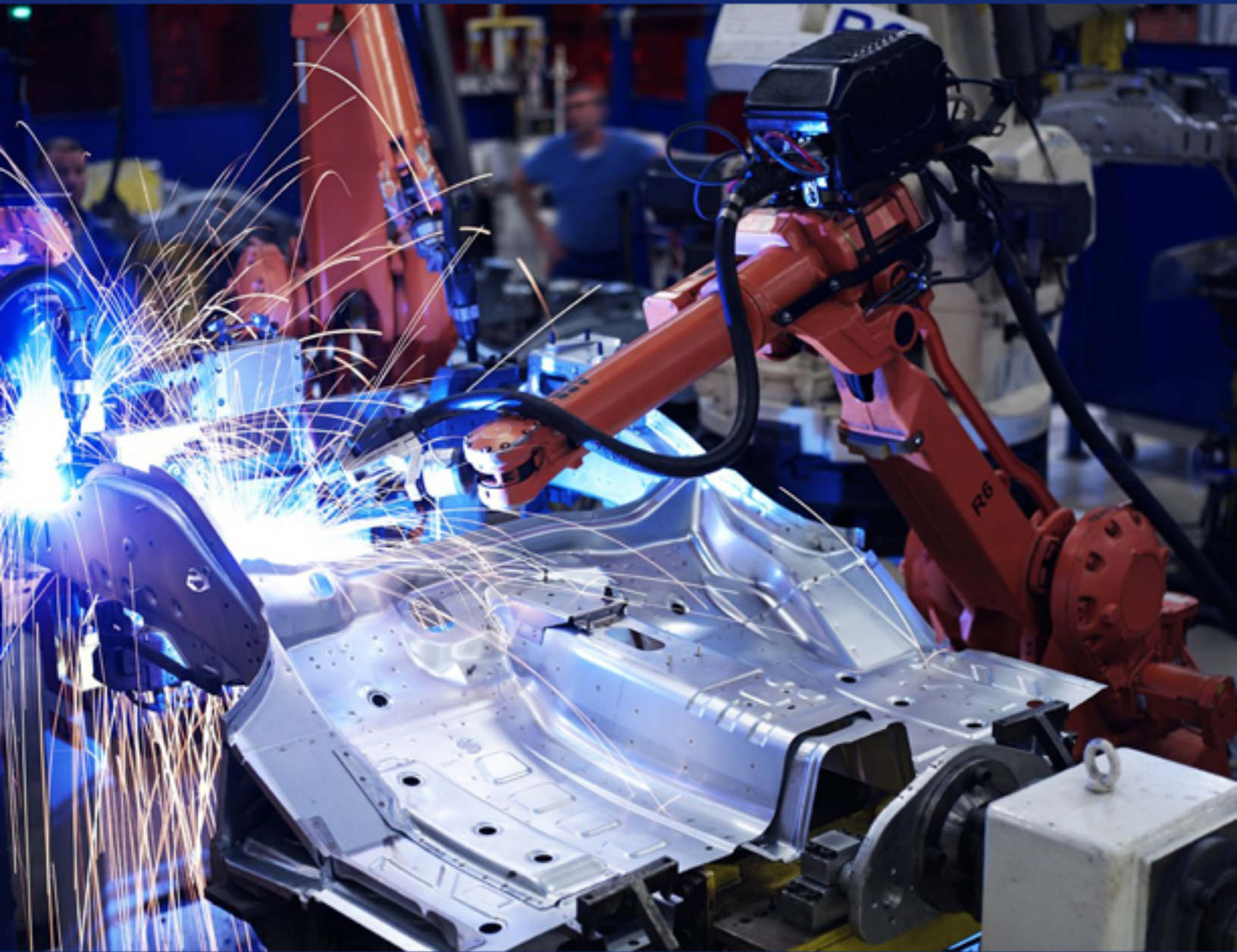


GATE Study Material



**Industrial Engineering
(Mechanical Engineering)**

INDUSTRIAL MANAGEMENT

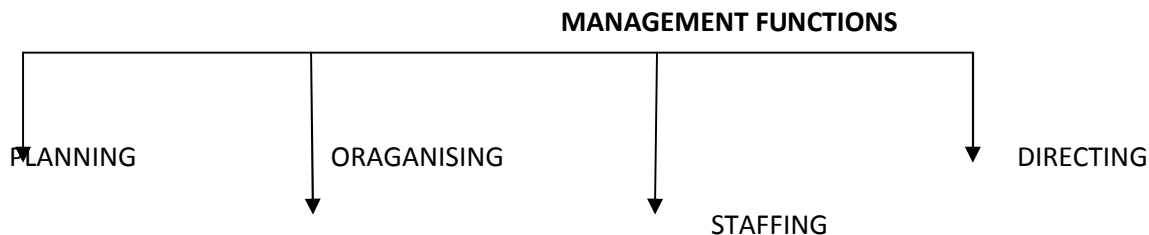
I unit-

Introduction : Concept, Development, application and scope of Industrial Management.

Productivity : Definition, measurement, productivity index, types of production system, Industrial Ownership.

MANAGEMENT –

Traditional Author says that management is an art of getting things done through people where as modern authors says that management is a process of accomplishing certain objectives through the utilization of human and other resource.



IMPORTANCE OF MANAGEMENT

- For the accomplishment of the goals.
- For effective utilization of the resources.
- Sound Organization.
- Providing vision & Foresight.
- For the harmony in work.
- To help employees in achieving personal objective.
- Development of the society and nation.

INDUSTRIAL MANGEMENT

- Industrial management is now a branch of engineering which facilitates creation of management system and integrates same with people and their activities to utilize the resources.
- Industrial management is structured approach to mange the operational activities of the organization.

SCOPE OF INDUSTRIAL MANGEMENT

1. Related to Designing of the production system.(see notes)
2. Relating to analysis & control of production operation.(see notes)

APPLICATION OF THE INDUSTRIAL MANGEMNT

1. Planning Function

- For Designing Conversion System
- For Scheduling Conversion System

2. Organizing Function

- Organizing for conversion
- Structuring of Operation Staffing
- Job & Work Design.
- For Production & Operation Standard.
- For Payment system.

3. Controlling Function

- Quality
- Quantity
- Time
- Inventory
- Cost
- Maintenance

PRODUCTIVITY

Production is transformation of inputs into the output of commodity in a specific period of time with the given technology.

Production implies the creation of form, place and time utilities of different usable commodities and service.

Productivity measures the efficiency of the production system. Or productivity may be defined as ratio between output and input.

Output means the amount produced or the number of items produced.

Input are the various sources employed like land. Building, equipment, machinery, material, labor, etc

Output

Productivity = _____

Input

PRODUCTIVITY INDEX

PRODUCTIVITY INDEX=
$$\frac{\text{Performance Achieved (Effectiveness)}}{\text{Input Resources Consumed (Efficiency)}}$$

- Efficiency is the ratio of actual output attained to the standard expected output. It measures of how well the resources are utilized to accomplish the target or result.
- Effectiveness is the degree of accomplishing the objectives

Production System

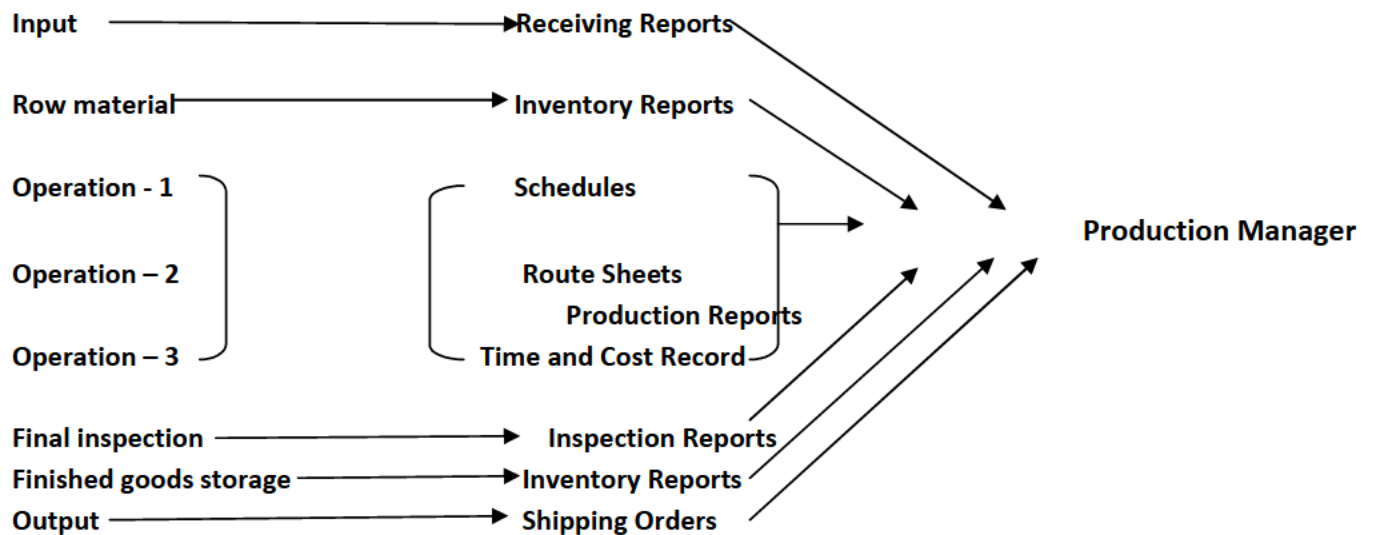
The production system can be viewed as a framework or skeleton of activities within which the creation of value can occur.

The difference between the value of input and the value of output represent the value created through production activities.

At the one end of the production system are the input and at the other end are output.

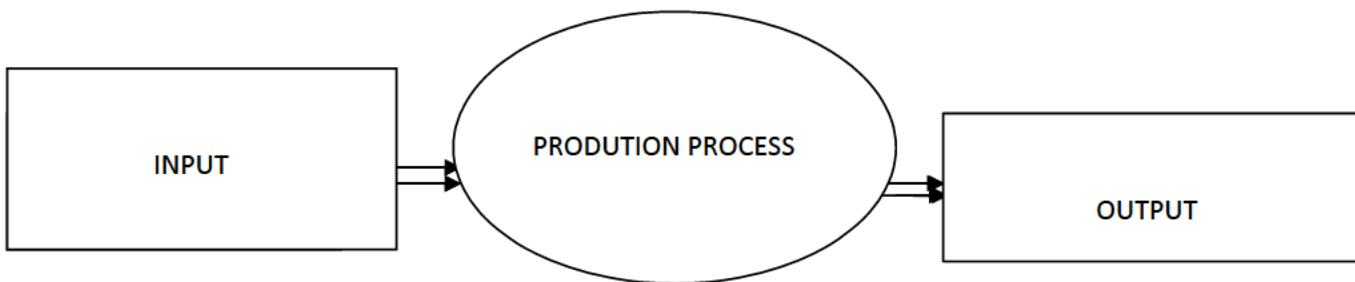
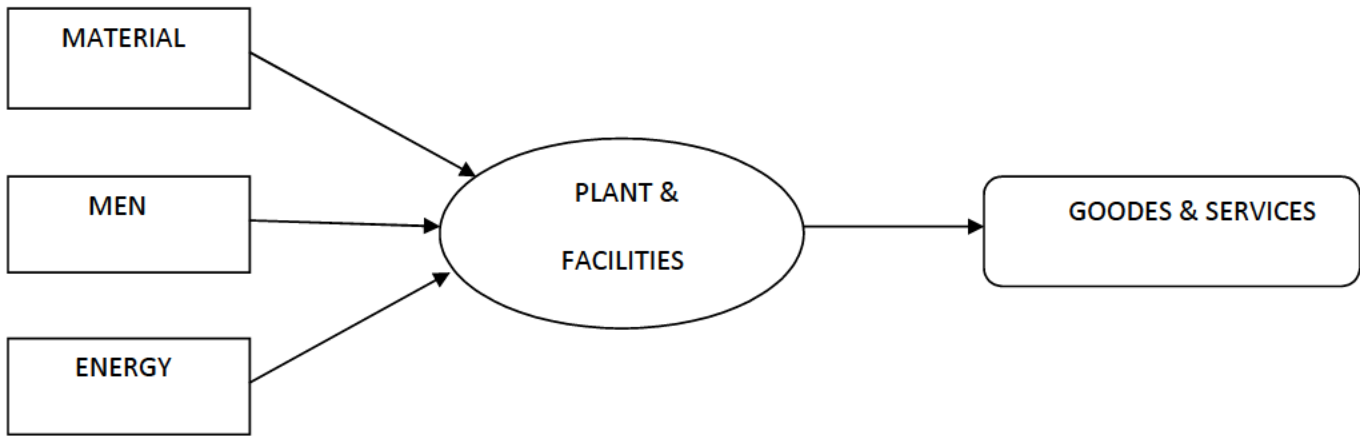
Connecting the input and output are a series of operations or processes, storage and inspections represent the simplified production system.

PRODUCTION SYSTEM



INPUT OUTPUT MODEL (ANALYSIS OF PRODUCTION SYSTEM)

- It is one of the basic models of the production system.
- Production system is the set of interconnected input output element.
- It is made up of three component parts namely – Input, Output and Process.
- A wide variety of inputs are transformed so that they give out a set of output.
- The transforming process can be complicated and the design of an actual input and output system for manufacturing may be expensive and difficult.



Purpose to Increase Productivity:

FOR MANAGEMENT

- To produce good earning (profit).
- To clear the debt or loans acquired from different sources.
- To sell more.
- To stand better in the market.

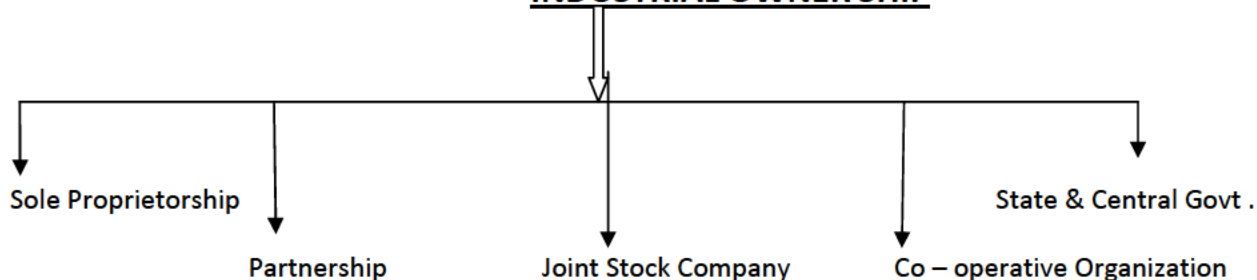
FOR WORKERS

- HIGHER WAGES.
- Better Working Conditions.
- Higher standard of living.
- Job Security and Satisfaction

FOR CUSTOMER

- To reduced price of the article.

INDUSTRIAL OWNERSHIP



Sole Proprietorship

Sole Proprietorship is that form of Industrial ownership in which Individual Exercise & enjoy all rights related to business in his own interest.

Merits –

- Easy Formation
- Easy to Operate
- Secrecy
- Simplicity

Demerits

- Limited Resources
- Lack of Continuity
- Unlimited Liability
- Limited Managerial Ability

Partnership

Partnership may be defined as the relation between person who has agreed to share the profits of a business carried on by all or any of them acting for all.

Merits

- Legal Entity
- Risk Sharing
- More Funds
- Continuity
- Mutual Agency

Demerits

- Unlimited Liability

- Limited Resources
- Possibility Of Conflict
- Lack of Public Interest

Joint Stock Company

A joint stock Company means an association of several people who contributed money or moneys worth to a joint or common stock & employ it in same business & share among themselves the profit or loss arising from it.

Merits

- Limited Liability
- Transfer of Interest
- Perpetual Existence
- Scope for Management
- Professional Management

Demerits

- Complexity in Formation
- Lack of Secrecy
- Impersonal Work Environment
- Numerous Regulation
- Delay In Decision Making

Co – Operative Undertaking

The Co – Operative society is voluntary association of person, who join together with the motive of welfare of the members and society.

Merits

- Limited liability
- Economy in Operation
- Support From Government
- Stable Existence
- Ease of Formation

Demerits

- Limited Resources
- Inefficiency in Management
- Lack Of Secrecy
- Government Control
- Difference Of Opinion

II unit-

Management Function : Principles of Management- Management Tools – time and motion study, work simplification- process charts and flow diagrams, Production Planning, Specification of Production requirements.

Management Function: Management

Management is generic. Management principles are general rather than specific to a type of firm or organization. However, management is universal only if the manager has become familiar with the specific situation in which it is applied. Production technology, customer characteristics and the culture of the industry are examples of specifics that managers need to learn to be effective in applying their generic management skills. *Management is creative problem solving. This creative problem solving is accomplished through four functions of management: planning, organizing, leading and controlling. The intended result is the use of an organization's resources in a way that accomplishes its mission and objectives.*

Planning is the ongoing process of developing the business' mission and objectives and determining how they will be accomplished. Planning includes both the broadest view of the organization, e.g., its mission, and the narrowest, e.g., a tactic for accomplishing a specific goal.

Organizing is establishing the internal organizational structure of the organization. The focus is on division, coordination, and control of tasks and the flow of information within the organization. It is in this function that managers distribute authority to job holders.

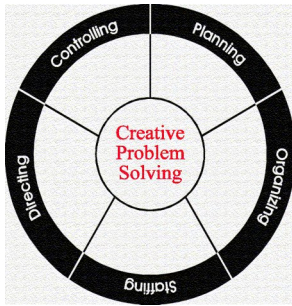
Staffing is filling and keeping filled with qualified people all positions in the business. Recruiting, hiring, training, evaluating and compensating are the specific activities included in the function. In the family business, staffing includes all paid and unpaid positions held by family members including the owner/operators.

Directing is influencing people's behavior through motivation, communication, group dynamics, leadership and discipline. The purpose of directing is to channel the behavior of all personnel to accomplish the organization's mission and objectives while simultaneously helping them accomplish their own career objectives.

Controlling is a four-step process of establishing performance standards based on the firm's objectives, measuring and reporting actual performance, comparing the two, and taking corrective or preventive action as necessary.

The American Luther Gulick and Brit Lydnall Urwick expanded Fayol's list to seven executive management activities summarized by the acronym POSDCORB:

- planning: determine objectives in advance and the methods to achieve them;
- organizing: establish a structure of authority for all work;
- staffing: recruit, hire and train workers; maintain favourable working conditions;
- directing: make decisions, issue orders and directives;
- coordinating: interrelate all sectors of the organisation;
- reporting: inform hierarchy through reports, records and inspections;
- budgeting: depend on fiscal planning, accounting and control.



Each of these functions involves creative problem solving. (Figure 4.2 from Higgins, page 118) Creative problem solving is broader than problem finding, choice making or decision making. It extends from analysis of the environment within which the business is functioning to evaluation of the outcomes from the alternative implemented. Henri Fayol, the father of the school of Systematic Management, was motivated to create a theoretical foundation for a managerial educational program based on his experience as a successful managing director of a mining company. In his day, managers had no formal training and he observed that the increasing complexity of organisations would require more professional management.

Principles of Management

A principle refers to a fundamental truth. It establishes cause and effect relationship between two or more variables under given situation. They serve as a guide to thought & actions. Therefore, management principles are the statements of fundamental truth based on logic which provides guidelines for managerial decision making and actions. These principles are derived: -

- a. On the basis of observation and analysis i.e. practical experience of managers.
- b. By conducting experimental studies.

There are 14 Principles of Management described by Henri Fayol.

1. Division of Labor

- a. Henry Fayol has stressed on the specialization of jobs.
- b. He recommended that work of all kinds must be divided & subdivided and allotted to various persons according to their expertise in a particular area.
- c. Subdivision of work makes it simpler and results in efficiency.
- d. It also helps the individual in acquiring speed, accuracy in his performance.
- e. Specialization leads to efficiency & economy in spheres of business.

2. Party of Authority & Responsibility

- a. Authority & responsibility are co-existing.
- b. If authority is given to a person, he should also be made responsible.
- c. In a same way, if anyone is made responsible for any job, he should also have concerned authority.
- d. Authority refers to the right of superiors to get exactness from their sub-ordinates whereas responsibility means obligation for the performance of the job assigned.
- e. There should be a balance between the two i.e. they must go hand in hand.
- f. Authority without responsibility leads to irresponsible behavior whereas responsibility without authority makes the person ineffective.

3. Principle of One Boss

- a. A sub-ordinate should receive orders and be accountable to one and only one boss at a time.
- b. In other words, a sub-ordinate should not receive instructions from more than one person because
 - It undermines authority
 - Weakens discipline
 - Divides loyalty
 - Creates confusion
 - Delays and chaos
 - Escaping responsibilities
 - Duplication of work
 - Overlapping of efforts
- c. Therefore, dual sub-ordination should be avoided unless and until it is absolutely essential.
- d. Unity of command provides the enterprise a disciplined, stable & orderly existence.
- e. It creates harmonious relationship between superiors and sub-ordinates.

4. Unity of Direction

- a. Fayol advocates one head one plan which means that there should be one plan for a group of activities having similar objectives.
- b. Related activities should be grouped together. There should be one plan of action for them and they should be under the charge of a particular manager.
- c. According to this principle, efforts of all the members of the organization should be directed towards common goal.
- d. Without unity of direction, unity of action cannot be achieved.
- e. In fact, unity of command is not possible without unity of direction.

Basis	Unity of command	Unity of direction
Meaning	It implies that a sub-ordinate should receive orders & instructions from only one boss.	It means one head, one plan for a group of activities having similar objectives.
Nature	It is related to the functioning of personnel's.	It is related to the functioning of departments, or organization as a whole.
Necessity	It is necessary for fixing responsibility of each subordinates.	It is necessary for sound organization.
Advantage	It avoids conflicts, confusion & chaos.	It avoids duplication of efforts and wastage

		of resources.
Result	It leads to better superior sub-ordinate relationship.	It leads to smooth running of the enterprise.

Therefore it is obvious that they are different from each other but they are dependent on each other i.e. unity of direction is a pre-requisite for unity of command. But it does not automatically comes from the unity of direction.

5. Equity

- a. Equity means combination of fairness, kindness & justice.
- b. The employees should be treated with kindness & equity if devotion is expected of them.
- c. It implies that managers should be fair and impartial while dealing with the subordinates.
- d. They should give similar treatment to people of similar position.
- e. They should not discriminate with respect to age, caste, sex, religion, relation etc.
- f. Equity is essential to create and maintain cordial relations between the managers and sub-ordinate.
- g. But equity does not mean total absence of harshness.
- h. Fayol was of opinion that, “at times force and harshness might become necessary for the sake of equity”.

6. Order

- a. This principle is concerned with proper & systematic arrangement of things and people.
- b. Arrangement of things is called material order and placement of people is called social order.
- c. Material order- There should be safe, appropriate and specific place for every article and every place to be effectively used for specific activity and commodity.
- d. Social order- Selection and appointment of most suitable person on the suitable job. There should be a specific place for every one and everyone should have a specific place so that they can easily be contacted whenever need arises.

7. Discipline

- a. According to Fayol, “Discipline means sincerity, obedience, respect of authority & observance of rules and regulations of the enterprise”.
- b. This principle applies that subordinate should respect their superiors and obey their order.
- c. It is an important requisite for smooth running of the enterprise.
- d. Discipline is not only required on path of subordinates but also on the part of management.
- e. Discipline can be enforced if -
 - There are good superiors at all levels.
 - There are clear & fair agreements with workers.
 - Sanctions (punishments) are judiciously applied.

8. Initiative

- a. Workers should be encouraged to take initiative in the work assigned to them.
- b. It means eagerness to initiate actions without being asked to do so.

- c. Fayol advised that management should provide opportunity to its employees to suggest ideas, experiences & new method of work.
- d. It helps in developing an atmosphere of trust and understanding.
- e. People then enjoy working in the organization because it adds to their zeal and energy.
- f. To suggest improvement in formulation & implementation of place.
- g. They can be encouraged with the help of monetary & non-monetary incentives.

9. Fair Remuneration

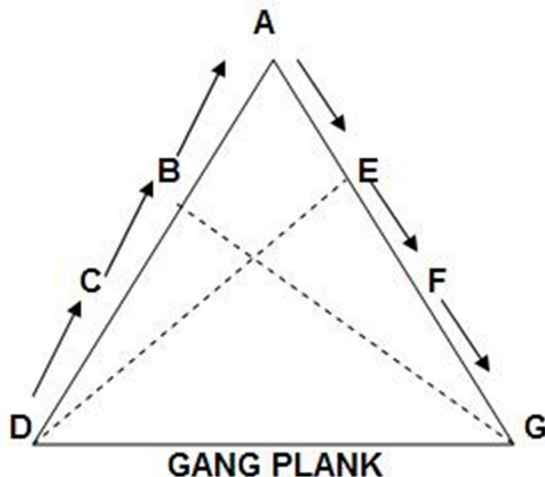
- a. The quantum and method of remuneration to be paid to the workers should be fair, reasonable, satisfactory & rewarding of the efforts.
- b. As far as possible it should accord satisfaction to both employer and the employees.
- c. Wages should be determined on the basis of cost of living, work assigned, financial position of the business, wage rate prevailing etc.
- d. Logical & appropriate wage rates and methods of their payment reduce tension & differences between workers & management creates harmonious relationship and pleasing atmosphere of work.
- e. Fayol also recommended provision of other benefits such as free education, medical & residential facilities to workers.

10. Stability of Tenure

- a. Fayol emphasized that employees should not be moved frequently from one job position to another i.e. the period of service in a job should be fixed.
- b. Therefore employees should be appointed after keeping in view principles of recruitment & selection but once they are appointed their services should be served.
- c. According to Fayol. "Time is required for an employee to get used to a new work & succeed to doing it well but if he is removed before that he will not be able to render worthwhile services".
- d. As a result, the time, effort and money spent on training the worker will go waste.
- e. Stability of job creates team spirit and a sense of belongingness among workers which ultimately increase the quality as well as quantity of work.

11. Scalar Chain

- a. Fayol defines scalar chain as 'The chain of superiors ranging from the ultimate authority to the lowest'.
- b. Every orders, instructions, messages, requests, explanation etc. has to pass through Scalar chain.
- c. But, for the sake of convenience & urgency, this path can be cut short and this short cut is known as Gang Plank.
- d. A **Gang Plank** is a temporary arrangement between two different points to facilitate quick & easy communication as explained below:



In the figure given, if D has to communicate with G he will first send the communication upwards with the help of C, B to A and then downwards with the help of E and F to G which will take quite some time and by that time, it may not be worth therefore a gang plank has been developed between the two.

- e. **Gang Plank** clarifies that management principles are not rigid rather they are very flexible. They can be moulded and modified as per the requirements of situations

12. Sub-Ordination of Individual Interest to General Interest

- a. An organization is much bigger than the individual it constitutes therefore interest of the undertaking should prevail in all circumstances.
- b. As far as possible, reconciliation should be achieved between individual and group interests.
- c. But in case of conflict, individual must sacrifice for bigger interests.
- d. In order to achieve this attitude, it is essential that -

- Employees should be honest & sincere.
- Proper & regular supervision of work.
- Reconciliation of mutual differences and clashes by mutual agreement. For example, for change of location of plant, for change of profit sharing ratio, etc.

13. Espirit De' Corps (can be achieved through unity of command)

- a. It refers to team spirit i.e. harmony in the work groups and mutual understanding among the members.
- b. Spirit De' Corps inspires workers to work harder.
- c. Fayol cautioned the managers against dividing the employees into competing groups because it might damage the moral of the workers and interest of the undertaking in the long run.
- d. To inculcate Espirit De' Corps following steps should be undertaken -
 - There should be proper co-ordination of work at all levels
 - Subordinates should be encouraged to develop informal relations among themselves.
 - Efforts should be made to create enthusiasm and keenness among subordinates so that they can work to the maximum ability.
 - Efficient employees should be rewarded and those who are not up to the mark should be given a chance to improve their performance.
 - Subordinates should be made conscious of that whatever they are doing is of great importance to the business & society.
- e. He also cautioned against the more use of Britain communication to the subordinates i.e. face to face communication should be developed. The managers should infuse team spirit & belongingness. There should be no place for misunderstanding. People then enjoy working in the organization & offer their best towards the organization.
- f.

14. Centralization & De-Centralization

- a. Centralization means concentration of authority at the top level. In other words, centralization is a situation in which top management retains most of the decision making authority.
- b. Decentralization means disposal of decision making authority to all the levels of the organization. In other words, sharing authority downwards is decentralization.
- c. According to Fayol, "Degree of centralization or decentralization depends on no. of factors like size of business, experience of superiors, dependability & ability of subordinates etc.
- d. Anything which increases the role of subordinate is decentralization & anything which decreases it is centralization.
- e. Fayol suggested that absolute centralization or decentralization is not feasible. An organization should strike to achieve a lot between the two.

Management tools

Classic Tools

There's an elusive balance between chasing after each new management tool or method, and ignoring the fact that we have actually learned some things about management over the past 100,000 years. The best tools are those which stand the test of time, and which give you a lot of leverage over common problems.

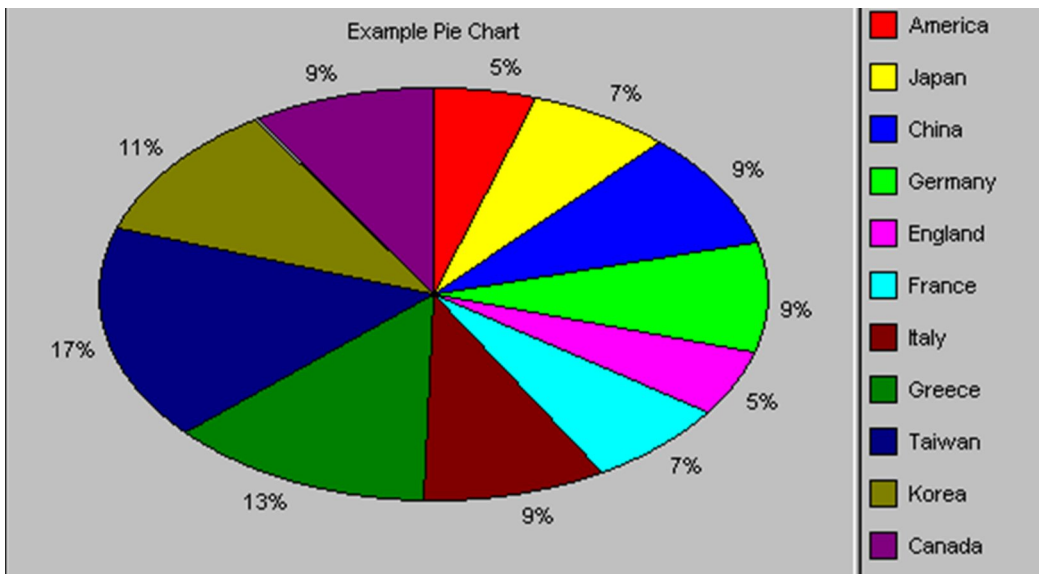
Quality Control Charts

- Pie charts
- Bar charts
- Run Charts
- Radar Charts
- Scatter Plots
- Histograms
- Pareto Charts
- Normal Test Plots
- Process Capability Calculations
- Control Charts

Other Quality Management Tools

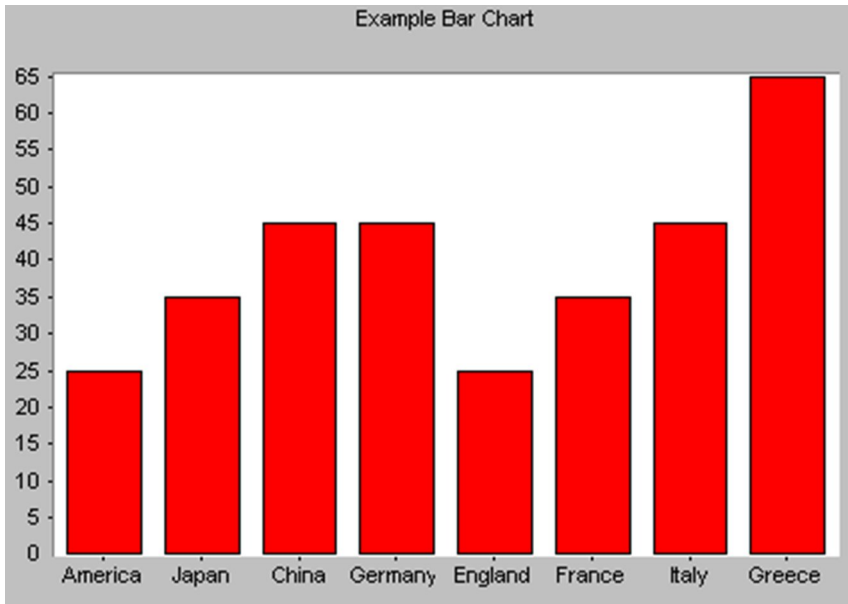
- Relations Diagram
- Pathway
- Affinity Diagrams
- Brainstorms
- Building Consensus
- Cause and Effect Diagrams
- Flowcharts
- Force Field Diagrams
- Tree Diagrams

Pie Charts



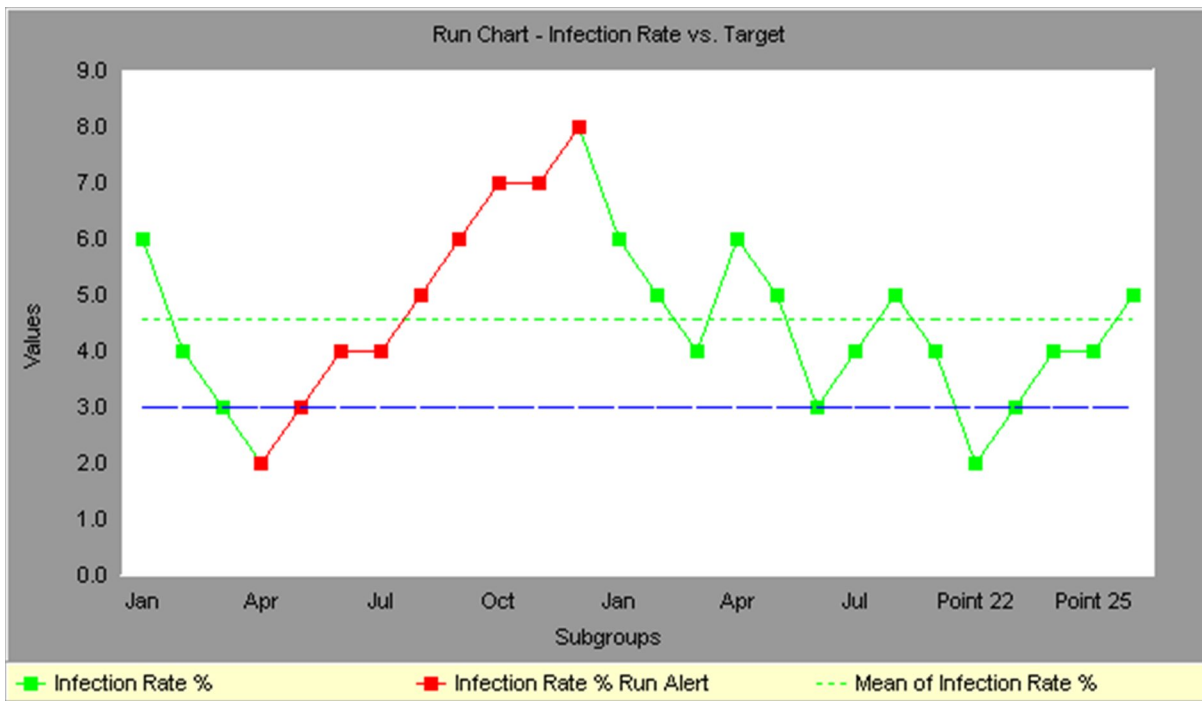
Pie charts are used to show classes or groups of data in proportion to the whole data set. The entire pie represents all the data, while each slice represents a different class or group within the whole.

Bar Charts



Bar Charts, like pie charts, are useful for comparing classes or groups of data. In bar charts, a class or group can have a single category of data, or they can be broken down further into multiple categories for greater depth of analysis.

Run Charts



Run charts (often known as line graphs outside the quality management field) display process performance over time. Upward and downward trends, cycles, and large aberrations may be spotted and investigated further. In a run chart, events, shown on the y axis, are graphed against a time period on the x axis. For example, a run chart in a hospital might plot the number of patient transfer delays against the time of day or day of the week. The results might show that there are more delays at noon than at 3 p.m. Investigating this phenomenon could

GATE Study Material Industrial Engineering (Mechanical Engineering)



Publisher : Faculty Notes

Author : Panel Of Experts

Type the URL : <http://www.kopykitab.com/product/9852>



Get this eBook