Industrial Management and Engineering Economics

Chapter 1

Basic Management Concepts and Industrial Organization

Prepared by Alebel M.

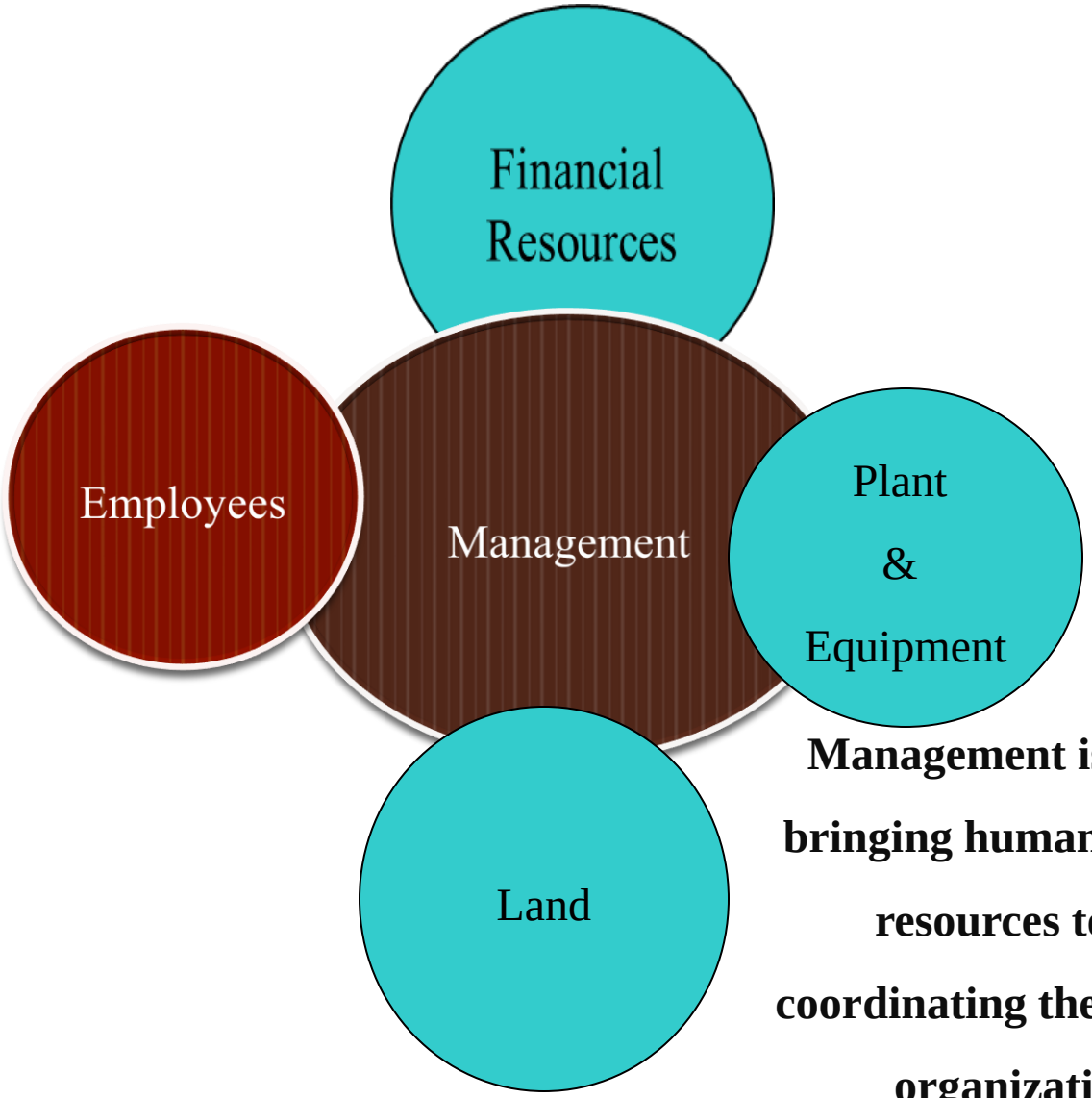
What comes in your mind when one talks about Management?

- Management is the use of people and other resources (human & non human) to accomplish objectives of an organization.
  - ✓Human - skill and knowledge.
  - ✓Non human - capital, land, technology, plant and equipment.

Objective:

- Maximize the potential of the people and coordinate their efforts to attain some predetermined goal.
- Managers use resources to attain organizational goals.

Management as a Unifying Force



Management is the process of bringing human and nonhuman resources together and coordinating them to accomplish organizational goals.

Organization:- is a stable and formal social structure that takes resources from the environment and processes them to produce outputs.

Common characteristics of organization:

- Goal
- People
- Structure

Type of organizations based on purposes for which they are formed;

1. Profit oriented organization (Product/Services)

- ✓ Return on investment /for making money

2. Nonprofit-oriented organization

- ✓ For offering services like;
  - Educational Institutions
  - Hospitals, social welfare agencies like red cross

3. Mutual Benefit organizations

- ✓ To advance members' interest like;
  - labor unions, trade associations, Political parties. Etc.

Organizations structure

- **Line organization**: sometimes called military organizations

  The chain of command is direct and so decisions can usually be quick and implemented rapidly. **Clear line of responsibility and authority.**

- **Functional organization**: type of activity or functions determines area of responsibility and authority. An expert or specialist is placed in charge of each functions and will have direct control of that functions wherever its undertaken within the enterprise.

- **Line and functional organization**: combination of line and functional and is most successful type of organizations
- **Matrix or project organization**: is set for temporary time to accomplish certain project work. Specialist from different discipline work as team and after project completion they go back to their role.

Industrial management

Industrial management is a broad field of study which is targeted on creation of management systems and integrating the people and their activities to improve productivity by utilizing the existing resources.

- The subject emphasizes studying the performance of **machines** and the **people.**
- Industrial management, therefore, is structured approach to manage the operational activities of an organization.

Scope of industrial management & Eng'g economy

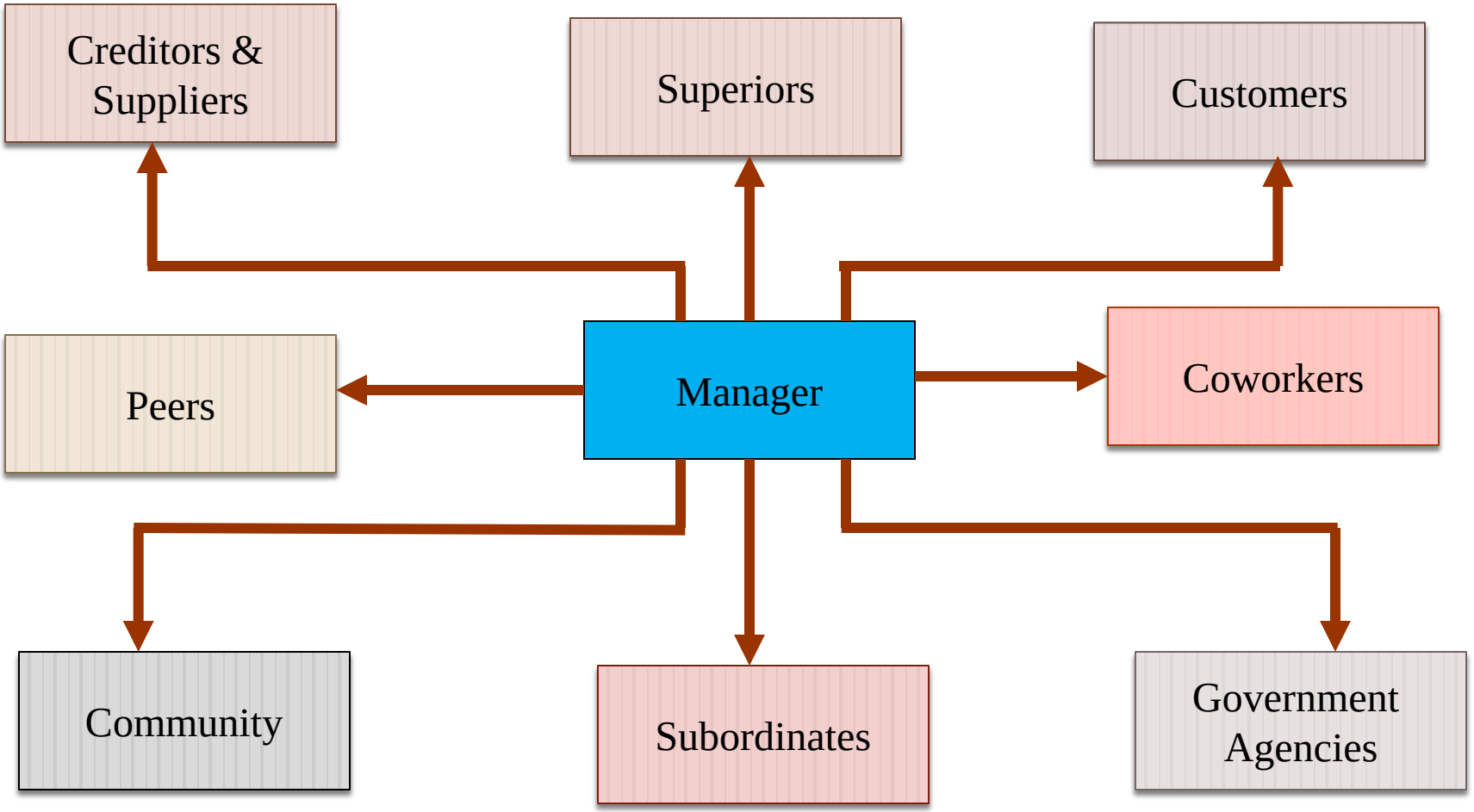
- ✓ Initially the scope & application of industrial management was restricted to manufacturing industry. Later on it spread to non-manufacturing activities such as hydroelectric power station, construction & transportation, farm and air-line operation and maintenance, public utilities & military operations.
- ✓ Where as engineering economics helps to make informed financial evaluation, decision and financial report of engineering projects, investment, lease/buy decisions.

Importance of industrial Management

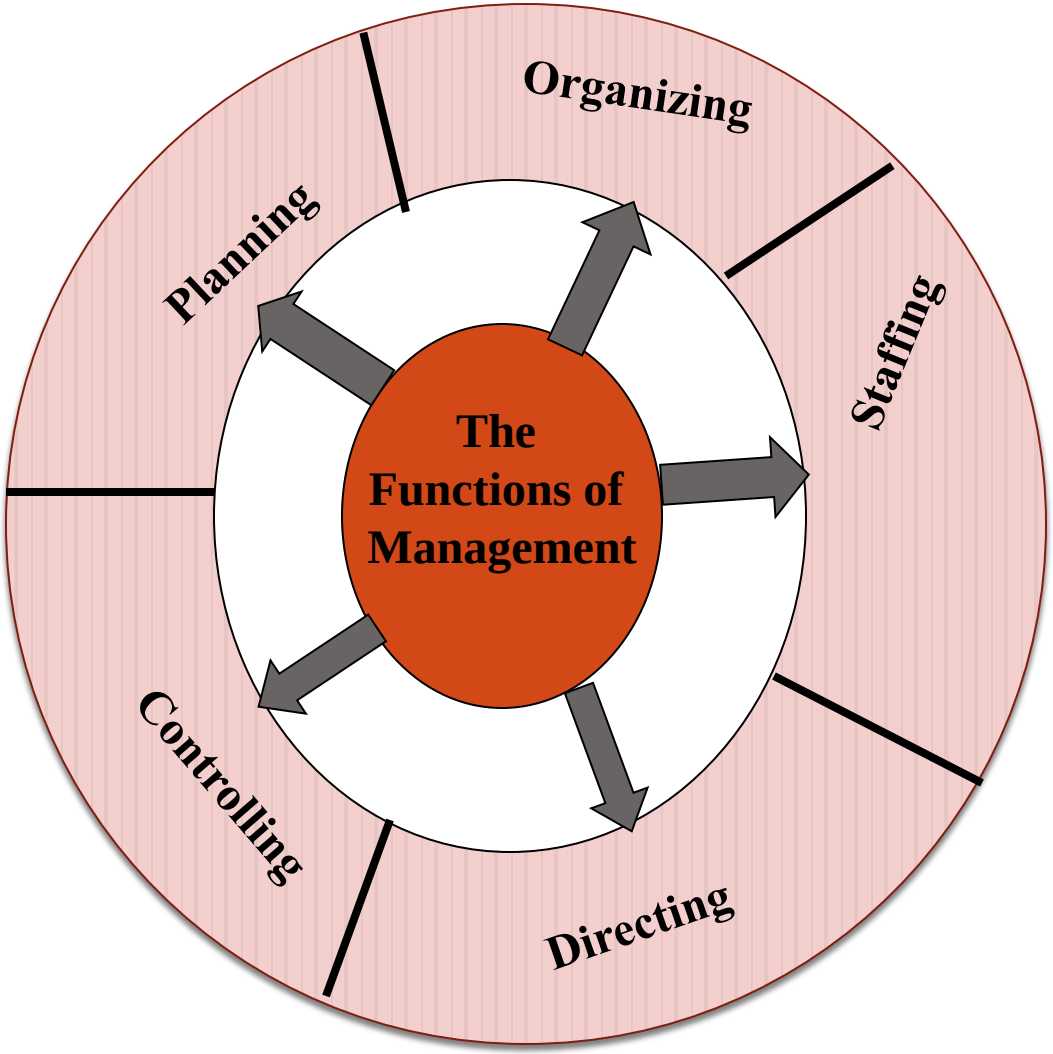
A well skilled Managers will going to

- Make business decisions easily.
- Take risks for which the reward is profit
- Act as an innovator by introducing new products, new technology and new ways of organizing business.
- Put together the factors of production to produce goods and services

Manager's Interactions with Other Groups of People



Functions of Management



Functions of Management…

I. **Planning**:- is the process of setting objectives for the future and developing courses of action to accomplish them. (What, How, Who &When)

II. **Organizing**:- is the process of arranging people and physical resources to carry out plans and accomplish organizational objectives.

III. **Staffing**:- is the process of matching jobs & people. (Human resource planning, recruiting, training & Development, Performance appraisal,

IV. **Directing**:- is the act of motivating or causing people to perform certain tasks intended to achieve specific objectives. It is the act of making things happen. (Communication, leadership, supervision, motivation, and coordination)

V. **Controlling**:- is the process by which managers determine whether organizational objectives are achieved and whether actual operations are consistent with plans. (Goal, actual, gap, and corrective measures)

Management Roles

1. Interpersonal Roles

Figurehead: All social, inspiration, legal and ceremonial obligations. In this light, the manager is seen as a symbol of status and authority.

Leader: Duties are at the heart of the manager-subordinate relationship and include structuring and motivating subordinates, overseeing their progress, promoting and encouraging their development, and balancing effectiveness.

Liaison (hibret): Describes the role of managers in representing their organization in different occasions. As bridge like middle management.

2. Informational Roles

Monitor: Duties include assessing internal operations, a department's success and the problems and opportunities which may arise. All the information gained in this capacity must be stored and maintained.

Disseminator: Highlights factual or value based external views into the organization and to subordinates. This requires both filtering and delegation skills.

Spokesman: Serves in a public relations capacity by informing and lobbying others to keep key stakeholders updated about the operations of the organization.

3. Decision Roles

Entrepreneur: Roles encourage managers to create improvement projects and work to delegate, empower and supervise teams in the development process.

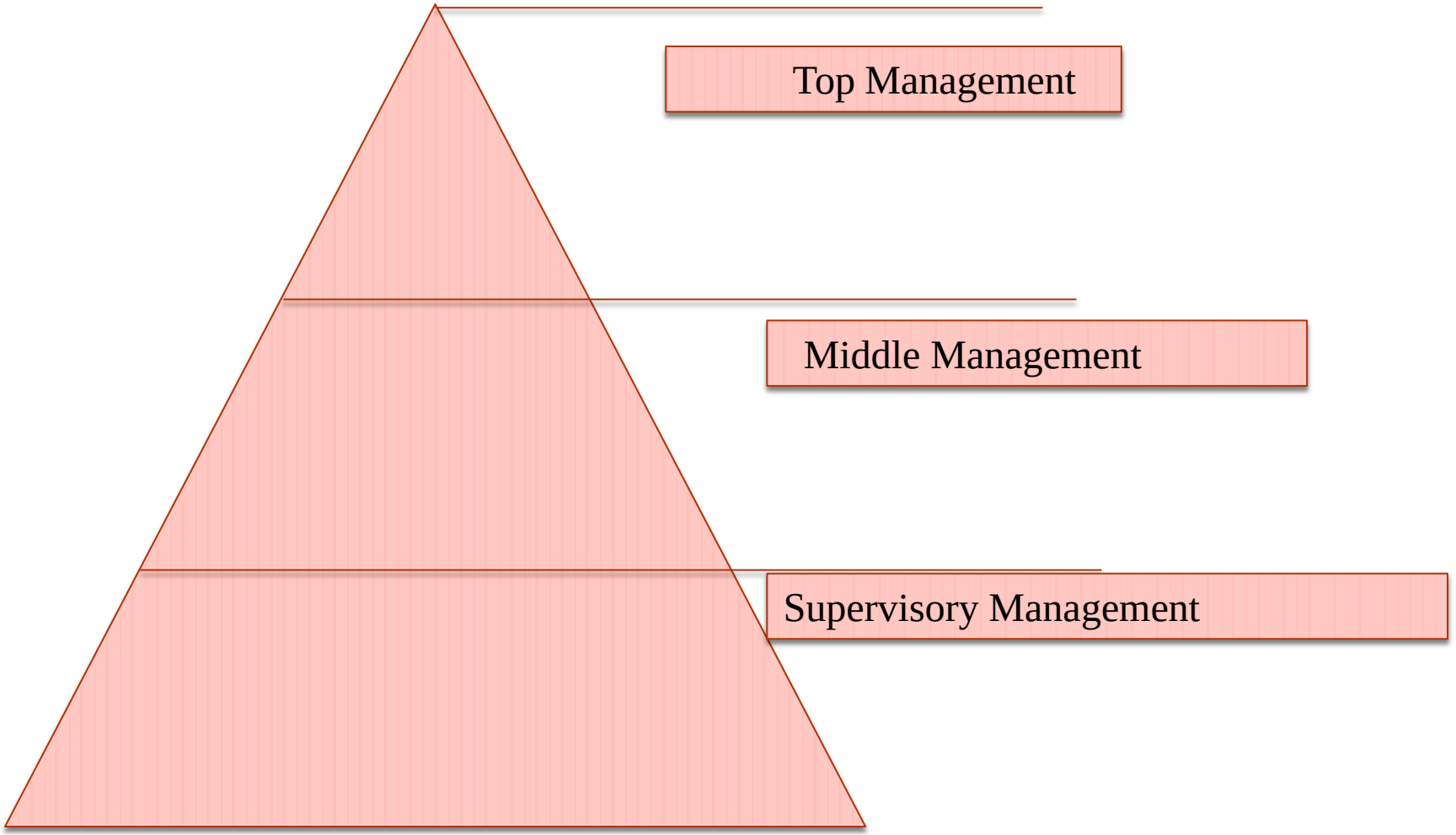
Disturbance handler: A generalist role that takes charge when an organization is unexpectedly upset or transformed and requires calming and support.

Resource Allocator: Describes the responsibility of allocating and overseeing financial, material and personnel resources.

Negotiator: Is a specific task which is integral for the spokesman, figurehead and resource allocator roles.

Management Hierarchy

Three distinct levels of management



i. Top Management

- Made up of individuals who have the possibility of making the decisions and formulating policies that affect all aspect of the firm's operations.

  President

  Vice President

  Chief Executive Officers

  Executive Vice President

- A manager's assigned job duties and the authority needed to fulfill those duties are what determine management level

ii. Middle Management

- ✓ Includes all managers above the supervisory level but below the level where overall company policy is determined.
- ✓ Middle managers manage supervisors.

Regional Sales Managers

Academic Deans (Universities)

Directors of Nursing (Hospitals)

iii. Supervisory Management

- Supervisors manage workers who perform the most basic job duties required in the business.

  Sales Manager

  Academic Department Chairperson (Universities)

  Nursing Supervisors (Hospitals)

Management Skills

Management Success depends on both a fundamental understanding of the principles of management and on the application of technical, human and conceptual skills.

a. Technical Skills

- Are the specialized knowledge and abilities that can be applied to specific tasks.

- Most important at lower level of management.

b. Human relation skills

- Are the abilities needed to resolve conflict, motivate, lead, and communicate effectively with other workers.

- Equally important at all levels of management.

c. Conceptual Skills

- Are the abilities needed to view the organization from a broad perspective and to see the interrelations among its components.
- Are most important in strategic (long-range) planning; therefore they are more important at top level executives.

Management Styles

Management Style	Description	Advantages	Disadvantages
Autocratic	Senior managers take all the important decisions with no involvement from workers	Quick decision making Effective when employing many low skilled workers	No two-way communication so can be de-motivating Creates "them and us" attitude between managers and workers
Paternalistic or Authoritarian	Managers make decisions in best interests of workers after consultation	More two-way communication so motivating Workers feel their social needs are being met	-Slows down decision making -Still quite a dictatorial or autocratic style of management
Democratic	-Workers allowed to make own decisions. -Some businesses run on the basis of majority decisions	-Authority is delegated to workers which is motivating -Useful when complex decisions are required that need specialist skills	Mistakes or errors can be made if workers are not skilled or experienced enough

School of Management Thought

The school of management can be classified as:

1. Classical perspectives.

I. Scientific management theory
II. Administrative management
III. Bureaucratic organization theory

} **F. W. Taylor , Henry Fayol & Max Waber**

2. Neo classical perspectives.

i. Human Relation management
ii. Behavioral science

} A. Maslow and D McGregor

3. Contemporary perspectives

a. Contingency Theory
b. Systems Theory
c. Quantitative theory and,
d. Quality management

} **TQM**

4. Quantitative School of thought

A. Management Science (problem solving/Modeling/Optimizations)
B. Operations management:- Concerned with work scheduling, facility location and design, and optimum inventory levels

I. Scientific management

F. W. Taylor (1856-1915)
Called Father of Scientific Management.

- Scientific Management theory arose in part from the need to increase productivity.
- In the United States especially, skilled labor was in short supply at the beginning of the twentieth century.
- The only way to expand productivity was to raise the efficiency of workers.
- He believed that there was one best way of performing every process and task in industry.
- To find that best way, workers' performance should be examined scientifically, objectively and in great detail, using **empirical** and **experimental** approach.

Frank B. and Lillian M. Gilbreth

(1868-1924 and 1878-1972)

- Lillian and Frank collaborated on fatigue and motion studies and focused on ways of promoting the individual worker's welfare
- To them, the ultimate aim of scientific management was to help workers reach their full potential as human beings.

❖ Using motion picture cameras, they tried to find the most economical motions for each task in order to upgrade performance and reduce fatigue.

2. Neo classical perspectives.

Originated from industrial psychology and sociology.

Thus, behavioral mgt. theory:

- Emphasizes on the interaction of people in the organization in order to understand the practice of management.
- Points out the role of psychology & sociology understanding the individual as well as group behavior in the organization.
- Advocated the human values in an organization.

There are two approaches in the behavioral mgt. theory.

1. Human relation approach / movement:- The theory was pioneered by A. Maslow and D McGregor Better human relations could increase worker productivity
2. Behavioral science approach:- This approach gave emphasis on individual behavior and motivation.

3. Contemporary or recent theories

Four more prominent recent management theories:

1. Contingency Theory

It is based on the premise that situations dictate managerial action/Innovative approach which best fit company's situations/. Managers approach be contingent on the individual and environmental situations.

2. Systems Theory

A manager must be able to see the interrelationship of the different parts of his/her organization and must understand how the organization fits. System components (Inputs, Transformation process, outputs and feedback)

3. Quality management

Managers focus on quality control (minimize error at each stages), quality assurance (enhance worker performance via standard documentations…) and 4. TQM

Total quality management (TQM)

Total quality management is a comprehensive approach lead by top management and supported throughout the organization dedicated to continuous improvement, training, and customer satisfactions.

Major components;

- Make continuous improvement a priority
- Get every employee involved
- Listen to and learn from customers and employees
- Use accurate standards to identify and eliminate problems

4. Quantitative School of thought

1. Management Science (use of mathematics to aid problem solving/Modeling/Optimizations);

   In design, construction, and maintenance of any engineering system, engineers have to take many technological and managerial decisions at several stages. The ultimate goal of all such decisions is either to minimize the effort required or to maximize the desired benefit.

   A. Linear Programming
   B. Network Analysis and Queuing Theory
   C. Inventory models and others

2. Operations management (Focus on managing production and delivery of products and services effectively. Concerned with work scheduling, facility location and design, and optimum inventory levels)

Which of the management philosophies we discussed so far you find very helpful than others? Why?

Management and productivity

- Management is concerned with productivity i.e. the effectiveness and efficiency.
- In the past productivity improvement program were mostly aimed at workers level but now it is for the management also.
- Productivity can be measured as the Output to Input ratios within a time period with due consideration for quality.

Productivity = *O P*/*I P*(within time period and considered)

- Productivity can be improved by
  a. By increasing O/P with same I/P.
  b. By decreasing I/P but maintaining same O/P.
  c. By Increasing O/P and decreasing I/P to change the ratio favorably.
- The I/P can be labor, material capital etc.

PRODUCTION AND PRODUCTIVITY

- Production refers to quantity of production
- productivity means the efficient use of resources consumed for achieving that production.
- Resources are of several types:-
  - ✓ material,
  - ✓ men,
  - ✓ machine hours,
  - ✓ energy consumed,
  - ✓ space utilized etc.

Lesser is the consumption of such resources per unit of production, higher is the productivity.

- Let us take the example of two motor cycle manufacturers who produce similar motorbikes same design, same HP etc. If one manufacturer uses 1.5 tons of steel per motorcycle and the other uses 1.4 tons of steel, hence, the latter's **material productivity is higher.**
- Productivity should not be confused with cost of manufacture, although a plant with higher productivity will use less resources and its product is likely to be cheaper.

- Total productivity $= \frac{output}{inputs} = \frac{goods\ and\ services\ produced}{All\ inputs\ used}$
- Partial productivity $= \frac{output}{labor}$ or $\frac{output}{capital}$ or $\frac{output}{materials}$ or $\frac{output}{energy}$
- Multifactor productivity $= \frac{output}{labor+capital+energy}$ or

$$= \frac{output}{materials+labor+capital}$$

Productivity Example

Input and Output Production Data ($)		Productivity Measure Examples
Output		
1. Finished units	$10,000	
2. Work in process	2,500	
3. Dividends	1,000	
4. Bonds		
5. Other income		
Total output	$13,500	
Input		
1. Human	$ 3,000	
2. Material	153	
3. Capital	10,000	
4. Energy	540	
5. Other expenses	1,500	
Total input	$15,193	

Total measure:

$$\frac{\text{Total output}}{\text{Total input}} = \frac{13,500}{15,193} = .89$$

Multifactor measures:

$$\frac{\text{Total output}}{\text{Human + Material}} = \frac{13,500}{3,153} = 4.28$$

$$\frac{\text{Finished units}}{\text{Human + Material}} = \frac{10,000}{3,153} = 3.17$$

Partial measures:

$$\frac{\text{Total output}}{\text{Energy}} = \frac{13,500}{540} = 25$$

$$\frac{\text{Finished units}}{\text{Energy}} = \frac{10,000}{540} = 18.52$$

Thank you!!!