management on the cost and effectiveness of maintenance.
6. To ensure safety through regular inspection and maintenance of plant, equipment and other facilities such as compressors, elevators, material-handling equipment etc.

Types of Maintenance

Generally, maintenance can be done in the following two types

1. Breakdown maintenance

Breakdown of a machine can occur due to the following two reasons:

(i) Due to unpredictable failure of components which cannot be prevented

(ii) Due to gradual wear and tear of the parts

which can be eliminated to a large extent by regular inspections, known as preventive maintenance. From experience it can be decided that, when a part should be replaced, so that breakdown can be avoided.

In breakdown maintenance, defects are rectified only when the machine cannot perform its function may longer, and the production department is compelled to call on the maintenance engineers for the repairs. After repairing the defect, the maintenance engineers do not attend the machine again until another failure occurs.

In this type of maintenance, repair shall have to be done on failure, thus it may disrupt the whole production, if it is performing an important work. This method is much expensive also due to increase of depreciation cost, payment to idle operators, overtime to the maintenance staff for doing the emergency repairs, and idling of matching equipment.

2. Preventive maintenance

Preventive maintenance is sometimes termed as "planned maintenance" or "scheduled maintenance" or "systematic plant maintenance" etc. It is an extremely important function for the reduction of maintenance cost and to keep the good operational condition of equipment and hence increases the reliability. Preventive maintenance aims to locate the sources of trouble and to remove them before the breakdown occurs. Thus it is based on the idea "prevention is better than· cure". Scheduled maintenance is always economical than unscheduled maintenance.

Frequency of inspection should be decided on the basis of the importance of the machine; wear and tear of the machine and its delicacy. Thus, period of inspection or checking helps to find out the reasons leading to breakdown and to rectify them, when they are in minor stages. Thus, the repair can be done when one wants to do it, i.e., when it has least effect on the production schedule. Further this repair requires lesser time as compared to that of breakdown repair and thus down time is reduced by doing preventive maintenance.

Preventive maintenance has following main objects

- To obtain maximum availability of the equipment by avoiding breakdowns and by reducing the shutdown periods to a minimum.
- To keep the machine in proper condition so as to maintain the quality of the product.
- By minimising the wear and tear, preserve the value of the equipment.
- To ensure for the safety of the workers.
- To keep the plant at the maximum production efficiency.
- To achieve all the above objectives with most economical combination.

Following are some of the important functions of the preventive maintenance programme

I. Inspection or check-ups.

II. Servicing including cleaning, cooling and lubrication.

III. Planning and scheduling.

IV. Records and analysis.

V. Training to maintenance staff.

VI. Storage of spare parts.

INSPECTION AND MAINTENANCE PROGRAM

To ensure thorough inspection of all-the vital components, detailed inspection and maintenance program should be prepared. Detailed inspection sheets should be used for each equipment listing specific points of inspection. Individual important parts such as track rollers, links, track shoes, etc. should be listed.

Maintenance instructions provided by the equipment manufacturer should be used as a reference in preparing the inspection report. A maintenance program should be prepared for implementation. Coordination between maintenance programs and construction operations is the most important responsibility. With cooperation between equipment operating personnel, servicing mechanics and the support of equipment dealer service personnel, the equipment manager can develop and implement a successful maintenance program.

The areas of responsibility of maintenance inspection personnel are as follows

a) Regular inspecting and adjusting,

b) Scheduling machines for maintenance checks at most opportune times.

c) Advising the equipment manager of apparent service needs, and·

d) Keeping records of their work on machines.

MATERIAL MANGEMENT

Material management is the management system for planning and controlling all efforts necessary to ensure that the correct quality and quantity of materials are specified in a timely manner, obtained at a reasonable cost, and available at the point of use when required.

Materials management can also be defined as "the function responsible for the coordination of planning, sourcing, purchasing, moving, storing and controlling manner so as a pre-decided service can be provided at a minimum cost".

Objectives and Functions of Materials Management

- Efficient materials planning
- Buying or Purchasing
- Procuring and receiving
- Storing and inventory control
- Supply and distribution of materials

- Quality assurance

Secondary Objectives of Materials Management

- Efficient production scheduling
- To take make or buy decisions
- Prepare specifications and standardization of materials
- To assist in product design and development
- Forecasting demand and quantity of materials requirements
- Quality control of materials purchased
- Material handling
- Use of value analysis and value engineering
- Developing skills of workers in materials management
- Smooth flow of materials in and out of the organization

Importance of Materials Management

- Lower prices for material and equipment.
- Faster inventory turnover.
- Continuity of supply.
- Reduced lead time.
- Reduced transportation cost.
- Less duplication of efforts.
- Elimination of bulk- passing.
- Reduced materials obsolescence.
- Improved supplier relationship and better records and information.
- Better inter -department cooperation and Personnel development.

Advantages of Materials Management

- The better accountability part of the material, as well as other departments and no one can blame others.
- As materials management by a single authority, which can lead to better coordination, because it became the central point of any substance -related problems.
- Materials management departments· to ensure a better quality material. This can lead to a better performance of the organization.
- A materials management system is usually controlled through a system, therefore, can help decision - making related to the material in the organization.
- An indirect use of materials management is the development of good quality material, ethical and moral standards in an organization.

- Maximum company profit and Improvement of credibility.
- Improved customer service.
- Enhancement of communication.
- Improved quality of staff.

INVENTORY MANAGEMENT

Inventory is simply a stock, of physical assets having some economic value which can be either in the form of material, money or labour. Inventory is also known as an idle resource as long as it is not utilised. Inventory may be regarded as those goods which are procured, stored and used for day-to-day functioning of the organisation.

Inventory control is the technique of maintaining stock items at desired levels. In other words, inventory control is the means by which material of the correct quality and quantity is made available as and when it is required with due regard to economy in the- storage costs, ordering costs, set up costs, manufacturing costs, purchase prices and working capital.

There are following three main issues involved in inventory management and control:

- How and what to prioritize for procurement'?
- How much to order?
- When to order?

Objectives of Inventory Control

As inventory is an essential part of any organisation, it consists of many items running into thousands. Systematic management and control of inventory for all the items is a challenging job.

- To maintain the overall investment in inventory at the lowest level, consistent with operating requirements,
- To supply the product,- raw material, sub-assemblies, semi-finished goods, etc.
- To its users as per their requirements at right time and at right price,
- To keep inactive, waste, surplus, scrap and obsolete items at the minimum level,
- To minimise holding, replacement and shmtage costs of inventories and maximise the efficiency in production and distribution, and
- To reduce the risk inherent in treating inventory as an investment which is risky. For some items, investment may lead to higher returns and for others less returns.

Factors affecting Inventory

Purchase Price or Production Cost

The cost of the item is the money paid to the supplier for the item received or the direct manufacturing cost, if produced. It is normally equal to purchase price. When the market prices go on fluctuating, planning for inventory is based on the average price mostly taken as a fixed price. The price factor is of special interest when. price discounts can be secured or when large production runs may result in a decrease in the production cost.

(a) Selling Price

In some inventory situations, the demand may be affected by the quantity stocked. In such cases, the inventory model is based on a profit maximisation criterion which includes the revenue from selling the commodity. The unit selling price may be constant or variable, depending upon whether quantity discount is allowed or not.

(b) Procurement Costs

These costs are those incurred on a purchase (known as ordering costs) or incurred as set up costs related with the initial preparation of a production system if manufactured. These costs vary directly with each purchase order placed or with the set up made and are usually assumed independent of the quantity ordered or produced. Procurement costs include costs of administration (such as salaries of the persons concerned, telephone calls, computer costs, postage etc.), transportation of items ordered, expediting and follow up, receiving and inspection of goods, processing payments etc. This cost is expressed as the cost per order or per set up.

(c) Shortage (or Stock out) Costs

The demand pattern of commodity may be either deterministic or probabilistic. In the deterministic case, it is assumed that the quantities needed over subsequent periods of time are known with certainty. This may be expressed over equal periods of time in terms of known constant demands or in terms of known variable demands. The two cases are referred to as static and dynamic demands respectively.

(d) Delivery Lag or Lead Time

When the need of the material is felt and an order is placed, it may be delivered instantaneously or it may require sometime before delivery is affected. The time between the placement requisition for an item and its receipt for actual use is called delivery lag or lead time. In general, lead time has four components, viz. administrative lead time, supplier's lead time, transportation lead time and inspection lead time. While administrative lead time and inspection lead time can be fixed, the supplier's lead time and transportation lead time can never be fixed.

MODULE 3

CONSTRUCTION QUALITY,SAFETY AND HUMAN VALUES

INTRODUCTION

Quality not only impacts aesthetics, appearance, durability and it also impacts performance. And poor performance can lead to failures in everything from an improperly installed section of roof flashing resulting in a leak to the deflection of a structural steel beam resulting in a roof collapse.

The characteristics of a good quality management plan and a good safety management plan are quite similar. Although each is defined by distinct concepts and specific mechanisms of control, which, it makes sense to administer quality and safety plans as one integrated management function.

Good contractors stake their reputations on-quality and safety. Successful construction manager's/ Site engineers are well· aware of what they must do to achieve quality results and maintain high safety performance. They must do the following:

- Insist upon good quality plans and specifications whenever possible.
- Provide experienced and adequate supervision on all jobs.
- Provide thorough and adequate inspections.
- Make sure that all workers are qualified to do the job they are hired to do.
- Never accept inferior work.

Although the project manager and superintendent are accountable for developing and implementing the quality and safety plans on the job, they must have support and participation from the field: quality and safety are ultimately achieved at the labour force level. Employees and subcontractors alike must embrace the plans and be encouraged in and recognized for their efforts to produce high-quality work and a safe work environment. And when they are, it sends a loud message, not only to other workers on the job ·but also to the project owner and the public at large. This is (he goal of the construction manager.)

DEFINING QUALITY

The term "quality" implies that a product or deliverable is fit for the intended purpose. Fitness normally involves a wide range ·of criteria, such as performance, safety, reliability, ease of handling, maintainability, logistical support, and no harmful environmental impacts.

Quality also implies an absence of defects. A defect is a nonconformity-something other than what the customer had expected, a problem or mistake. One way to achieve quality is to identify and correct as many nonconformities as possible, and to identify them as soon as possible.

In construction, quality is defined as meeting or exceeding the requirements established in the design documents. Fundamentally, the quality of the construction project is set through the plans and specifications provided by the architects and engineers. There are various levels of quality that can be specified for any given project. The design team works with the owner to determine exactly what their expectations for quality are.

In construction, the job of the project team is to deliver whatever quality standard has been set for the facility by the design team.

Construction is not a perfect science, and it would be impossible to produce a project without some defects, failures, or complaints. However, the goal of the construction manager is to produce a project. with as few defects, failures, and complaints as possible.

Fundamentally, quality plan must focus on three primary objectives:

1. Doing things right the first time.
2. Preventing things from going wrong.
3. Continually improving the process.

QUALITY: MANAGEMENT IN CONSTRUCTION PROJECTS

Quality management can be defined as "the application of quality management system in managing a process to achieve maximum customer satisfaction at the lowest overall cost to the organization while continuing to improve the process."

Quality in construction projects includes not only the quality of products and equipment used in the construction, but the total management approach to completing the facility as per the scope of works to customer/owner satisfaction within the budget and in accordance with the specified schedule to meet the owner's defined purpose.

The nature of the contracts between the parties plays a dominant part in the quality system required from the project, and the responsibility for fulfilling them must therefore be specified in the project documents. The documents include plans, specifications, schedules, bill of quantities, and so on.

Quality control in construction typically involves ensuring compliance with minimum standards of material and workmanship in order to ensure the performance of the facility according to the design. These minimum standards are contained in the specification documents. For the purpose of ensuring compliance, random samples and statistical methods are commonly used as the basis for accepting or rejecting work completed and batches of materials.

PROCESSES OF PROJECT QUALITY MANAGEMENT

Project quality management consists of three processes:

1. Quality planning,

Quality planning guides future quality activities; it sets the requirements and standards to be met and the actions necessary to meet them.

2. Quality assurance

Quality assurance performs the planned quality activities and ensures the project utilizes processes necessary to meet quality standards and end-item requirements.

3. Quality control.

Quality control ensures that quality assurance activities are performed according to quality plans, and that requirements and standards are being met.

4. Quality Planning

Quality planning should provide confidence that everything necessary to ensure quality has been thought through. It has two aspects:

- Establishing project quality management procedures and policies for. the entire organization
- Establishing a quality plan as part of the project master plan for each project. Projects often employ quality standards that already exist in the organization, such as the ISO 9001 standard, in a quality management system.

The quality plan for construction projects is part of the overall project documentation consisting of the following

1. Well-defined specification for all the materials, products, components, and equipment to be used to construct the facility.
2. Detailed construction drawings.
3. Detailed work procedure.
4. Details of the quality standards and codes to be compiled.

Quality Assurance

Project quality assurance related to the execution of the project quality management plan. It reduces the risks related to not meeting desired features or performance requirements of deliverables.

Quality assurance covers the following:

1. Activities performed in a specific project to ensure that requirements are being met and that the project is being executed according to the quality plan.
2. Activities that contribute to the continuous improvement of current and future projects.

According to ISO, Quality assurance is defined as a set of activities whose purpose is to demonstrate that an entity (such as product, processes, person, department and organization) meets all quality requirements.

Quality assurance (QA) takes a long-range view toward developing systems that produce high-quality work consistently over time. To be effective, a good quality assurance plan must influence every aspect of the company, from the management to the field.

Project organizations that strive to continually improve their technical operations and managerial processes conduct a formal closeout or post-completion review for every project. The review happens upon completion of the project or, ideally, upon completion of each phase of the project. The reviews enable the organization to improve its technical processes and project management.

With respect to construction industry, quality assurance activities include all those planned and systematic administrative and surveillance functions initiated by project owner or regulatory agents to enforce and certify, with adequate confidence, compliance with established project quality standards to ensure that the completed structure and/or its components will fulfil the desired purposes efficiently, effectively and economically.

Quality assurance programmes cover the following:

i) Establishing the procedure for defining, developing and establishing quality standards in design, construction and occasionally the operational stages of the structure and/or its components.

ii) Establishing the procedure to be used to monitor, test, inspect, measure and perform current and review activities to assure compliance with established quality standards, with regard to construction materials, methods and personnel.

iii) Defining the administrative procedure and requirements, organizational relationships and responsibilities, communications and information patterns, and other management activities required to execute, document and assure attainment of the established quality standards.

Quality Control

According to ISO, quality control is defined as a set of activities or techniques whose purpose is to ensure that all quality requirements are being met.

Quality control (QC) addresses quality at the project level and is implemented on the job site. Quality control is the ongoing process of monitoring and appraising work, and taking corrective action so as to achieve the planned quality outcomes.

The process also verifies that quality assurance activities are being performed according to the quality plan, and that project requirements and specifications are being met. All of the materials, systems, and workmanship applied to the project must conform to the requirements set forth.in the contract documents.

Quality control refers to verifying adherence to specifications and standardspreviously set, scope verification also includes verifying acceptability of those specifications and standards. Control activities, include both planned quality control activities and adhoc problem-solving. Planned activities include, for example, site inspections on a construction project, tests on a product component, or an audit of a supplier to ensure that it is using correct materials.

QA is a construction management process while-QC is a sampling or inspection process. The focus in quality assurance is on defect prevention, while the focus in quality control is on defect detection once the item is constructed. In fact, it can be said that quality-control is an clement of a quality assurance programme.

With respect to construction industry, quality control is administered by the contractors or by the specialist consultants such as consulting engineers or testing laboratories. Construction quality control needs performing inspection, test, measurement and documentation necessary to check, verify and correct the quality of construction materials and methods. Primary objectives of construction quality control are to produce a safe, reliable and durable structure so that the owner gets the best value for his investment.

Three major quality control methods commonly used on construction projects are:

1. Inspection
2. Testing
3. Sampling

QUALITY OF CONSTRUCTION

Quality of construction projects can be evolved as follows:

1. Properly defined scope of work.
2. Owner, project manager, design team leader, consultant, and constructor's manager are responsible to implement quality.
3. Continuous improvement can be achieved at different levels as follows:
4. Owner-Specify the latest needs.
5. Designer-Specification should include the latest quality materia1s, products and equipment.
6. Constructor-Use the latest construction equipment to build the Facility.

Establishment of performance measures

1. Owner

To review and ensure that designer has prepared the contract documents that satisfy his needs.

To check the progress of work to ensure compliance with the contract documents.

2. Consultant

As a consultant designer, to include the owner's requirements explicitly and clearly define them in the contract documents.

As a supervision consultant, supervise contractor's work per contract documents and the specified standards.

3. Contractor

To construct the facility as specified· and use the materials, products, and equipment that satisfy the specified requirements

4. Team approach.

Every member of the project team should know that TQM is a collaborative effort, and everybody should participate in all the functional areas to improve the quality of the project work. They should know that it is a collective effort by all the participants.

5. Establish leadership

Organizational leadership should be established to achieve the specified quality. Encourage and help the staff and labourers to understand the quality to be achieved for the project. Quality in construction is achieved through the complex interaction of many participants in the facilities development process.

COSTS OF QUALITY IN CONSTRUCTION

Quality of construction is defined as

i) Scope of work

Cost of quality refers to the total cost incurred during the entire life cycle of construction project in preventing non conformities to owner requirements (defined scope). There are certain hidden costs that may not directly affect the overall cost of the project; however, it may cost the consultant/designer to complete the design within the stipulated schedule to meet owner requirements and conformance to all the regulatory codes/standards, and for the contractor to construct the project within the stipulated schedule meeting all the contract requirements. Rejection/non-approval of executed/installed works by the supervisor due to noncompliance with specifications will cause the contractor loss in terms of

- Material
- Manpower
- Time

The contractor shall have to rework or rectify the work, which will need additional resources and will need extra time to do the work as specified.

This may disturb the contractor's work schedule and affect execution of other activities. The contractor has to emphasize the "Zero Defect" policy, particularly for concrete works. To avoid rejection of works, the contractor has to take the following measures:

Execution of works per approved shop drawings using approved material.

Following approved method of statement or manufacturer's recommended method of installation.

1. Conduct continuous inspection during construction/installation process.
2. Employ properly trained workforce.
3. Maintain good workmanship.
4. Identify and correct deficiencies before submitting the checklist for inspection and approval of work.

ii) Time

Timely completion of a project is.one of the objectives to be achieved. To avoid delay proper planning and scheduling of construction activities are necessary. Since construction projects have the involvement of many participants, it is essential that the requirements of all the participants are fully coordinated. This will ensure execution of activities as planned resulting in timely completion of the project.

iii) Budget

Normally, the construction budget is fixed at the inception of the project, therefore it is necessary to avoid variations during the construction process as it may take time to get approval of an additional budget resulting in time extension to the project.

Since quality is always related to value for the money spent, quality planning should consider the costs and benefits of quality activities. A ·cost-benefit analysis is performed to evaluate and justify proposed quality activities, and to compare the costs of quality assurance and control activities with the savings or benefits from fewer or eliminated nonconformities owing to those activities.

Money spent on quality assurance and control should be justified in terms of reduced risk of not meeting requirements. Costs of quality can be classified as follows

1. Prevention: costs of training, design reviews, and any activity aimed at preventing errors; includes cost of quality planning.
2. Appraisal and control: costs of evaluating products and processes, including product reviews, audits, tests, and inspections.
3. Internal failure: costs associated with nonconformities discovered by the producer; includes costs for scrap, rework, and retest.
4. External failure: costs incurred as a result of product failures after delivery to the customer; includes costs for replacements, warranty repairs, liability, lost sales, and damaged reputation.

TOTAL QUALITY MANAGEMENT

Total Quality Management (TQM) is an enhancement to the traditional way of doing business. It is a proven technique to guarantee survival in world-class competition.

Therefore, TQM is the art of managing the whole to achieve excellence. TQM is defined as both a philosophy and a set of guiding principles that represent the foundation of a continuously improving organization. It is the application of quantitative methods and human resources to improve all the processes within an organization and exceed customer needs now and in the future.

The TQM includes all activities like quality planning, quality operation and systematic evaluation. For attaining TQM in the organization, a total commitment and participation of all the members who are in the organization is essential. The responsibility for quality management should belong to top management of the organization.

TQM is a management-led approach applicable in all the operations of a company and the responsibility of ensuring quality is collective. The philosophy of TQM is one of prevention rather than defect detection. In other words, TQM is a way of thinking about goals, organizations, processes and people to ensure that -the right things are done right the first time. It is an approach to improving the competitiveness and effectiveness, and flexibility of the whole organization.

The essential elements of TQM are:

1. Management commitment and leadership
2. Training
3. Teamwork
4. Statistical methods
5. Cost of quality
6. Supplier involvement

TQM is based on the following principles:

1. Primary responsibility for product quality rests with top management.
2. Quality should be customer focused and evaluated using customer-based standards.
3. The Production process and work methods must be designed consciously to achieve quality conformance
4. Every employee is responsible for achieving good product quality.
5. Quality cannot be inspected into a product, so make it right the first time.
6. Quality must be monitored to identify problems quickly and correct quality problems immediately.
7. The organization must strive for continuous improvement.
8. Companies must work with, and extend TQM programs to their suppliers to ensure quality inputs.

TQM helps in

1. Achieving customer satisfaction.
2. Continuous improvement.
3. Developing teamwork.
4. Establishing vision for the employees.
5. Setting standards and goals for the employees.
6. Building motivation within the organization.
7. Developing corporate culture.

Total Quality Management in Construction Industry

Construction projects being unique and non-repetitive in nature need specified attention to maintain the quality. Each project has to be designed and built to serve a specific need. TQM in construction projects typically involves ensuring compliance with minimum standards of material and workmanship in order to ensure the performance of the facility according to the design.

TQM in a construction project is a cooperative form of doing the business that relies on the talents and capabilities of both labour and management to continually improve quality. The important factor in construction projects is to complete the facility per the scope of works to customer/owner satisfaction within the budget and to complete the work within the specified schedule to meet the owner's defined purpose.

It is believed that adoption of TQM by construction companies will result in higher customer satisfaction, better quality products and higher market share. However, adoption of TQM requires a complete turnaround in the corporate culture and management approach, as compared to the traditional way of top management giving orders and employees merely obeying those.

INTRODUCTION TO ISO 9000

ISO (International Organization for Standardization) is a worldwide federation of national standards bodies from each country. The object of ISO is to promote the development of standardization and related activities in the world with a view to facilitating international exchange of goods and services, and to developing cooperation in the spheres of intellectual, scientific, technological and economic activity. The results of ISO technical work are published as International Standards.

ISO is the International Organization for Standardization. It is located in Switzerland and was established in 1947 to develop common international standards in many areas. It is rapidly becoming the most important quality standard. Thousands of companies in over 100 countries have already adopted it.

ISO 9000 applies to all types of organizations. It can help both product and service oriented organizations achieve standards of quality that are recognized and respected throughout the world.

The term ISO 9000 refers to a set of three standards ISO 9000, ISO 9001; and ISO 9004. All three are referred to as quality management system standards. ISO's purpose is to facilitate international trade by providing a single set of standards that people everywhere would recognize and respect.

Management principles

1. ISO 9000 is based on eight management principles:
2. Customer focus, resulting in meeting customer requirements and striving to exceed them;
3. Leadership, aiming to create an internal environment in which people are fully involved;
4. Involvement of people who are the essence of an organization;
5. Process approach, resulting in improved efficiency to obtain desired results;
6. System approach to management, leading to improved effectiveness and efficiency through identification, understanding and management of interrelated processes;

7. Continual improvement, which becomes a permanent objective of the organization;
8. Factual approach to decision-making, based on the analysis of data and information; and
9. Mutually beneficial supplier relationships, based on an understanding of. their interdependence.

How to implement ISO 9000

1. Following procedure adopted to get ISO certification:
2. Select an appropriate quality system model.
3. Conduct status review against the standard.
4. Develop quality system as per standard.
5. Implement quality system in line with the standard.
6. Apply for registration with certification body.
7. Get the quality system verified and certified by a recognised certification body.

Benefits· of ISO 9000

The following are the benefits of ISO certification:

1. Customer satisfaction and confidence in the organization's products services
2. Management's confidence.
3. Improvement in staff performance.
4. Effectiveness in the utilization of staff.
5. Efficient utilization of time, money, and other resources.
6. Improved quality, higher productivity any profitability.
7. Consistency in products/services quality.
8. Access to global market.
9. Organisations become system dependent and not people dependent.
10. Continuous improvement in organizational process.

Although ISO does not define product quality, it ensures that customer feedback is captured and measured to improve future processes.

To enhance efficiency, competitiveness, and customer satisfaction, an increasing number of organizations are adopting the philosophy of total quality management (TQM)

QMS{IS/1SO 9001)

BIS is the National Standards Body of India and is a founder member of ISO. BIS represents India, in ISO. The Technical Committee (TC) number 176 (ISO/TC 176), and its Sub-committees of ISO are responsible for the development of ISO 9000 standards. Quality and industry experts from India including BIS officers nominated by BIS participate in the meetings of the Technical

Committee ISO/TC 176 and its Sub-committees. ISO 9001 'Quality Management Systems - Specifications with Guidance for use is a standard and· adopted by BIS as IS/ISO 9001. I�SO 9001 is the exact replica of ISO 9001.

It is a requirements standard. It contains a set of requirements to define the operation of the Quality Management System. Since the requirements are expressed in a general form, it has the flexibility to be applied to any organization. IS/ISO 9001 is the only certification standard in the IS/ISO 9000 family.

Benefits of BIS Certification of Quality System QMS(IS/1SO 9001)

1. Conformance to the quality specification as documented by organization.
2. Ensure corrective action is taken whenever defects occur
3. Early detection of defects and avoidance of wastage.
4. Defect rates decrease and reduce costs.
5. Procedures identify current practices and that continuously improved upon.
6. Helps in training.
7. Increase in market share, increasing in sales or revenue.
8. Better management control and reporting.
9. Consistent quality.

ACCIDENTS

An unintended occurrence arising out of and in the course of employment of a person resulting in injury or an accident is defined as an event that is unplanned, undesired, unexpected and uncontrolled, and one that may or may not result in damage to property or injury to person, or both, in the course of employment or occupational accident as an unexpected and unplanned occurrence, including acts of violence, arising out of or in connection with work, which results in one· or more workers incurring a personal injury, disease, or death..

Accidents in Construction Industry

Accidents in the construction industry tend to be costly in both human and financial terms. These expenses are concentrated in the areas of health care, litigations, management time, and workers compensation. Safety is not a luxury and may be considered an important function to be used against unnecessary loss of property, injury or death. Preventing occupational injuries and illness should be a primary concern of all employers. Especially in developing countries, there must be an effort to raise the level of awareness among both employees and employers of the importance of health and safety at work-sites.

Hazard's condition at construction site

Several accidents are caused by the following factors:

1. Unsafe mechanical or physical condition Example: Over loading, poor light.
2. Unsafe acts Example: Working under suspended loads, operating without authority, using damaged tools.
3. Personal factors

Construction accidents that can occur include

1. defective and collapsing scaffolds
2. falls from ladders,
3. falls from roofs and roofing structures; cranes,
4. injuries from faulty machinery like tractors and forklifts, toxic welding rod injuries; crane accidents,
5. electrical accidents,
6. power tool accidents,
7. holes in flooring,
8. construction debris accidents,
9. lift accidents,
10. fires and explosions,
11. burn injuries,

The effects of accidents in construction industry are

1. Loss of human life.
2. Temporary or permanent injuries to workers.
3. Loss or damage of materials and equipment's.
4. Loss of time in completion of work.
5. Loss of money by way of compensation, medical expenses and cost involving in re-doing the work.

In construction industry accidents due to the following causes:

1. Failing to identify an unsafe condition that existed before an activity was started or that developed after an activity was started.
2. Deciding to proceed with a work activity after the worker identifies an existing unsafe condition.
3. Carelessness of workers during the work i.e. the workers carrying heavy materials such as stones, bricks, cement concrete etc., at higher level by moving over temporary support and the painters and masons during plastering or masonry work..

4. During dismantling of the building, loose unprotected and unsafe parts such as walls, beam etc., results in accidents.
5. Due to overcrowding of workers at a particular spot of support there may be accident occurs due to failure of support
6. The greediness of contractor will lead to the accident

The objective& of safety managements are:

1. To help increase in speed in construction,
2. To increase the standard of living,
3. To reduce cost of construction,
4. To conserve the available labour force by minimizing idle time,
5. To reduce human suffering.
6. Safety in Planning and Design
7. Plan the works to meet the complete requirements.
8. Design the structure considering all the loads and to meet the codal requirements.
9. Procure and use standard material.

HEALTH AND SAFETY ISSUES FOR CONSTRUCTION WORKERS

Majority of the health issues that labours are facing in construction field are the following:

1. Pain or injury from overexertion.
2. Repetitive manual tasks, or working in uncooperative postures.
3. Exposure to moulds, fungi or rodent droppings.
4. Exposure to paints, lead, wood dust, asbestos and/or toxic chemical solutions.
5. Working in extreme conditions like high temperatures and under UV radiations.
6. Working with hand tools, powered tools and heavy machinery equipment's.
7. Excessive vibration of hands, arms or body from powered tools or equipment's.
8. Extension of work days, stress or Shift work hours.
9. During night, working in low lightening or poor visibility

SAFETY PRECAUTIONS TO PREVENT ACCIDENTS

1. The supports provided at higher levels over which the workers move in connection with the work should be strong and stable.
2. For workers moving at higher levels the support should have side protections to prevent the workers from falling due to slipping.
3. Before dismantling the building all unsafe parts should be properly protected to prevent any accidents to the workers.
4. No unskilled person should be engaged on jobs such as operation of heavy equipment's like bulldozers, cranes, etc.
5. For workers engaged in operations such as welding, etc., effective screens or proper goggles should be provided to the workers for the protection of eyes.
6. No workers should be allowed to enter into pits or chambers or confined spaces where danger fumes are present.
7. Safety training is provided for workers.
8. Making use of personal safety devices and protective equipment's(wearing Helmet, Safety belts etc.)

SAFETY MEASURES TO BE ADOPTED FOR

Excavation

The following safety measures should be adopted at the time of excavation

1. In all works, an experienced and competent foreman or supervisor should look after the excavation work. He should have authority to enforce safety rules and prevent the use or detective/unsafe appliances.
2. Before doing the excavation work, a complete knowledge of underground structures (such as sewers, water pipe lines, gas mams, etc.) is essential.
3. Safety helmets should be worn by all persons entering a t nch where hazards from falling stones, timber or other materials exist.
4. Whenever workmen have to excavate in tr ches in soil, soft or fissured rock, or hard soil exceeding 2m in depth, the trenches should be properly shored and timbered.
5. Sheathing should be placed against the side of the trench so that the length of each piece of sheeting is vertical. Where the trench is excavated in loose or soft soil, each piece sheathing should be driven into the bottom of the trench so as to be firmly held in a place.
6. Excavated material should be kept away from the edge of the trench in order to provide a clear berm width not less than one third the final depth of excavation. However, in special cases where disposal area is limited, the minimum berm width should not be less than lm.

Drilling and Blasting

The following safety measures should be adopted at the time of Drilling and Blasting

1. Detonators and other explosives for blasting shall be transported to the site of work in the original containers or in securely locked separate non-metallic container and shall not be carried loose or mixed with other materials.
2. Care should be taken in loading and unloading of explosives. The Shield containers shall not be handled roughly or dropped.
3. Explosives shall be stored only in a magazine which is clean, dry, well ventilated, reasonably cool, correctly located, protected against lightning.
4. Any package containing explosives shall not be dragged, dropped or handled roughly. The packages shall be opened at a safe distance.
5. Smoking shall not be permitted nor matches, open lights, fire, flame, or any other device capable of producing sparks or flame shall be carried while handling or using explosives.
6. Basting shall be carried out only, with the permission of the engineer-in-charge. The blasting operation shall remain in the charge of competent and experienced supervisor and workmen who are thoroughly acquainted with the details of handling explosives and blasting operations.
7. All the materials, tools and equipment used for blasting operations shall be of approve type.
8. No drilling shall be started until previous holes in the blasted area are flushed with air and filter.
9. The blaster shall be in good physical condition and not be under influence of drugs alcohol intoxicants, etc.
10. While planning drilling operations for blasting purposes, consideration must be given to the nature of startum and the overburden with a view to avoiding the possibilities of land-slides after blasting.
11. The face of rock shall be carefully examined before drilling, to determine the possible presence of unfired explosive.
12. The position of all holes to be drilled shall be marked out with white paint.

13. The bore hole shall be carefully checked for length, presence of water, dust, etc, with a wooden tamping pole or a measuring tape before loading. It shall be cleared of all debris before explosives are inserted. The diameter of the bore of each hole shall be greater than the outside diameter of the cartridges of explosive. The line of detonating fuse extending into a bore hole shall be cut from the spool before loading the remainder of the charge. Use of short pieces of fuse shall be prohibited for detonation purposes.
14. Surplus explosives shall not be stacked near working areas during loading.
15. Loading and drilling shall not be carried out at the same time in the same area.
16. A bore hole shall not be loaded with explosives after springing (enlarging the hole with explosives) or upon completion of drilling without making sure that it is cool and that it does not contain any hot metal, burning or smouldering materials. Temperatures in excess of 65°C are dangerous. No force shall be used for inserting a blasting cap or an electric blasting cap into explosive. Metallic devices of any kind shall not be used in tamping.
17. Rock drillers shall be equipped with approved respirators for use in sillicious dusty atmosphere arising out of drilling operations.
18. Firing circuit shall be kept completely insulated from the ground or other conductors, such as bare wires, rails, pipes or other paths' of stray current. .
19. The fuse shall not be lighted until sufficient stemming has been placed over the explosives to prevent sparks of live match head from coming into contact with an explosive.
20. Before blasting, sufficient warning shall be given to enable the people working In the blasting area to get off the danger zone. All persons, other than blaster, shall leave the danger area at least 10 minutes before the blasting starts. The danger zone shall be suitably cordoned off and flag men posted at important points.
21. No loose materials, such as tools, drilling implements, etc, shall be left on the rock surfaces to be blasted.

22. Blasting in the open shall be carried out during fixed hours every day or on fixed days in the week. This information shall be amply publicized and the following precautions observed:
23. All approaches to the project site, where regular blasting operations are undertaken, shall be sign-posted for warning the public and indicating the days and timings when blasting is to be carried out;
24. All approaches to the project site, shall be closed by barriers at a distance of not less than 400 m, 10 minutes before firing is to take place and
25. Loud wailing note of not less than 1-minute duration shall be sounded on sirens to warn the public before commencement of firing. The end of firing operations must be followed by sounding an all clear signal on the sirens as a continuous long note of not less than 1-minute duration.

Hot bituminous works

The following safety measures should be adopted at the time of Hot bituminous works

1. All necessary precautions should be taken to avoid fire.
2. Those working with bitumen and boilers must be trained in the action to take in the event of ire, and in first-aid treatment and procedure for dealing with bitumen burns.
3. Care to be taken when using and storing materials used for ignition purposes, i.e. matches, lighters.
4. Keep the Hot Work Area clean, tidy and free from any combustible materials.
5. Bitumen is heated only to the temperature required for the particular application.
6. Hot bitumen does not come in to contact with water.
7. Excessive moisture should not present in the aggregate as it may lead to frothing. In case of frothing, addition of some hygroscopic material or anti-frothing agent may be required.
8. Suitable protective clothing, goggles, boots and gloves are supplied to, andused by, operators when handling hot bitumen.
9. Dust is suppressed and reduced to a minimum.
10. Bitumen products and solvents are not spilt on to the ground or into ditches or into water courses.
11. Any bitumen products or solvents which are spilt are immediately removed along with any contaminated soil, etc. and ·disposed off in a place and manner such tpat without effecting environment.
12. Waste or over-heated bitumen or solvents are not disposed off by burning.
13. Because of the highly flammable nature of the solvent, great care is required when using rapid-curing cutback bitumen.

Scaffolding, Ladders, Form work and other equipment

Various safety measures to be adopted while using ladders, formwork and scaffolds are:

1. Every scaffold should be securely supported or suspended and property braced to ensure stability
2. If independent of a building, they should be braced properly.
3. If scaffolds are to be used to a great extent for long periods of time, a'regular plank stairway, wide enough to allow two people to pass, should be erected with handrails on both sides.
4. When work is being performed above a scaffold platform, a protective overhand covering should be provided for the men working on the scaffolds. The protection should not be more than 3m above the scaffold platform and should be made of planks.
5. All scaffolds should be erected and dismantled by workmen who are thoroughly experienced in the erection and dismantling of scaffolding.
6. All scaffolds should be inspected by a competent person av least every three days after erection. and the results of inspections recorded and the records shall be kept available for checking by the Employer's representative.
7. Tags shall be fitted to all scaffolds to show whether they are safe for use or not: All Safe for Use tags shall be signed by a senior site engineer from the Contractor .
8. All scaffolds shall be constructed of sound materials free from patent defect.
9. For wooden ladders, no rung should be fixed to the stringer with nails spikes or other similar fixings. In case of bamboo ladders, rungs may be fixed to the rails with spikes of appropriate design and strength.
10. Ladders employed in heavier trades should not exceed 6m in length. For lighter trades, ladders should not exceed 8m in length.
11. During dismantling of scaffolds, necessary precautions should be taken to prevent injury to persons due to fall of loose materials, bracings and other parts of scaffolds.

12. Care should be taken to see that noun-insulated electric wires exist within 3metres.
13. The supporting balies for formwork should be checked for each individual member. The ballies should be properly braced. Many accidents occur due to negligence on this account.
14. All operators and supervisors of machines should be thoroughly trained in operation the machines and equipment. All persons handling construction equipment should be completely acquainted with the safety aspects of machines and then operation.
15. Safety in terms of both main and auxiliary equipment should be considered at all construction sites. Unauthorized persons should not be allowed to handle or operate any equipment.
16. Ropes, guys and connection should be thoroughly checked before use.

Fabrication and Erection

The following safety measures should be adopted during fabrication and erection:

1. All equipment such as gas cutting and welding sets, drills, power hacks.aws, grinders, etc.
2. Should be checked periodically to ensure their safe working.
3. Moving parts of all equipment should be provided with safety guards.
4. Rubber pipe-lines for oxygen and acetylene gas should ·be regularly checked for leakage or damage. Leakage of gas from regulators, pipe lines or connections with the gas torch should be rectified immediately.
5. Workers engaged in gas cutting and welding operation should wear suitable gloves and aprons and use proper welding screens.
6. Power cables for all equipment should be properly insulated and protected from damage and cuts.
7. Danger signs should be prominently displayed on all poles of overhead electric lines/conductors ·used at site
8. Cut pipes and scrap should be stored at an appropriate place to avoid accidents.
9. All lifting tools and tackles such as wire ropes, U-clamps, shackles, chain-pulley hooks, etc., should be checked thoroughly before undertaking erection work.
10. Worker engaged in erection work should wear helmets and use safety belts to avoid accidents.

Storage

Construction materials should be stored in such a manner as to prevent deterioration, mixing up with foreign matter and to ensure preservation of their quality.

Cement should be stored in damp proof place. The stocks should not be more than 10 bags high and at least 30cms away from the works. Otherwise cement is likely to form into lumps and stacking and removal will be difficult Sand and aggregate should be stacked on firm ground and in bins this will avoid soil and dust getting mixed with sand and aggregate.

Bricks shall not be dumped at site. They should be stacked on level ground to minimize breakage. Height of stacks to be limited to 1.5metre.

Timber including sleeper's runners, scantlings, ballies, plywood, etc., should store separately in neat stacks. Adequate space should have left in between the stacks to avoid fire hazard. Smoking and open fires should be prohibited in timber yards and stores.

Petroleum products should be separately stored. Smoking and open fires would be strictly prohibited when these products and stored. Only essentially required quantities of such products should be stored at site.

Adequate firefighting arrangements should be provided at site particularly in areas where petroleum products and timber are stored.

Explosives must be stored in proper magazines and the prescribed safety measures for handling and storage of explosives should be observed.

Steel reinforcement bars should be stacked section wise. ·

Demolition

Various safety measures to be adopted at the time of demolition of buildings are:

1. On every demolition work, danger signs should be provided all around the structure and doors giving access to the structure. Barricades should be erected around the structure. and at least two exit must be provided for the escape of workmen during any emergency.
2. During night time, lights should be placed around the barricades and entry of unauthorized persons restricted.
3. At the time of demolition work, workers should use all safety appliances such as helmets, goggles, gloves, etc.
4. The process of demolition may weaken the side walls of an adjoining structure and to prevent possible damage, these walls should be supported until permanent protection is provided.
5. The power on all electrical service lines must be shut off and all such lines disconnected before the demolition work is started.
6. If a structure to be demolished has been partially wrecked by fire, explosion, the walls and damaged roofs should be braced suitably.
7. No demolition work should be carried out at night especially when the structure to be demolished is in an inhabited area.

Handling building materials

1. When moving materials manually, workers should attach handles or holders to loads. In addition, workers should always wear appropriate personal protective equipment and use proper lifting techniques.
2. To prevent injury from oversize loads, workers should seek help in the following:
3. When a load is so bulky that employees cannot properly grasp or lift it,
4. When employees cannot see around or over a load, or
5. When employees cannot safely handle a load.
6. Using the following personal protective equipment prevents needless injuries when manually moving materials:
7. Hand and forearm protection, such as gloves, for loads with sharp or rough edges.
8. Eye protection.
9. Steel-toed safety shoes or boots.
10. Metal, fibre, or plastic metatarsal guards to protect the instep area from impact or compression.

Employees should use blocking materials to manage loads safely. Workers should also be cautious when placing blocks under a raised load to ensure that the load is not released before removing their hands from under the load. Blocking materials and timbers should be large and strong enough to support the load safely. In addition to materials with cracks, workers should not us materials with rounded corners, splintered pieces, or dry rot for blocking.

using mechanical equipment to move and store materials increases the potential for employee injuries. Workers must be aware of both manual handling safety concerns and safe equipment operating techniques. Employees should avoid overloading equipment when moving materials mechanically by letting the weight, size, and shape of the material being moved dictate the type of equipment used. All materials-handling equipment has rated capacities than determine the maximum weight the equipment can safely handle and the conditions under which it can handle that weight.

SAFETY MEETINGS

Safety meetings are frequently carried out to review the safety measures at project site at different levels:

- Job Site Safety Meetings

Since conditions are constantly changing on a construction site, regular and frequent jobsite safety meetings are essential to the safety performance on the site. The contractor should be required to host and conduct the meetings to monitor safety activities o_n the project. Two types of jobsite safety meetings commonly included on construction projects are initial project orientation and weekly safety meetings.

- Project safety orientation

New employees to the project should be required to attend an initial project safety orientation that covers the site-specific rules and procedures that must be followed, along with the disciplinary action that may result if such procedures are violated or ignored.

- Weekly safety meetings

Weekly safety meetings should be held by all contractors on the site to review safety conditions and corrective actions taken. The Prime contractor should be required to attend all of these meetings, to hear the concerns that are raised and make sure they are addressed in a timely manner. Documentation in the form of minutes, of all meetings should be required in the contract documents. On larger or complex projects, a separate meeting may be held weekly to discuss safety health and environmental liaison.

- Monthly safety meetings

A monthly safety meeting is normally held at a higher level on larger projects, in order to decide strategic issues rather than the detail of day to day work. Discussion between the most senior management of the participators in the work, to review reports and recommendations and to review minutes of the weekly meetings held on site to identify trends and points where executive action is required to implement necessary changes.

- SAFETY CAMPAIGN

With the increase in the number of accidents in the construction industry, it has become essential to educate people in regard to safety measures. It is the duty of management to provide a safe working environment to workers at construction sites. Unsafe practices must not be tolerated at any cost and proper safeguards must be provided at all times.

Frequent exchange of ideas between the labour and the management would help in minimizing the accident rate.

A continuing education programme using posters, booklets, films lectures at?d discussions with emphasis on supervisory safety training will prove effective in reducing the accident rate. It should be understood both by management and the workers that all accidents occur due to negligence on the part of someone. Accidents result in loss of life, property and reputation of the construction agency apart from financial loss and litigation. Accidents adversely affect the progress of work and have a demoralizing effect on the construction team. Safety play an important role in executing a construction project with speed, economy and efficiency.

EMPLOYER'S LIABILITY FOR COMPENSATION

1. If a personal injury is caused to a workman by an accident in the course of his employment, then the employee should pay the compensation according to the provision· of the act. The compensation is provided if the employer shall have:
2. The injury disabling the workers for a period more than three days.
3. Have the injury resulting in death caused by an accident, if the worker being not. under the influence of drinks or drugs.
4. No disobedience of the worker to the orders issued for the safety of the workers.
5. No removal of any safe guard.
6. If the worker refuses to undergo medical examination and other medical free of charge and by a medical qualified doctor and if any injury resulted in disablement of the worker, then the worker will not be entitled for compensation.

SAFETY THROUGH LEGISLATION

In construction industry the legislation is needed for:

1. Improving the working condition
2. Determining the terms of employment
3. Providing social security i.e. compensation
4. Regulating the relationship between employers and employees
5. Safe guarding the lives of workman for the welfare of worker

Some of the important Acts are:

a) Payment Wages Act (1936)
b) Minimum Wages Act (1968)
c) Workmen Compensation Act (1923)
d) Industrial Dispute Act (1967)
e) Indian Trade Union act (1926)
f) Factories Act (1948)

- **Workmen Compensation Act (1923)**

This act covers all persons employed in construction, maintenance, repairs or demolition of any building, dam, roads, bridges, tunnel works, plastering operations, etc.

The salient features of the Act are

a) The Act defines partial and total disablement and fatal accidents while on duty.
b) It sets a schedule of compensation to be paid for various injuries.
c) The Act protects workers against injuries arising out of and in the course of employment. But no compensation is payable in respect of
d) Injury which will not result in partial or total disability
e) Non-fatal injury caused by the worker under the influence of alcohol
f) The Act identifies important occupational diseases.
g) The Act decides the quantum of loss of earning capacity in terms of p[illegible]entage in the event of injury.
h) The Act prescribes rate of compensation to be paid by employer to the injured or deceased person in proportion to the quantum of injury.
i) The Act provides appointment of commission for workmen's compensation whose functions are:
j) Settlement of disputed claims
k) Disposal of claims in case of fatal cases
l) Revision of periodical payments
m) It is liable on the employer to pay compensation to workers as per provisions of the Act, failing

Indian Factories Act (1948)

The Factories Act 1948, contains provisions in respect to health of workers, safety, welfare of labour, working hours, leave with wages concerning the workers employed in factories, etc. In this Act, is defined as the precincts where 10 or more workers. are engaged for over 12 months in the manufacture of a product with the use of power. Hence this Act does not hold good for civil construction unless a rule is made making the Factories Act applicable to construction industry.

Indian Trade Union Act (1926)

Trade union means any association of persons temporarily or permanently formed primarily for the purpose of regulating the relations between workmen and employers or between workmen and workmen or between employers and employers or for imposing restrictive conditions on the conduct of any trade or business. Some of the important trade unions in India are listed below:

a) All India Trade Union Congress (AITUC)
b) Indian National Trade Union Congress (INTUC)
c) Hind Mazdoor Sabha (HMS)
d) United Trade Union Congress (UTUC)
e) Centre of Idian Trade Union (CITU)
f) Bharatiya Mazdoor Sangh(BMS)

The following are objectives of a trade union in India.

- The wage formula for the workers should be based on the cost of living and the prevailing standards of living in India.
- To improve the working conditions, the workers should have the following:
- limited working hours and leaves facilities.
- education & other welfare facilities.
- To ensure that the workers get adequate bonus.
- To defend individual workers from improper treatment.
- To ensure the workers security of employment and justice when punishment is imposed.

Ethics

Ethics can be defined as the branch of philosophy that defines what is good for the individual and for society and establishes the nature of obligations, or duties, that people owe themselves and one another. It involves defining, analysing, evaluating and resolving moral problems and developing moral criteria to guide human behaviour.

Ethics is concerned with truth and justice, concerning a variety of aspects like the expectations of society, fair competition, public relations, social responsibilities and corporate behaviour. Some of the universally accepted ethical principles. are honesty, integrity, fulfilling commitments, abiding by agreements, open minded and willing to admit mistakes, being caring and compassionate, having respect for human dignity, responsible pursuit of excellence and being accountable for one's decisions and their consequences.

Aspects of ethics

There are two aspects to ethics:

- The first involves the ability to discern right from wrong, good from evil and propriety from impropriety.
- The second involves the commitment to do what is right, good a[illegible]d proper. Ethics entails action.

Significance of Ethics

The study of ethics can offer some understandings of basic ethical principles and strategies of moral reasoning that can be used in discussion and debate in support of moral issues positions. Significance of ethics listed below:

- Ethics Set/Establish moral standards/norms of behaviour.
- Ethics Suggest moral behaviour, prescribes recommendations about Do's & Don'ts.
- Ethics create credibility and image for the corporations with the public.
- Ethics improve the employee morale and enhance the credibility of the management with the employees.

Benefits of Ethics at Work Place

a) Ethics at work place brings discipline and order. It improves and strengthens relationships amongst superiors, peers and subordinates. It enhances commitment and accountability of the top managers and ensures safety of interest of its various stakeholders.
b) Ethics programmes support employee growth and also the more emotionally healthy executives are higher on ethics work.
c) Work ethics promotes team work and productivity as employees feel strong alignment between their values and those of the organisation.
d) Ethics at work place helps manage values associated with quality management, strategic planning and diversity management. TQM includes high priority on certain operating values, e.g. trust among employees, customers, performance reliability, measurement and feedback.
e) Ethics programmes promote a strong public image as employees operate with integrity and self-respect. Ethical values build socially responsible business and commercially successful.

MORALS

Morals are the standards, norms and principles for right and wrong concepts. They are standards that help to guide behaviour. These issues related to these standards arc based on science and logic. In other words, these arc scientific standards developed by the society.

Moral reasons include

a) Respecting others and ourselves,
b) Respecting the rights of others,
c) Keeping promises,
d) Avoiding unnecessary problems to others and avoiding cheati.ng and dishonesty,
e) Showing gratitude to others and encourage them to work.

ETHICS AND MORALITY

Ethics is often used in connection with the activities of organisations and with professional codes of conduct whereas Morality, on the other hand, is more often used in connection with the ways in which individuals conduct their personal, private lives, often in relation to personal financial probity, lawful conduct and acceptable standards of interpersonal behaviour (including truthfulness, honesty, and sexual propriety).

Sl. No.	Ethics	Morality
1	The term ethics is rooted in the Greek ethos, meaning custom or common practice.	The word morality derives from the Latin mores, meaning custom, habit, and way of life.
2	The rules of conduct recognized in respect to a particular class of human actions or a particular group, culture, etc. It defines how thing are according to the rules.	Principles or habits with respect to right or wrong conduct. It defines how things should work according to an individual's ideals and principles.
3	Refers only to professional behavior.	Refers only to personal behaviour.
4	Ethics referring to the examination, justification, and critical analysis of morality.	Morality referring to values and beliefs about what is right and wrong, good and bad, just and unjust.
5	Thrust is on influence, education, training through codes, guidelines, and correction.	Thrust is on judgment and punishment, in the name of God or by laws.
6	Ethics generally uniform.	Morals may vary from society to society and culture to culture.
7	Example: Notions or beliefs about tastes, customs, and towards laws.	Example: Character flaw, corruption, extortion, and crime.

PROFESSIONAL ETHICS

Profesional ethics is a codified formal system or set of rules which are explicitly adopted by a group of people. It encompases how professionals should behave in their professional work and how they conduct themselves.

The main characteristics of a professional ethics are given below:

1. Professional ethics is based on certain ethical values and norms which a professional is supposed to follow.·
2. Professional ethics speaks about managing values and conflicts among professionals
3. Most of the ethical dilemmas laced by managers in the workplace are highly complex.
4. The value of code of ethics to an organization is its priority and focus regarding certain ethical values m that workplace. Managing ethics in the workplace includes every one working as a team to help each other and remain ethical at work.
5. Profit maximization, expanding market share, etc. can be very strong influences on morality. Laws, regulations and rules influence behaviours to be more ethical.

Objectives

Improvement of the cognitive skills:

1. Cogent moral reasoning.
2. Moral coherence & imagination.
3. Moral communication, to express and support one's views to others.

To act in morally desirable ways, towards moral commitment and responsible conduct:

1. Willing and able to be morally responsible.
2. Respect for persons.
3. Tolerance of diversity.
4. Integrity.

PROFESSIONAL ETHICS AND HUMAN VALUES

Professional ethics is necessary to reveal, sustain and enhance certain basic human values.

These values are kindness, care and compassion, trust and reliability, truthfulness and honesty, justice and fairness, performance of a duty for the benefit of others, non-violence and nori-injury, and accountability and social responsibility.

ENGINEERING ETHICS

The term professional ethics is interchangeable with engineering ethics. Engineering Ethics deals with the moral issues and decisions confronting individual or organizations engaged in engineering. The questions about the moral ideals, character, policies and relationships of people and corporations involved in technological activities. Engineering Ethics is the activity and discipline aimed at understanding the moral values that may be used to guide engineering practice, resolving moral issues in engineering and justifying moral judgements concerning engineering.

Objectives

To understand that moral values that ought to guide the Engineering profession, resolve the moral issues in the profession, to justify the moral judgment concerning the profession. It is intended to develop a set of beliefs, attitudes, and habits that engineers should display concerning morality, to increase one's ability to deal effectively with moral complexity in engineering practice.

As related to engineering ethics, these skills include the following:

1. Moral awareness: Proficiency in recognizing moral problems and issues in engineering.
2. Cogent moral reasoning: Comprehending, clarifying, and assessing arguments on opposing sides of moral issues.
3. Moral coherence: Forming consistent and comprehensive viewpoints based on consideration of relevant facts.
4. Moral imagination: Discerning alternative responses to moral issues andfinding creative solutions for practical difficulties.
5. Moral communication: Precision in the use of a common ethical language, a skill needed to express and support one's moral views adequately to others.
6. Moral reasonableness: The willingness and ability to be morally reasonable.
7. Respect for persons: Genuine concern for the well-being of others as well as oneself.
8. Tolerance of diversity: Within a broad range, respect for ethnic and religious differences and acceptance of reasonable difference in moral perspectives
9. Moral hope: Enriched appreciation of the possibilities of using rationaldialogue in resolving moral conflicts.
10. Integrity: Maintaining moral integrity and integrating one's professional life and personal convictions.

VALUES

Values are the rules by which we make decisions about right and wrong, should or shouldn't, and good or bad. The word 'value' expresses the qualitative significance we assign to ideas, feeling, activities and experiences. Value are the evaluative standards we use for deciding what is right and what is wrong, what is good and what is bad, what is desirable and what is undesirable? The quality of living space we create for ourselves is determined by our system of value.

Human Values Vs. Moral Values

a) Moral values regard matters of right and wrong whereas human values help a person to distinguish between right and wrong.
b) Moral values are constant and unchanging whereas human values change from person to person and from time to time.
c) Moral values are for self-development and self-discipline· whereas human values are about how we treat others in society.
d) Moral values can be taught whereas human values are inherited values and are intact in all of us.

INTEGRITY

Integrity is one of the core qualities that any professional practitioners should possess. It also refers to honesty and open mindedness either with oneself or others. Mostly integrity involves the discovery of truth and its communication. In specific terms, integrity refers to the capacity to communicate the truth in proper manner so, that it enables the client and others to make informed decisions. Integrity as well as honesty are very vital for the development of trust. Integrity plays its important role in different situations and contexts, in order to lead to the consistency of character and operation.

Integrity is one of the self-direction virtues on commitment and on putting understanding to action. Moral integrity refers to the unity, which is a consistency among human attitudes, emotions and conduct in relation to justified moral values. Thus integrity acts as a link between responsibility in private and public life

The integrity of the engineers is most essential in the following works:

a) Engineering research and testing,
b) In the use of intellectual property, ·
c) Client professional confidentiality,
d) Expert testimonials and
e) Failure to inform the public.

WORK ETHICS

Work ethic is a set of values based on hard work and diligence. It is also a belief in the moral benefit of work and its ability to enhance character. A work ethic may include being reliable, having initiative, or pursuing new skills or maintaining social skills.

In general, employees need some jobs and wages, but they also desire to be treated humanely with dignity. Moreover, they look for a workplace which is safe and healthy, that respects their privacy, and provides meaningful work, and offers some security during retirement periods.

Work ethics are laid down by the organization to bring uniformity in the behaviour of workers and managers. A good work ethic creates a work. culture in the organization and increases the productivity. This value helps the engineer to work hard, discipline and build team in an organization.

Factors That Demonstrate a Strong Work Ethic

- *Integrity:* Integrity stretches to all aspects of an employee's job.
- *Sense of Responsibility:* A strong sense of responsibility affects how an employee works and the amount of work he does.
- *Emphasis on Quality:* Some employees do only the bare minimum, just enough to keep their job intact. The employee's commitment to quality improves the company's overall quality.
- *Discipline:* It takes a certain level of commitment to finish your tasks every day. An employee with good discipline stays focused on his goals and is determined to complete his assignments.
- *Sense of Teamwork:* An employee with a high sense of teamwork helps a team meet its goals and deliver quality work.

DUTIES AND RIGHTS

Duties are moral obligations. The main duties that a person should perform are as follows:

- Respect for truth,
- Respect for laws,
- Respect for society and the state,
- Respect for life,
- Respect for freedom and personality.

Right is the entitlement or empowerment to do certain things rights are moral claims of individuals recognized by society. There are many types of rights, like, legal, constitutional, fundamental and moral. Right gives us the liberty and choice and empowerment. There are many basic rights given to every citizen of a country. These rights include life and security, education, freedom of speech, employment, express opinion, legal remedies, contractual right, equality and human rights. Rights are based on several sources of authority. Moral rights give individuals the (freedom to pursue one's own interest so long as the interests of others are not violated. Moral rights need to be justified, and they are necessary for self-realization. These rights are essential for the highest personal good and social benefits.

The two phrases 'rights' and 'duties' co-exist with each other. In other words, the rights and duties are two sides of the same coin, to regulate the values and behavioural patterns of an individual.

On one side, rights are important in developing the human personality and behaviour. The duties on the other hand, direct the individual’s importance of their contribution for the promotion of social good. In a way duty targets at the realization of rights guaranteed by various laws and regulations both nationally and internationally.

Engineers have many types of moral rights apart from their responsibilities. The rights and responsibilities to some extent coincide with each other. These rights are as follows:

a) Human Rights: These should be possessed by engineers by virtue of being people or moral agents. These rights include the basic rights to pursue legitimate personal interests, right to make a living and right to privacy.

b) Professional Rights: These rights are possessed by virtue of being professionals having special moral responsibilities.

Examples of such rights are:

- Right to form and express professional judgment without any obstacles.
- Right to deny participating in unethical activities.
- Right to express professional judgment, including the right to disagree.
- Right to warn the public about dangers.
- Right to fair recognition and remuneration for services.
- Right to talk freely about the work.
- Right to get involved in the activities of professional societies.

Sl. No.	General Ethics	Engineering Ethics
1.	Ethics is an activity which concerns with making investigations and knowing about moral values, finding solutions to moral issues and justifying moral issues and justifying moral judgments.	Like ethics, engineering ethics also aims at knowing moral values related to engineering, finding accurate solutions to the moral problems in engineering and justifying moral judgements of engineering.
2.	Ethics is a means of contrasting moral questions from non-moral problems.	Engineering ethics gives total view of the moral problems and how to solve those issues specifically related to engineering field.
3.	Ethics is also used as a means of describing the beliefs, attitudes and a habit related to an individual's or group's morality. Eg: Ethics given in the Bhagavat Gita or the Bible or the Quran.	Engineering ethics is also using some currently accepted codes and standards which are to be followed by the group of engineers and engineering societies.
4.	As per the definition of dictionaries - 'moral principles' is about the actions and principles of conduct of the people i.e., ethical or unethical.	Engineering ethics also concerns with discovering moral principles such as obligation, rights and ideas in engineering and by applying them to take a correct decision.

CONFLICTS OF INTEREST

Conflict of interests has been a subject of extreme importance in recent scandals in which employees, agents, and professionals failed to exercise proper judgment on behalf of their principals.

Conflicts of interest are the situations where professionals have self-interest. If self-interest is given importance, it may keep them away from meeting their obligations to their employers or clients. i.e., a conflict of interest occurs when the employee has more than one interest.

It can be stated as, "A conflict of interests occurs when the independent judgment of a person is swayed, or might be swayed, from making decisions in the best interest of others who are relying on that judgment".

Conflict of interest created by Interest in other companies

- Serving as a consultant for a competitor's company.
- Personal interest, such as making private investments in a competitor's company. Having partial ownership or substantial stock holdings in the competitor’s business.
- It may not arise by merely hav.i.ng a spouse working for sub-contractor to one's company, but it will arise if one's job also includes granting contracts to that subcontractor.
- Tempting customers away from their current employer, while still working for them to form their own competing business.
- Moonlighting usually creates conflicts when working for competitors, suppliers or customers but does not conflict when working for others without affecting the present employer's business.

Conflicts of interest created by Insider information

- Using inside information to set-up a business opportunity for oneself or family or friends.
- Buying stock in the company for which one works is not objectionable but it should be based on the same information available to the public. •
- The use of any company secrets by employee to secure a personal gain threatens the interest of the company.

Types of Conflicts of Interest

a) Actual conflict of interest
b) Potential conflicts of Interest
c) Apparent conflict of Interest
d) Interest in other companies
e) Moonlighting
f) Insider information

I. Actual conflict of interest

It is based on weaker judgment and service. It refers to the loss of objectivity in decision making and inability to faithfully discharge professional duties to employer. For example, an engineer may have financial interest or returns in the company, the suitability of which he has to judge for procurement of materials or any specific contract as the case may be.

II. Potential conflicts of Interest

There are situations where the interest of an employee extends beyond the current employer and into the interest on one's spouse, relative or friend.

- Bribe

  A bribe is a substantial amount of money or goods offered beyond a stated business contract with the aim of winning an advantage in gaining or keeping the contract, and where the advantage is illegal or otherwise unethical. Bribes

are illegal or immoral because they are substantial enough to threaten fairness in competitive situations. Since bribes can bias judgments, companies have given elaborate guidelines for their employees, illustrating acceptable and unacceptable gifts. But in some company's officials are prohibited by law from accepting anything of value.

- Gifts

  Gifts are riot bribes as long as they are small gratuities offered in the normal conduct of business. A gift one believes is given in friendship rather than for influence. Often companies give gifts to employees of government agencies or partners in trade. Many such gifts are unobjectionable.

  Engineers should not accept money directly or indirectly from contractors, or their agents in connection with the work. This is one of the guidelines. If one receives any gifts which will cause an embarrassing consequence for the company when made public, then the gift is considered as a bribe. Entertainment, travel and other social functions give rise to special difficulties. Many companies encourage their employers to form social relationships with the suppliers and the clients, in order to enhance their business interest. This is also another form of bribery. Engineers are the objects of bribery attempts.

Bribe	Gift
1.Given before	Given after
2.Large amount	Small amount, articles of daily use.
3. Usually poor quality of product.	May be good or high quality.
4. Given in secret.	Given in open.
4. Expect undue favour.	Expect a favour or thanking for the favour.
5. Damages the goodwill and reputation of organization.	No damage is involved to organization.

III. Apparent conflict of interest

Apparent conflict of interest may occur, when an engineer is paid based on a percentage of the cost of the design and there is no incentive for him to cut-costs. In this situation, it appears that the engineer is making the design more expensive in order to make a large commission for himself.

The distrust caused by this situation compromises the-engineer's ability to do this and future work and leads to a situation for questioning his judgment.

There are some other forms of conflicts of interest. They are as follows:

IV. Interest in other companies

This kind of conflict of interest consists of having an interest in the business of a competitor or a sub-contractor. For example, working as an employee or consultant for the competitor or subcontractor, and partial ownership or large stock holding in the business of competitors.

Holding a few shares of competitor's business will not create conflict of interest, but when the number of stock holdings increases it will create a conflict of interest. Likewise, if the wife of a person works for a sub-contractor, there will not be any form of conflict of interest, but at the same time, a conflict of interest arises if that person grants contracts to that sub-contractor. This kind of outside interest may be possible when an engineer prepares to leave a company in order to form his own company to compete with the former company, where he worked.

V. Moonlighting

It deals with a person who is working in two companies. This will break the rights, to pursue a person's self-interest. Moonlighting will produce the conflict of interests only when a person is working for competition, suppliers or even customers. Another effect of moonlighting is that it leaves the person exhausted and harms the job performance in both places.

VI. Insider information

It is a kind of sensitive conflict of interest which consists of using "inside" information to make an advantage or to start a new business opportunity for oneself, one's family or one's friends. The information may be of a person's own company or another company with which he does business.

For example, holding stocks of the company in which a person works will not be objectionable. But that ownership must be based on the same information available to general shareholders of the company and not more than that. Thus the use of company's secrets by its employees to get a personal benefit is always dangerous in the interest of the company and will create a conflict of interest between the employer and employee.

CONFIDENTIALITY

Confidentiality is an ethical principles associated with several professions. Employed engineers must keep information about their companies and clients confidential. They are expected not to leak out any confidential information to unauthorized people both inside and outside the company.

confidential information with respect to business includes:

a) Any information that the employer or client would like to have kept secret in order to compete effectively against business rivals. i.e., data concerning the company's business or technica1 processes.
b) Most information about how a business is run, its products and its suppliers, directly affects the company's ability to compete in the market place. Such information can be used by a competitor to gain advantage or to catch up.
c) Test results and data.
d) Information about upcoming unreleased products.
e) Designs or formulas for products.
f) The number of employees working on a project and the identity of suppliers.
g) Marketing strategies.
h) Production costs:
i) Production yields.

There are two terms that are related to confidentiality, they are

VII. Privileged information

Information available only on the basis of special privilege such as granted to an employee working on a special assignment. It covers information that has not yet become public or widely known within an organization.

VIII. Proprietary Information

"Proprietary Information" is an information that a company owns. It is the information owned by the proprietor in a legal sense. This means "property" or "ownership". This is primarily used in legal sense. Also called Trade Secret. A trade secret can be virtually any type of information that has not become public and which an employer has taken steps to keep secret.

It may be data about designs and technical processes and so on. Patents differ from trade secrets. Patents legally protect some specific products from being manufactured and sold by other competitors without any written permission of the patent holder.

No such protection exists in the case of trade secrets. A patent holder has legally protected monopoly power. But in case of trade secrets, the legal protection · is limited to keeping relationships of confidentiality and trust.

Effect of change of job on confidentiality

a) Employees are obliged to protect confidential information regarding former employment, after a change of job.
b) The confidentiality trust between employer and employee continues beyond the period of employment
c) But, the employee cannot be forced not to seek a change of job.
d) The employer's right to keep the trade secrets confidential by a former employee should be accepted at the same time, the employee's right to seek career advancement cannot also be denied.

WHISTLE BLOWING

A whistle-blower (whistle-blower or whistle blower) is a person who exposes any kind of information or activity that is deemed illegal, unethical, or not correct within an organization that is either private or public. The term whistle-blower comes from the whistle a referee uses to indicate an illegal or foul play.

Exposing misconduct, illegal, or dishonest activity is a big fear for public employees because they feel they are going against their government and country. These laws were enacted to help prevent corruption and encourage people to expose misconduct, illegal, or dishonest activity for the good of society

The reasons for whistleblowing may be:

a) Violation of company policy/rules, law, regulation
b) Threat to public interest
c) Threat to national security
d) Fraud and corruption.

Types

Whistle blowing may be broadly classified into two types: 1. Internal whistle blowing and 2. External whistle blowing. Those who become whistle-blowers can choose to bring information or allegations to surface either internally or externally.

Internal Whistle blowing

Internally, a whistle blower can bring his/her accusations to the attention of other people within the accused organization. Individuals who expose information regarding wrongdoing, fraud, corruption or mismanagement and report such acts inside an organization i.e. to the Chief executive officer or any member of the senior management are called as internal whistle blowers.

Most whistle-blowers are internal whistle-blowers, who report misconduct on a fellow employee or superior within their company., One of the most interesting questions with respect to internal whistle-blowers is why and under what circumstances do people either act on the spot to stop illegal and otherwise unacceptable behaviour or report it..

External Whistle blowing

Individuals who report of such wrongdoings or misconduct outside of the ·organisation i.e. to the media, law enforcement agencies, etc. are called as external whistle-blowers. Externally, a whistle-blower can bring allegations to light by contacting a third party outside of an accused organization. Whistle-blowers can reach out to the media, government, law enforcement, or those who are concerned.

In these cases, depending on the information's severity and nature, whistle-blowers may report the misconduct to lawyers, the media, law enforcement or watchdog agencies, or other local, state, or federal agencies.

Individual harm, public trust damage, and a threat of national security are three categories of harm that may come to whistle-blowers. Revealing whistle-blower identities automatically puts their life in harm's-way. They face stiff reprisal and retaliation from those who are accused or alleged of wrongdoing.

MODULE - 4

ENGINEERING ECONOMY

INTRODUCTION TO BASIC ECONOMICS

The word Economics has been derived from two Greek words, namely. Oikus and Nemein. Oikus means "household" and Nemein ineans "management".

Economics is the science that deals with the production and consumption of goods and services and the distribution and rendering of these for human welfare. The following life the economic goals.

- A high level of employment
- Price stability
- Efficiency
- An equitable distribution of income
- Growth

Management of money is critical to the success of any company. Therefore, a knowledge of the role money plays in the day to day operations of a construction company is of the utmost importance to a construction manager. Issues such as the borrowing of money, expenditure of money for expansion of company operations. Construction firms acquire funds, as most individuals do, by borrowing money from banks and similar lending resources. It is typical for instance, to borrow money to finance operations in the field pending receipt of progress payments from the client.

Interest and its application over time impact the cost of any transaction involving the lending, borrowing, and investment of money. In fact, the cost of money and_ the time during which money is tied up in any business decision process are crucial financial management factors.

CONCEPT OF ENGINEERING ECONOMICS

Science is a field of study where the basic principles of different physical systems are formulated and tested. Engineering is the application of science. It establishes varied application systems based on different scientific principles. Price has a major role in deciding the demand and supply of a product. Hence, from the organization's point of view, efficient and effective functioning of the organization would certainly help it to provide goods/services at a lower cost which in turn will enable it to fix a lower price for its goods or services

BASIC ECONOMIC PROBLEMS

1. Allocation of resources:

The wants or requirements of an individual, business firm or the government far exceed the resources available to satisfy these needs. So with scarce resources, a choice has to be made regarding which all wants should be satisfied. This allocation of resources has different objectives in different countries.

2. By what methods are goods produced:

Goods are produced, in various ways. For example, agricultural goods can be produced by using more of labour and less of capital or more capital and less of labor. When the former is used, it is known as labour intensive method while the latter is known as capital intensive method.

3. Distribution of goods

After the goods are produced, the question arises as to who is going to receive these and in what proportion.

4. Utilization of resources:

The next question is arc the resources of the country, such as Men, material and money, fully utilized or are they underutilized. This leads us to the question of employment of resources. When resources remain unuti]ized, goods and services do not get produced the cost of which is very huge for the society to hear. The resources should not only be put to use, but also efficient utilization of these is necessary.

5. Consumption:

Consumption means the use of resources or wealth in order to satisfy one's needs. It also means destruction of resources by human beings.

6. Production:

Consumption is only possible when there is production. As consumption is destruction of utilities similarly production is creation of utilities to satisfy human wants. Production is possible by the combination of four factors: land, labour, capital, and organization.

7. Exchange and Distribution:

Distribution means distribution of national income among various factors of production. The land owners get rent, labourers get wages, suppliers of money get rate of interest and organizers get profit.

8. Money and Banking:

Money is generally accepted by all as a means of payment, medium of exchange, standard of deferred payment, and store of all values.

9. Modern economy is based on money.

Economic activities are measured in terms of money. Bank is the financial institution that accepts money in the form of deposits and lends it for productive purposes.

10. International Trade:

When nations trade among themselves, it is denoted as international trade. No country can produce all the commodities it requires. So in order to satisfy various needs a large number of items are depending on international trade.

Definition of Engineering Economics

- Engineering economics deals with the methods that enable one to make economic decisions towards evaluation of design and engineering alternatives. It helps in examining the relevancy of a project, estimating its value and justifying it from the engineering viewpoint.
- Engineering economics provides methods that enable one to take economic decisions towards minimizing costs and/or maximizing benefits to business organizations.

Engineers use the knowledge of engineering economy in performing analysis, synthesizing and drawing conclusions as they work on projects of all sizes. The success of engineering and business projects is normally measured in terms of financial efficiency. A project will be able to achieve maximum financial efficiency when it is properly planned and operated with respect to its technical, social, and financial requirements. Since engineers understand the technical requirements of a project, they can combine the technical details of the project and the knowledge of engineering economy to perform economy study to arrive at a sound managerial decision.

PROBLEM SOLVING AND DECISION MAKING

An engineering economist draws upon the accumulated knowledge of engineering and economics to fashion and employ tools to identify a preferred course of action. There is still considerable debate about their theoretical bases and how they should be used. There are many aspects to consider and many ways to consider them.

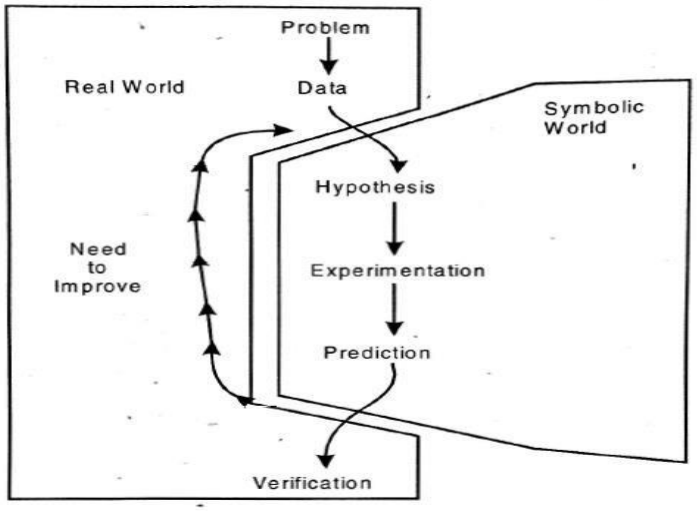

Fig. 4.1. Problem solving process

The fundamental approach to economic problem solving is to elaborate on the time honoured scientific method.

The method. is anchored in two worlds: the real, everyday working world and the abstract, scientifically oriented world as shown in Fig. 4.1.

Problems in engineering and managerial economy originate in the real world of economic planning, management, and control. The problem is confined and clarified by data from the real world. This information is combined with scientific principles supplied by the analyst to formulate a hypothesis is symbolic terms. By manipulating and experimenting with the abstractions of the real world, the analyst can simulate multiple configurations of reality that otherwise would be too costly on too inconvenient to investigate.

From this activity a prediction usually emerges. The predicted behaviour is converted back to reality for testing in the form of hardware designs, or commands. If it is valid, the problem is solved. If not, the cycle is repeated with the added information that the previous approach was unsuccessful.

PRINCIPLES OF ENGINEERING ECONOMY

The following are seven principles of Engineering Economics.

Principle 1 : Develop the alternatives

The choice (decision) is among the alternatives. The alternatives are to be identified and then defined for subsequent analysis. A decision situation involves making a choice among two or more alternatives. Developing and defining the alternatives for direct evaluation is important because of the resulting impact on the quality of the decision.

Principle 2: Focus on the differences

Only the difference in expected future outcomes among the alternatives is relevant to their comparison and should be considered when making the decision. If all prospective outcomes of the feasible alternatives were exactly the same, then there would be no basis or need for comparison. We would be indifferent to the alternatives and make decision on the basis of random selection.

Principle 3: Use a consistent viewpoint

The prospective outcomes of the alternatives, economic and other, should be consistently developed from a defined viewpoint (perspective). It is important that the viewpoint for a particular decision be first defined and then used consistently in the description, analysis and comparison of the alternative.

Principle 4: Use a common unit of measure

Using a common unit of measurement to enumerate as many of the prospective outcomes as possible will make easier the analysis and comparison of alternatives.

Principle 5: Consider all relevant criteria

Selection of a preferred alternative (decision-making requires the use of a criterion or several criteria). The decision process should consider both the outcomes enumerated in the monetary unit and those expressed in some other unit of measurement made explicit in a descriptive manner.

Principle 6: Make uncertainty explicit

Uncertainty is inherent in projecting for estimating the future outcomes of the alternative recognized m their analysis and comparison.

Principal 7: Revisit your decision

Improved decision-making results from an adoptive process. To the extent practicable, the projected outcomes of the selected alternative should he subsequently compared with the actual results achieved.

- Problem recognition, definition and evaluation
- Development of feasible alternatives
- Development of cash flow for each alternative
- Selection of criteria
- Analysis and comparison of the altemativ.es
- Selection of the preferred alternative
- Performance monitoring and post-evaluation results

MICROECONOMICS AND MACROECONOMICS

The subject matter of Economics has been divided into two parts Microeconomics and Macroeconomics.

Microeconomics deals with the analysis of individual units and small groups of individual units such as individual income, price and demand for a product, supply of a goods, etc. Two conditions of the mixed economy that are most important for microeconomics, including efficiency, and equity, that are generally desired by society and pursued by governments throi1gh economic policies

Macroeconomics is the study of economics system as a whole. It deals with the study of aggregates covering the entire economy such as national income, national product, general price level, employment, aggregate demand, aggregate supply, and so on.

Macroeconomics is focused on the movement and trends in the economy as a whole, while in microeconomics the focus is placed on factors that affect the decisions made by firms and individuals. The factors that are studied by macro and micro will often influence each other, such as the current level of unemployment in the economy as a whole will affect the supply of workers.

DIFFERENCE BETWEEN MICROECONOMICS AND MACROECONOMICS

S.No.	Basis of	Microeconomics	Macroeconomics
1.	Definition	Microeconomics if the study of particular firm, particular household, individual price, wage, income, industry and particular commodity.	Macroeconomics is concerns with such variables as the aggregate volume of the output of an economy, with the extent to which its resources are employed, with the size of national income and with the géneral price level.
2.	Objectives	The objective of microeconomics is optimum allocations of resources.	The objective of macroeconomics is full employment and evelopment of economic resources.
3.	Demand depends	Consumer's expectations and the price of the particular product.	Household's expectations and the price of the all products.
4.	Supply depends	Expectations of profits by firms and the price of the good or services	Producer's expectations and total productions costs
5.	Nature of activity	Microeconomics is based on disaggregation.	Microeconomics is based on aggregation
6.	Assumptions	Microeconomics is assumed that there is full employment.	Macroeconomics is assumed that the allocation of resources is constant.
7.	Equilibrium	Equilibrium occurs when the quantity demanded equals the quantity supplied.	Equilibrium in an economy occurs when the aggregate demand equals the aggregate supply.
8.	Price	There is a price for each good or service that will clear the market.	There is a price level in an economy at which the aggregate demand will equal aggregate supply.

DEFINITIONS FOR ENGINEERING ECONOMIC TERMS

- **Present Worth**

Present worth, Present Value and Principal all represent the value of money at time zero, which is the beginning of the engineering economic analysis period under investigation. In formulas, the present sum of money may be labelled as PW, PV, P or P_0. All four of these symbols represent the same initial time frame, which is time zero.

- **Future Worth**

Future worth (FW), future value (F) or (F0) represent the future sum of money including principal plus interest. Future values occur at any point in time in the future and they are usually designated as the end of the engineering economic analysis period if they are the last activity to occur in the analysis period. The future worth of present values, and payments and disbursement streams, includes interest on the money interested or withdrawn from an account.

- **Annuities: Uniform Series**

Annuities represent a payment or disbursement stream deposited or withdrawn at equal set intervals such as daily, weekly, monthly, or yearly. As each annuity is deposited into an interest bearing account, it begins to draw interest at the end of each compounding period. The annuities deposited, plus any previous interest earned, are used when calculating the interest on the funds in the account at the end of each period.

Annuity(A) is characterized by

- Equal payment
- Equal periods between payments and
- The first payment occurring at the end of the first period.

A series of payments made at the beginning instead at the end of each period is referred to as annuity due. In this case, calculation will be slightly different from general annuity. It will differ in the following ways

- The series should be divided into two equal parts.
- The first payment should be treated separately.
- The remaining payments should follow the rule of general annuity calculation.

- **Salvage value**

The salvage value is what an asset is worth at the end: of its useful life. In engineering economic analysis, the salvage value is represented by a future value occurring at the end of the analysis period. It is not always possible to accurately determine what a future salvage value of an asset will be; therefore, for the purpose of an analysis, a reasonable salvage value is assumed and included in the calculations. Many times, salvage values for similar items from previous projects are incorporated into a new analysis.

- **Sunk Cost**

Sunk cost is a difficult concept to understand when performing engineering economic analysis. Sunk cost represents funds not recoverable because they have already been expended sometime in the past. This is known as the past cost of an equipment/asset.

- **Marginal Cost**

Marginal cost of a product is the cost of producing an additional unit of that product.

- **Marginal Revenue**

Marginal revenue of a product is the incremental revenue of selling an additional unit of that product.

- **Opportunity Cost**

In practice, if an alternative (A) is selected from a set of competing alternatives (A,B), then the corresponding investment in the selected alternative is not available for any other purpose. If the same money is invested in some other alternative (B), it may fetch some return. Since the money is invested in the selected alternative (A), one has to forego the return from the other alternative (B). The amount that is foregone by not investing in the other alternative (B) is known as the opportunity cost of the selected alternative (A). So the opportunity cost of an alternative is the return that will be foregone by not investing the same money in another alternative.

- **Capitalized Cost**

Capitalized cost is a term used in engineering economics and it refers to the present worth of a project with an infinite life. In other words, capitalized cost is a lump sum of money needed today (t = 0) to support an infinite life project simply on earned interest only. The concept of capitalized cost usually applies to public projects such as airports, bridges, dams, and long-term private projects such as hospitals and private airports. Since most present value interest factors are the same after 50 to 100 years depending on interest rates, the concept of perpetual annuity may be used to detem1ine the present worth of infinite life projects as capitalized cost.

Since it is difficult to calculate the capitalized cost of a project with a stream of infinite cash flows when they vary from year to year or they occur irregularly, it is necessary first to convert those cash flows to a uniform series or annuity and then use the perpetual annuity concept to calculate the capitalized cost of that project.

INTEREST FORMULAS

Interest rate can be classified into simple interest rate and compound interest rate. In simple interest, the interest is calculated, based on the initial deposit for every interest period. In this case, calculation of interest on interest is not applicable. In compound interest, the interest for the current period is computed based on the amount (principal plus interest up to the end of the previous period) at the beginning of the current period. The notations which are used in various interest formulae are as follows:

- P = principal amount
- n = No. of interest periods
- i = interest rate (It may be compounded monthly, quarterly, semiannually or annually)
- F = future amount at the end of year n
- A= equal amount deposited at the end of every interest period
- G = uniform amount which will be added/subtracted period after period to/ from the amount of deposit A 1 at the end of period 1

TIME VALUE OF MONEY

The time value of money is important when one is interested either in investing or borrowing the money. Ifa person invests his money today in bank savings, by next year he will definitely accumulate more money than his investment. This accumulation of money over a specified time period is called as time value of money. The time value of money is generally expressed by interest amount. The original investment or the borrowed amount (i.e. loan) is known as the principal. The amount of interest indicates the increase between principal amount invested or borrowed and the final amount received or owed.

In case of an investment made in the past, the total amount of interest accumulated till now is given by total amount to be received- original investment (i.e., principal amount). Similarly, in case of a loan taken in past, the total amount of interest is given by amount of interest = Present amount owed - original loan (i.e., principal amount)

In both the cases there is a net increase over the amount of money that was originally invested or borrowed.

When the interest amount is expressed as the percentage of the original amount per unit time, the resulting parameter is known as the rate of interest and is generally designated as 'i'.

The time period over which the interest rate is expressed is known as the interest period. The interest rate is generally expressed per unit year. However, in some cases the interest rate may also be expressed per unit month.

Module 5
Entrepreneurship

Entrepreneur thus is an innovator who carries out new combinations in ever changing environment to initiate & accelerate the process of economics social & technological development. The person having a dynamic activity to prime changes in the process of production, innovations in business, new ideas & usages of resources, establishing new markets.

Evolution of concept

It varies from country to country, time to time & the level of economic development of the place. This word is derived from French verb. Which is entreprendre means to undertake 16th country the Frenchmen who organized & military expeditions were referred to as entrepreneurs. Since the word entrepreneur is used to me who takes the risk of stating new organization or business or introducing a new idea, production service to society.

Characteristics of Entrepreneur

1. A good entrepreneur should be action oriented enthusiastic & energetic & ready to take risk at all levels to achieve the goal.
2. Should have cerwavering determination & commitment.
3. Creativeness & result oriented, lord working
4. Accepts responsibilities with entrusiom,
5. Self-confident deactivated & self-disciplined
6. Both thinker & doer planner & worker,
7. Future vision intelligent, imaginative & self-directed

Type of entrepreneur

According to the type of business.

1. *Business entrepreneur* are individuals who conceive an idea for a new product or service and then crate business to convert their idea into reality. They are responsible for production and marketing of the new products and services and for tapping resources in their search to make the business opportunity a success.
2. *Trading entrepreneur* is one, as the name suggests, who undertakes trading activities and is concerned with production. He identifies potential markets, stimulates demand and creates a desire and interest among the discerning buyers to go for his product/service.
3. *Industrial Entrepreneur* is essentially a manufacturer who identifies the potential needs of consumers and tailors a product or service according to the market needs.
4. *Corporate Entrepreneur* is a company who is an artificial person iq the eyes of law, demonstrating his innovative skill in the organizing and managing a corporate undertaking.
5. *Agricultural Entrepreneurs* are those who undertake agricultural activities, such as raising and marketing of crops

According to the use of technology:

1. *Technical Entrepreneur* is essentially compared to a 'master craftsman', who develops improved quality goods because of his technological expertise. In this type concentration is more on production than on marketing. Depending on the level of updated technology used the entrepreneur is called as *high-tech or low-tech entrepreneur.*
2. *Professional Entrepreneur* is a person who is interested in establishing a unit, but does not have interest in managing it, once it is established. A professional entrepreneur sells out the established business and starts another venture, conceiving new ideas and developing newer projects.
3. *Non-technical Entrepreneurs* are those who are concerned with the technical aspects of the product, but concerned only with marketing and distribution for promoting their business.

4. *High-tech entrepreneurs* who concerned with updated technical aspects of their product whereas low-tech entrepreneurs as the name suggests deal in products which are not that updated and complex in technology.

According to motivation:

1. *Pure entrepreneur* - not for economic rewards awn satisfy by psychological
2. *Induced entrepreneur*- Polices measures provides assistance, incentives by the support of government & institutions
3. *Motivated entrepreneur*- self-fulfilment for making & marketing same things new
4. *Spontaneous entrepreneur* - inherent national talent by boldness initiative in any enterprise self-confident

According to the stages of development

1. First generation entrepreneur is one who has become an entrepreneur by his innovative skill, bringing out a marketable product or service.
2. Modern entrepreneur is one who develops the product according to the market demand which is dynamic and changing over a period of time.
3. Classical entrepreneur is stereotype entrepreneur whose aim is to maximize the economic returns for the sake of survival of the unit. He is not unduly worried about growth of the firm.

Entrepreneurship

The resistance against flexibility, growth & diversification can be overcome by developing a spirit of entrepreneurship within the organization called an entrepreneurship. It reflects in the proportionate increase in social, cultural & business pressures.

Concept of Entrepreneurship:

It is a process undertaken by entrepreneur to augment his business interests. It is defined as

an indivisible process flourishes, when the interlinked dimensions of individual psychological entrepreneurship, entrepreneur traits, social encouragement, business opportunities government policies, availability of resources, opportunities coverage towards the common good, development of society & economy.

Entrepreneurship in today's context in the product of teamwork & ability to crate, build & work as team. It is also a process of identifying opportunities in the market place, arranging the resources required to pursue these opportunities & inverting the resources to exploit the opportunities for better gains.

Elements of entrepreneurship

It is the legal agreement that happens between the person & organization The entrepreneurship has four important Clements

1. *New business venturing*

This is the corporate venturing, the creation of new business within the organization. This includes redefining the company's products or services, development of new market segment or formation of new corporate ventures.

2. *Innovations*

Innovation is the development of new products, improvement of existing products, development of improved & simplified production methods & procedures.

3. *Self-renewal*

This is the transformation of an organization their renewal of main ideas. This includes a redefinition of a business concept, reorganization or modification in the system with an aim to initiate innovating.

4. *Proactiveness*

Proactiveness includes initiative & risk thing competitiveness & dashing to take new challenges, organization with this type of proactiveness spirit will lead the market than follow the competitors.

Characteristics of entrepreneurship

1. *Innovation:* Entrepreneurship involves innovation of new things to effect dynamic changes & good success in economy. It should create conditions for growth of economy.
2. *Risk – taking:* Risk is an inbuilt element of any business. An entrepreneur, however, prefers to take calculated risks, ploughs back in business, takes small steps to grow, make sustained profits and moves on.
3. *Skilful management:* Entrepreneurship hinges together various functions of the management planning organizing staffing directing controlling & leading.
4. *Organization:* It being together various facilities of production for an efficient & economical use.
5. *Decision making:* Decision making is very vital. Taking decision at all levels & stages of entrepreneurship is a routine task.
6. *Making the enterprise a success:* It is mainly an economic activity as it deals with creating & operating an enterprise. It involves in satisfying the needs of customers with the help of production and distribution of goods & services.

Point	Entrepreneur	Entrepreneur	Manager
Goal Management	Independent innovates kew ideas	Independent starts new ventures & leads direct involvement	Delegates & supervises more than direct involvement
Status	Not concerned about traditional status, but wants recognition	Not concerned about status	Concerned about status symbol
Risk	Owns moderate risk	Bears all the risk & uncertainly	Does not bear any risk.
Rewards	Gets fixed rewards for lies work, many get extra for his innovations	Since there is risk, he may get profit or loss depending on outcome	Works for salary for his service which fixed & definite.
Innovations	Innovative	Any innovative	Need not be innovative. He manages the ideas of top management.
Decision making	Moderate, limited to this work	Beng much irrvolred in decision making	Delegates the decisions of top management

STAGES IN ENTREPRENEURIAL PROCESS

The entrepreneurial process involves all the functions, activities and actions associated with perceiving opportunities and creating organizations to pursue them. Entrepreneurs can increase their chances of success if they understand, follow and implement the basic five-stage entrepreneurial process. These five stages form the backbone of the entrepreneurial process and are as follows:

a) Stage I: Conducting Opportunity Analysis
b) Stage II: Developing the Plan and Setting up the Company
c) Stage III: Acquiring Financial partners and sources of funding
d) Stage IV: Determining Resources Required and Implementing the Plan
e) Stage V: Scaling and Harvesting the Venture.

Stage I: Conducting Opportunity Analysis

This is a very difficult task. In this stage, the founder identifies the opportunity and creates a vision for the company. The entrepreneur ways value the real and perceived value of opportunity against the risk and return of the same. The entrepreneur tries to build the vision and conduct market analysis to sustain a competitive advantage. He also prepares a competitive analysis. Because this stage details the pricing the sales strategies required, it usually takes at least one year.

Stage II: Developing the Plan and Setting up the Company

In this stage, the ideas are converted into business strategies which are documented and converted to a business plan. The focus of this stage is writing a well-conceived business plan detailing how the vision and the market analysis will become a sustainable competitive advantage. At this stage the type, form and the structure of the company are determined.

Stage III: Acquiring Financial partners and sources of funding

Entrepreneurs may not be aware of any financing options and sources available. Hence, it is important to know the expectations, requirements and sources of funds, so as to finance the venture. Funding sources include self-finding, family and friends, venture capital and government sources. He should also be aware of private placement, capital issue and sources of debt financing.

Stage IV: Determining Resources Required and Implementing the Plan

Varieties of resource that are needed are to be first estimated. The critical resources are to be differentiated from others. In this stage, the appraisal of the entrepreneur's present resources is done at first. Needed resources are to be acquired and arranged in a timely manner for the success of the enterprise. While acquiring other funds care should be taken that the funds are available as a cheaper cost and there is least loss of control.

Stage V: Scaling and Harvesting the Venture.

In this stage the risks faced by an entrepreneur and pros and cons of each decision taken is weighed. Screening of different types of technologies, development of growth strategies, talent building, seeking capital etc., are covered in this stage. Options available for entrepreneurs to scale the venture, merging with another company, implementing leverage buy out or selling the company as an exit strategy are considered.

MICRO, SMALL & MEDIUM ENTERPRISES (MSME)

Definition of MSMEs usually take into consideration the total assets, the level of turnover and the number of employees of the firm.

In India, the enterprises have been classified broadly into two categories:

- Manufacturing; and
- Those engaged in providing / rendering of services.

Both categories of enterprises have been further classified into micro, small and medium enterprises based on their investment in plant and machinery (for manufacture enterprises) or on equipment's (in case of enterprises providing or render ng services). The present ceiling investment to be classified as micro, small or medium enterprises is as under:

Classification	Investment Ceiling for Plant, Machinery or Equipments *@	
	Manufacturing Enterprises	Service Enterprises
Micro	Upto ₹ 25 lakh ($50 thousand)	Upto ₹ 10 lakh ($20 thousand)
Small	Above ₹ 25 lakh ($50 thousand) and Upto ₹ 5 crore ($ 1 million)	Above ₹ 10 lakh ($20 thousand) and upto ₹ 2 crore ($0.40 million)
Medium	Above ₹5 crore ($1 million) and upto ₹ 10 crore ($2 million)	Above ₹2crore ($0.40 million) and upto ₹ 5 crore ($1 million)

CONCPT AND SCOPE

The environmental scope of the Micro, Small and Medium Enterprises or MSMEs is universally accepted by all the economies whetμer underdeveloped or developed. The governments have realised the need of growth and development of the MSMEs and they are initiating for the same.

The MSMEs in any country today are expected to be more dynamic. It is essential for achieving

the economic goals of the country as this particular sector is always at the central place for eliminating the economic backwardness of especially the rural and underdeveloped regions of the country.

Along with this prime objective, the MSMEs will have to contribute significantly for:

1. Creating self sufficiency in the business areas.
2. Reduction of regional imbalances.
3. Optimum use of all resources of production and consumption.
4. Establishing main employment centres.
5. Fulfil quality demands of the core sector industries.

The scope and importance of the MSMEs can be explained ·by various ways. The major contribution of this sector is the availability of huge employment opportunities to the labour. The labour scattered in very small and rural areas can get employment in these industries. Likewise, the access to local market is another benefit to the MSMEs. Due to its less capital intensive and high labour absorption nature, the small industries have contributed sizably to the employment generation and to the rural industrialization.

ROLE OF MSME IN ECONOMIC DEVELOPMENT

Micro, small and medium enterprises play a significant role in nation 's development through high contribution to domestic production, significant export earnings, low investment requirements, operational flexibility and indigenous technology. For these reasons Indian small and medium enterprise sector has emerged as a highly vibrant and dynamic sector of the Indian economy over the last five decades.

The role of micro, small and medium businesses in the economic development of a nation is as discussed:

i) High contribution to domestic production: The SMEs play a significant role in nation

development through high contribution to the gross domestic production. In India, these units are producing more than 8,000 products and contribute about 40 percent to the GDP. In this sense, in recent years the MSME sector has constantly registered higher growth rate compared to the overall industrial sector.

ii) Large employment opportunities: The MSME Sector, in terms of per unit of business employment figure may nor- appear to be a big employer. However, collectively the number of employment opportunities created by this sector, is notable. Also, while creating local job opportunities it helps mitigate problem that causes large scale migration of rural population to urban areas.

iii) Meet local requirements of larger businesses: The micro, small and medium businesses are complementing to larger industries as ancillary units. The local input requirements of bigger units for several raw, semi-finished and finished products are largely met by these locally based units.

iv) Environmentally friendly approach: The methods of production applied by micro, small and s are largely eco-friendly, thus, not damaging its basic elements, i.e., air, water and soil. The manufacturing techniques are simple and in most cases they do not require use of harmful substances quire use or heavy machines. Some of the SMEs rather enrich the environment with their production processes. Organic farming, handmade paper production and manure making are few examples.

v) Export earnings and import substitution: The SMEs are making a huge contribution towards improving the balance of payment position and self-reliance. Their share in total exports stands at about 40 percent- with a massive production of more than 8000 products to the tune of about 18 lakh crore. There are more than 8,000 products ranging from traditional to high-tech items which are being manufactured by the Indian MSMEs. All this is helping Indian economy significantly in becoming self-reliant by cutting down on the list of import

items

vi) Supporting the idea of inclusive growth: Inclusive growth means equitable opportunities for economic participants during economic growth with benefits to every section of society. The micro, small and medium enterprises create employment opportunities, help kill development and encourage innovation. Thus, they promote inclusive development of a society. The National Programme on Skill Development and Entrepreneurship, 2015 is a major step in the direction of inclusive growth

Institutional Support

INTRODUCTION

Entrepreneurs who wish to start a business or industrial units require various sources and facilities apart from appropriate information related to their business. Recognizing the need to help budding entrepreneurs, both Central Government and all State Governments have initiated and started various Agencies, Institutes, Banks, Boards etc., throughout the country, in this regard.

DIFFERENT SCHEMES

1. **DIC-** A Single Window Agency

Meaning: DISTRICT INDUSTRIES CENTRE. Launched in 1978 in all districts of each state. There are about 400 DIC's in India.

Nature of support: Information and Consultancy Services. Industrial Inputs.

Objectives:

- To effectively promote cottage and small-scale industries in rural areas and small towns.
- To act as a Single Window Agency to help the entrepreneur with all the information under one roof.
- To serve as an integrated administrative frame work at the district level for industrial development.

Functions:

- **Surveys:** To carry out surveys to assess the potential of a district with respect to industrial development taking into account availability of raw material, manpower, infrastructure, demand for a product etc. This survey provides a basis for advising budding entrepreneurs.
- **Action Plan:** To prepare an action plan for the industrial development of the district.

- **Appraisal:** To appraise various investment proposals received from entrepreneurs.
- **Guidance:** To guide entrepreneurs in selecting appropriate machinery and equipment.
- **Marketing:** To assist entrepreneurs in marketing their products and assess the possibility of export promotion.
- **R&D:** To link R&D institutes with entrepreneurial activities for product innovation.
- **Training:** To conduct artisan training programs.

2. SISI

Meaning: SMALL INDUSTRIES SERVICE INSTITUTE. There are 58 SISIs all over the country including one in each State Capital.

Nature of support: Entrepreneurship development, consultancy and training.

Objectives:

a) To provide consultancy and training to small entrepreneurs – both existing and prospective.
b) To serve as an interface between Central and State governments.
c) To initiate entrepreneurial promotion programs

Functions:

a) To render technical support services.
b) To conduct Entrepreneurship development programs
c) To collect Trade and Market information and share it with entrepreneurs.
d) To carry out modernization and implant studies.
e) To conduct State and District industrial potential surveys.
f) To provide consultancy services.
g) To provide training in various trade/activities.

3. NSIC

Meaning: NATIONAL SMALL INDUSTRIES CORPORATION LTD. This is one of the oldest agencies set by the central government in 1955 and is the forefront of industrial development in the country.

Nature of support: Wide ranging industrial inputs.

Objectives:

- To promote, aid and foster the growth of SSI's in the country with a focus on commercial aspects.
- To enable the Small Scale Industries to gain competitive advantage and to contribute effectively to the development of the country.
- To evolve special schemes to meet the needs of handicapped, scheduled castes and scheduled tribe entrepreneurs.

Functions:

- To provide machinery on hire-purchase scheme to SSI's
- To procure government orders for small scale units
- To develop small-scale units as ancillaries to large industries.
- To import and distribute scarce and rare raw materials among actual users in the small-scale sector
- To undertake the construction of industrial estates
- To help exporting products of SSIs
- To develop prototype of machines and equipment's and pass on the know how to SSIs
- To set up SSI in other developing countries.
-

4. SIDBI

Meaning; SMALL INDUSTRIES DEVELOPMENT BANK OF INDIA. It was established in 1990 under Act of Indian Parliament as a principal financial institution. It is a subsidiary of IDBI. Its head office is in Lucknow. SIDBI is among the top 25 development banks in the world.

Nature of support: Financial services and other support services

Objectives:

(i) To promote, finance and develop small scale sector in India.

(ii) To co-ordinate the functions of other institutes engaged in similar activities

(iii) To finance industrial infrastructure projects.

Functions:

- To provide finance assistance to
    a. new projects
    b. expansion/diversification projects
    c. modernization projects
- To initiate steps for technological upgradation and modernization of existing units.
- To promote rural industrialization
- To provide channels for marketing SSI products in India and abroad.
- To foster Human Resource Development to suit the SSI sector needs
- To disseminate appropriate information to budding and existing entrepreneurs.

5. KSFC

Meaning: KARNATAKA STATE FINANCIAL CORPORATION. It was established in 1951 through a State Financial Corp. Act-1951.

Objectives:

a) To cater to financial requirements of small-scale units.
b) To extend medium and long term credits to units which fall outside the preview of Industrial Finance Corporation and Public Sector Banks.

Functions:

- To provide long-term finance to small and medium industrial units organized on different ownership basis such as proprietorship, partnership, co-operative, public or private company concern.
- To provide finance to service-oriented enterprises such as travel agencies, car rental agencies, hotels, tourism-related activities, hospitals and nursing homes etc.
- To take over sick SSI units and auction them to entrepreneurs willing to rebuild.

6. TECSOK

Meaning: TECHNICAL CONSULTANCY SERVICES OF KARNATAKA. It was established in 1976 by the government of Karnataka. It is located in Basava Bhavan, Basaveshwara Circle, Banglore.

Nature of support: Multi-disciplinary technical, industrial and management consultancy.

Objectives:

a) To provide reliable consultancy support for entrepreneurs to startup self-employment ventures in Karnataka.
b) To provide consultancy services to the various Departments and Agencies of state and Central Governments.

Functions:

- To identify investment opportunities which are location specific.

- To assist entrepreneurs in obtaining statutory and procedural clearances.
- To carry out feasibility studies and environmental impact studies.
- To assist preparation of detailed project reports as per investment norms and financial norm.
- To carry out market survey and research specific to industry needs.
- To assist in project implementation and extend turnkey assistance.
- To help in reorganization and restructuring of employees.
- To diagnose sick units and suggest rehabilitation measures
- To provide consultancy in valuation of assets, manpower, planning and budgetary control system
- To promote consultancy for merges and take overs.

7. KIADB

Meaning: KARNATAKA INDUSTRIAL AREA DEVELOPMENT BOARD. This is a statutory body established in 1966 by government of Karnataka. Headquarters is at Bangalore with 9 zonal offices all over Karnataka.

Objectives:

a) To establish Industrial areas and promote rapid and orderly establishment of industries in the state of Karnataka
b) To provide infrastructural facilities and amenities to SSIs
c) To assist in implementation of government policies (iv) To function on 'No profit – No loss' basis.

Functions:

- To acquire lands for industrial activity at identified and notified locations and form

industrial area with all infrastructure facilities like road, electricity power, water supply

- To acquire lands in favour of single unit.
- To acquire lands for single unit complexes for government organizations and to facilitate government projects
- To provide all the infrastructure facilities to such industrial areas.
- To maintain the infrastructural facilities during the contractual project.

8. **KSSIDC**

Meaning: KARNATAKA STATE SMALL INDUSTRIES DEVELOPMENT CORPORATION LTD. Established in 1960 by Government of Karnataka.

Nature of support: Infrastructure and industrial inputs.

Objectives:

- To assist small scale industries in the procurement of raw materials
- To take up any activity aimed at rapid development of small scale industry

Functions:

- To establish and manage industrial estates
- To procure and distribute scarce and rare raw materials to various SSIs
- To provide assistance towards marketing of products from various SSIs
- To organize national level and international level exhibition and facilitate exchange of information
- To supply machinery under hire purchase scheme
- To provide guidance to SSI entrepreneurs contributing
- To provide technical library facilities in coordination with Indian Standard Institution.

Types of help

(i) KSSIDC has promoted establishment of ancillary units to help PSU's like BEL, ITI, HAL, NGEF. BEML etc.

(ii) It has constructed 86 plots exclusively for SC/ST entrepreneurs.

9. **KSIMC**

Meaning: KARNATAKA SMALL INDUSTRIES MARKETING CORPORATION. This was established in 2001 as a subsidiary of KSSIDC. The office is in Rajajinagar Industrial Estate.

Objectives:

(i) To extend marketing support and assistance

(ii) To procure government needs fromSSI's throughly purchase and price preference.

Functions:

- To improve quality of products
- Improve production manufacturing process
- Reduce prices
- Augment exports

Types of help

(i) 75% of items reserved by SSI sector shall be procured from the units located within State, through an open tender system

(ii) SSI units of the state shall be offered a price preference of 15% over the lowest price quoted.

(iii) Benefits were available from 1st April 2001 upto 5 years.

BUSINESS PLAN

Planning is the first and the most crucial step for starting a business. A carefully charted and meticulously designed business plan can convert a simple idea/innovation into a successful business venture.

A business plan is a road map for starting and running a business. A well-crafted business plan identifies opportunities, scans the external and internal environment to assess the feasibility of business and allocates resources in the best possible way, which finally leads to the success of the plan. It provides information to all concerned people like the venture capitalist and other financial institutions, the investors, the employees

A business plan is the blueprint of the step-by-step procedure that would be followed to convert a business idea into a successful business venture. A business plan first of all identifies an innovative idea, researches the external environment to list the opportunities and threats, identifies internal strengths and weakness, assesses the feasibility of the idea and then allocates resources (production/operation, finance, human resources) in the best possible manner to make the plan successful.

- **Functional Plans**

From this point on, the business plan would introduce, in a little more detailed manner, the major functions of the business in order to achieve its objectives. These functions are: operations of the business, its management, marketing, and finances.

- **Operational Plan**

This plan is all about producing the proposedproduct andthe service delivery. The objective istoshowthe manner inwhichtheproposedbusinessplanwillbeabletodeliver withalevelof efficiency for the day- to-day operations, while keeping an eye on the strategic plan. This may require an explanation ofthe type of facilities needed, spacerequirements, capital equipment, labour force, and technological

capacity. It may also address storage and inventory control, purchasing plan, workshifts, shutdowns, as well as legal requirements forlicensingandpermits.

- **Management Plan**

This section would demonstratethe plan's validity through exposing who is going to implement it, and how the presented concepts are going to be realized and turned into a market success. This section should refer to the availability of the formal ·resumes for key people in the lead and management team, and have copies of those resumes placed in the appendix.

- **Marketing plan**

Thispart of businessplan is where anentrepreneur presents anadequatedescription ofhow proposed business is going tosucceedinmovingthe productfromthe productionphaseto consumption or from the firm to consumers through the market. It is basically the plan that would identify who the consumers are, what they like, what they are willing to buy, and how to attract them into buying this specific product. Also, who else has been attracting them, and how to beat such competitor, if any.

The efficient answers to these questions can be given by arranging the information into two parts.

- Market analysis that discusses the target market, market size and trends, market share, market claims, and market competition.
- Market strategy that addresses product pricing, product distribution and sales, advertising and promotion, and public relations

FEASIBILITY STUDY

Feasibility study is a systematic method to find out the possibility and practicability of starting a project or business. An Entrepreneur with a limited financial resources before venturing in

to a business has to study whether it is feasible or not. Feasibility study analyses availability of materials, skills and expertise, capital market, etc. Feasibility study contains fairly specific estimates of project cost, means of financing, sales revenues, production costs, financial and social profitability.

Uses of feasibility study

- It helps Entrepreneur in making investment decision.
- It helps the agencies and organizations the viability of the project.
- It helps to work out the economics of production and expected profitability of the venture or enterprise.

1. *Technical evaluation or feasibility*

The technical feasibility is an attempt to determine how will the technical requirements for a proposed industrial unit can be met. It is a study made to see how-best the country's resources and facilities fit the needs of the proposed industrial unit. The information presented by the entrepreneur should contain.

2. *Economic evaluation or feasibility*

After the technical feasibility study of the project is made, Economic feasibility study of project has to be taken up. Economic evaluation of a proposed project by the entrepreneur is the presentation of information regarding the profitability of the business/industry so as to convince financial institutions and borrow loans.

3. *Financial analysis*

The objective of financial analysis is to ascertain whether the proposed project will be financially viable in the sense of being able to meet the burden of servicing debt and whether the proposed project will satisfy the return expectations of those who provide the capital. While conducting a financial appraisal certain aspects has to be looked into like:

- Investment outlay and cost of project
- Means of financing
- Projected profitability
- Break- even point
- Cash flows of the project
- Investment worthiness judged in terms of various criteria of merit
- Projected financial position

1. Ecological analysis

In recent years, environmental concerns have assumed a great deal of significance especially for projects, which have significant ecological implications like power plants and irrigation schemes, and for environment polluting industries (like bulk drugs, chemicals and leather processing). Toe concerns that are usually addressed include the following:

- What is the likely damage caused by the project to the environment?
- What is the cost of restoration measures required to ensure that the damage to the environment is contained within acceptable limits?

Feasibility study report

After making the feasibility study of the project taking into consideration the economic, financial, and technical aspects, the entrepreneur has to prepare a report. This feasibility study report is prepared in a prescribed format. Major contents of the report are:

1. An introductory report regarding the product selected, process selected, production capacities, Justification for the proposed location, etc.
2. Non recurring expenditure (on and, factory/office buildings godowns, machinery and equipment)
3. Recurring expenses per month (on raw materials, consumables, Salaries, Rent, Fuel

Power, etc.)

4. Capital requirement and sources of capital (own capital, borrowings, subsidies, etc.)
5. Total cost of production (per month)
6. Profitability (per month)
7. Percentage of operating profit per annum (Return on total project, return on won capital and Return on Total Sales)

PROJECT REPORT

Project report is a document which describes the progress at every stage of the project. The project report provides detailed information about the project which is used to fill up the form for obtaining the provisional SSI registration. Project report is also useful while applying for loans from financial institutions and for getting clearances from the government. But, while evaluating the profitability of various project ideas, an entrepreneur can prepare the project report for all such projects and can select the most profitable and technically sound project.

It acts as a guide to management, especially at the intimal stage to know whether the technical, commercial, financial and economic conditions are feasible or not.

Importance of a Project Report

Project report is of great importance. It highlights the practicability of a project in terms of different factors like economy, finance, technology and social desirability. It is needed by the entrepreneur for carrying out expansion or starting a new production line.

These may be carried on by individuals like engineers and scientists, bankers or institutions, consultancy services ·and development banks. Ah important aspect of the report lies in determining the profitability of the project and minimizing risks in the execution of the project.

Contents of report:

- General information
- Promoter
- Location
- Land & building
- Plant & machinery
- Capital requirement & cost
- Operational requirement & cost
- Raw material
- Man power
- Products
- Market
- Economic analysis
- Working capital
- Requirement of funds.

Typical Outline of the Project Report

Section A: Information about the entrepreneur

1. Name of the entrepreneur, residential address, telephone -number e-mail fax and date of birth.
2. Educational qualifications of the entrepreneur.
3. Special training/vocational training.
4. Job held/business undertaken/industrial activity undertaken.
5. Qualities, skills, values, beliefs, attitudes and aptitude.
6. Why has the entrepreneur decided to set up this particular project?
7. Why does the entrepreneur think he will be successful in this business?
8. Family background of the entrepreneur.

Section B: Information about the project

1. Name of the product(s).
2. Description of the product with the unique selling preposition and special features.
3. Where the product is being used or consumed?
4. Available substitutes in the market:
5. Names of competitors.
6. Description of products of competitors with their special features
7. Present demand and supply position and projected sales for first three years.
8. Future demand and supply position.
9. Price of the product.
10. Anticipated changes in tastes, preferences and needs of the market.
11. Anticipated changes in technology, sources of raw material and packaging.
12. Target market
13. Value of orders_ in hand (already received) and expected shortly.

Section C: Information about the business

1. Name of the business
2. Address of the business
3. Form of ownership organisation (Proprietorship, partnership, company, etc.)
4. Type of Project-Manufacturing/service/trading

Section D: Details of the proposed project

1. Production programme (for a period of one year)
2. Inputs
    a. Machinery, equipment, and instruments
    b. Raw material, semi-finished goods and finished goods
    c. Utilities
    d. Manpower

GUIDELINES BY PLANNING COMMISSION FOR PROJECT REPORT

Planning commission of India issued some guide lines for preparing/ formulating realistic project reports. The project formulation stage involves the identification of investment options by the enterprise and in consultation with the Administrative ministry the planning commission and other concerned authorities.

The summery of the guidelines by planning commission are presented here.

1. *General information:*

The feasibility report must include the analysis of the industry to which it belongs. The report should deal with description of type of industry, its priority, past performance, increase in production, role of public sector, technology, allocation of funds and information about the enterprise.

2. *Preliminary Analysis of alternatives*

The details like gap between demand and supply of proposed products, availability of capacity, list of all existing plants in industry, indicating their capacity, level of production attained, list of present projects and list of proposed projects. All technically feasible options are considered here.

3. *Project Description*

The feasibility report should provide a brief description of the technology/process selected for the project, information pertaining to the selection of optimal location, population, water. Land, environment, pollution and other environmental problems etc., are to be provided.

The report should contain details of operational requirements of the plant, requirement of water, power, personnel, land, transport, construction details for plant and offices etc.

4. *Marketing plan:*

The details like marketing plan, demand, target price of product, distribution methods etc., are to be presented.

5. *Capital requirements and costs*

Information with regard to capital requirement and costs with breakup are to be provided. The estimates should be realistic and based on logical information.

6. *Financial Analysis*

Financial analysis is essential to assess the financial viability of the project.

A preformat balance-sheet, details of depreciation, clearance for foreign exchange, details of any income tax rebate, incentives for back work areas are to be included.

7. *Economic Analysis*

Social profitability analysis is to be made. Impact of the operations on foreign trade, direct costs and benefits are to be included in the report.

8. *Miscellaneous aspects*

Depending upon the nature and size of operation of a particular project, any other relevant information may be included in the project report

INTERNATIONAL ENTREPRENEURSHIP

International entrepreneurship involves carrying out business activities across national border to respond to customer needs outside the country by availing opportunities outside the country.

International business is becoming more and more important for ventures of all sizes, particularly in the present highly competitive global economy, wherein more and more countries are opening up their economies for international trade. It is important to realize that although it helps an entrepreneur expand their business, it also requires a better understanding of international markets by appropriately diagnosing economic, political, technological, market, legal, social and cultural environments of each country wherein the entrepreneur proposes to enter.

ENTREPRENEURIAL ENTRY INTO INTERNATIONAL BUSINESS

The key to entering into foreign markets is to understand the customer in detail first with due emphasis on issues related to language, social norms and culture. Entering into international markets mainly involves extending business internationally by adding customers, distribution channels and production facilities internationally.

After having analysed the business environment to identify business opportunities abroad, an entrepreneur needs to respond to the following challenges before deciding to operate abroad:

- management practices and style,
- strategic issues that need to be appropriately responded to,
- alternative strategies and their implications to enter into other countries,
- process to take decision for entering into international markets,
- ethical practices and propensities across nations and their implications for business,
- country-specific risk associated with change in government regulations.

There are various ways an entrepreneur can market products internationally. The method of entry into a market and the mode of operating overseas are dependent on the goals of the entrepreneur and the company's strengths and weaknesses. The modes of entering or engaging in international business can be divided into three categories:

- Exporting,
- Non-equity arrangements, and
- Direct 'foreign investment.

1. Exporting

Usually, an entrepreneur starts doing international business through exporting. Exporting involves providing products manufactured in one country to customers located in another country. It could be direct exports or indirect exports. Exporting normally involves the sale and shipping of products manufactured in one country to a customer located in another country.

a) Indirect Exporting:

Indirect exporting involves having a foreign purchaser in the local market or using an export management firm. For certain commodities and manufactured goods, foreign buyers actively seek out sources of supply and have purchasing offices in markets throughout the world. An entrepreneur wanting to sell into one of these overseas markets can deal with one of these buyers. This method of exporting involves the least amount of knowledge and risk for the entrepreneur.

b) Direct Exporting:

In the case of direct exports, the entrepreneur routes their products through an independent distributor or through their own overseas sales office. The independent distributor takes the responsibility of identifying foreign customers and also takes care of technicalities related to documentation, financing and delivery of products and gets a set commission for it. Independent foreign distributors usually handle products for firms seeking relatively rapid entry into a large number of foreign markets.

2. *Non-equity Arrangements*

When market and financial conditions warrant the change, an entrepreneur can enter into international business by one of three types of non-equity arrangements:

- Licensing,
- Turn-key projects, and
- Management contracts.

Each of these allows the entrepreneur to enter a market and obtain sales and profits without direct equity investment in the foreign market.

a) Licensing:

Licensing involves an entrepreneur who is a manufacturer (licensee) giving a foreign manufacturer (licensor) the right to use a patent, trademark, technology. Production process, or product in return for the payment of a royalty. The licensing arrangement is most appropriate when the entrepreneur has no intention of entering a particular market through exporting or direct investment. Since the process is low risk, yet provides a way to generate incremental income, a licensing arrangement can be a good method for the entrepreneur to engage in international business.

b) Turn-Key Projects:

Another method by which the entrepreneur can do international business without much risk is through turn-key projects. The underdeveloped or lesser-developed countries of the world have recognized their need for manufacturing technology and infrastructure and yet do not want to turn over substantial portions of their economy to foreign ownership. One solution to this dilemma has been to have a foreign entrepreneur build a factory or other facility, train the workers, train the management, and then turn it over to local owners once the operation is going, hence the name turn-key operation.

c) Management Contracts:

A final non-equity method the entrepreneur can use in international business is the management contract. Several entrepreneurs have successfully entered international business by contracting their management techniques and skills. The management contract allows the purchasing country to gain foreign expertise Without giving ownership of its resources to a foreigner, or the entrepreneur, the management contract is another way of entering a foreign market without a large equity investment.

3. Direct Foreign Investment

The wholly owned foreign subsidiary has been a preferred mode of ownership for entrepreneurs using direct foreign investment for doing business in international markets. Joint ventures and minority and majority equity positions are also methods for making direct foreign investments.

The percentage of ownership obtained in the foreign venture by the entrepreneur is related to the amount of money invested, the nature of the industry and the rules of the host government.

a) Minority Interests:

Japanese companies have been frequent users of the minority equity position in direct foreign investment. A minority interest can provide a firm with a source of raw materials or a relatively captive market for its products. Entrepreneurs have used minority positions to gain a foothold or acquire experience in a market before making a major commitment. When the minority shareholder has something of strong value, the ability to influence the decision-making process is often far in excess of the amount of ownership.

b) Joint Ventures:

Another direct foreign investment method used by entrepreneurs to enter foreign markets is the joint venture. Although a joint venture can lake on many forms, in its most traditional form, two firms (for example, one Indian firm and one U.S firm) get together and form a third company in which they share the equity.

Joint ventures have been used by entrepreneurs most often in two situations:

- when the entrepreneur wants to purchase local knowledge as well as an already established marketing or manufacturing facility, and
- when rapid entry into a market is needed. Sometimes joint ventures arc dissolved and the entrepreneur takes 100 percent ownership.

Even though using a joint venture to enter a foreign market is a key strategic decision, the keys to its success have not been well understood, and the reasons for forming a joint venture today are different from those of the past.

c) Majority Interest:

Another equity method for the entrepreneur to enter international markets is to purchase a majority interest in a foreign business. In a technical sense, anything over 50 percent of the equity in a firm is majority interest The majority interest allows the entrepreneur to obtain managerial control while maintaining the acquired firm's local identity. When entering a volatile international market, some entrepreneurs take a smaller position, which they increase up to 100 percent as sales and profits occur.

VENTURE CAPITAL

Venture capital is the source of finance committed to an enterprise that has risk and adventure. It is a fund made available for financing of new business ventures from scratch. Venture capital is arranged to the entrepreneurs through the private equity market for supporting profitable, but risky ventures.

- Venture capital is "the money obtained through private investments or public investment funds directed to high risk and high potential enterprises".
- Central Bank, U.K. defines venture capital as "an equity by which an investor supports an entrepreneurial talent with finance and business skills to exploit market opportunities, and thus, gain long-term market gains".

Venture capital funding represents a win-win situation wherein the venture capitalist who is in search of high returns meets the entrepreneur who is in need of risk-finance. Keeping in view the long-term interest a venture capitalist tries to build-up a rewarding relationship by not only providing funds, but also participating in the overall management of the venture through arranging technical advice on product development, finding new resources, expanding marketing network and guaranteeing repayment of loans.

Role and Significance of Venture Capital

A timely availability of adequate venture capital plays a crucial role in encouraging entrepreneurial activity in any society. Thus, venture capital can be regarded as a launching pad to innovative entrepreneurship by which adequate boost is given to convert creative business ideas into commercially viable ventures.

The important role played by venture capital in the overall well-being of a country is as follows:

a. *Venture capital opens new avenues for deserving entrepreneurs:*

Venture capital is provided to entrepreneurs who have conceived excellent business ideas, have sound knowledge of the specific business, but lack financial resources to implement them. The venture capitalist come into their rescue by:

- Arranging development finance to accelerate early growth of their Businesses.
- Supplying funds for faster expansion of their already growing ventures.

b. Venture capital is provided after reducing uncertainty to risks:

Before taking any decision on investment, a venture capital firm will satisfy itself with not only the entrepreneur's qualifications, technical and managerial competence, but also the techno-economic viability of the proposed project, including marketing prospects of the concerned product or service.

Venture capital is provided only after ensuring a high rate of return on the investment under risky business conditions. Availability of venture capital to a business on the basis of its merits implies safety and security of investment.

c. Helps building entrepreneurial vision:

Today, many societies around the globe show a lower preference for adopting entrepreneurship as careers. Children belonging to middle and lower middle class families with money constraints are rather encouraged to take up employment.

d. Mobilisation of small savings:

Mostly, the small investors in their individual capacity do not possess the professional expertise to analyse the risk factor involved in high-risk investment like venture capital. Investment organisations help them by providing the required computations and analysis.

e. Results in socio-economic benefits:

Besides bringing about direct gains in the form of growth of individual businesses through profitability and expansion, venture capital helps achieving a number of socio-economic goals. It opens up the path to the overall social up-liftment by creating job opportunities, removing poverty, facilitating support to innovation and creativity, fulfilling ambition of entrepreneurship minded people and transforming education system into action-oriented industry.