Production & Operations Management

Chapter 1

Nature & Scope of Production & Operations Management

Nature of Production

Production is the process by which raw materials and other inputs are converted into finished goods.
Manufacturing refers to the process of producing tangible goods only.
Nature of production can be better understood if we view the manufacturing function fro three angles

- Production as a System
- Production as an organizational function
- Decision making in production

Nature of Production

•**Production** and operations management (POM) is the management of an organization's **production system**.

•A **production system** takes inputs and converts them into outputs.

•The conversion process is the predominant activity of a **production system**.

•The primary concern of an operations manager is the activities of the conversion process.

Production as a System

A system is understood as a whole which can not be taken apart.There systems are classified into three types.

- Production System
- Conversion subsystem
- Control Subsystem

Production system receives inputs in the form of

1) Capital.
2) Utilities.
3) Personnel.
4)Information

Cont.

Production as a System

Inputs of a Production System

- **External**

  Legal, Economic, Social, Technological

- **Market**

  Competition, Customer Desires, Product Info.

- **Primary Resources**

  Materials, Personnel, Capital, Utilities

Cont..

Production as a System

Conversion Subsystem

- Physical (Manufacturing)
- Vocational Services (Transportation)
- Exchange Services (Retailing)
- Storage Services (Warehousing)
- Other Private Services (Insurance)
- Government Services (Federal)

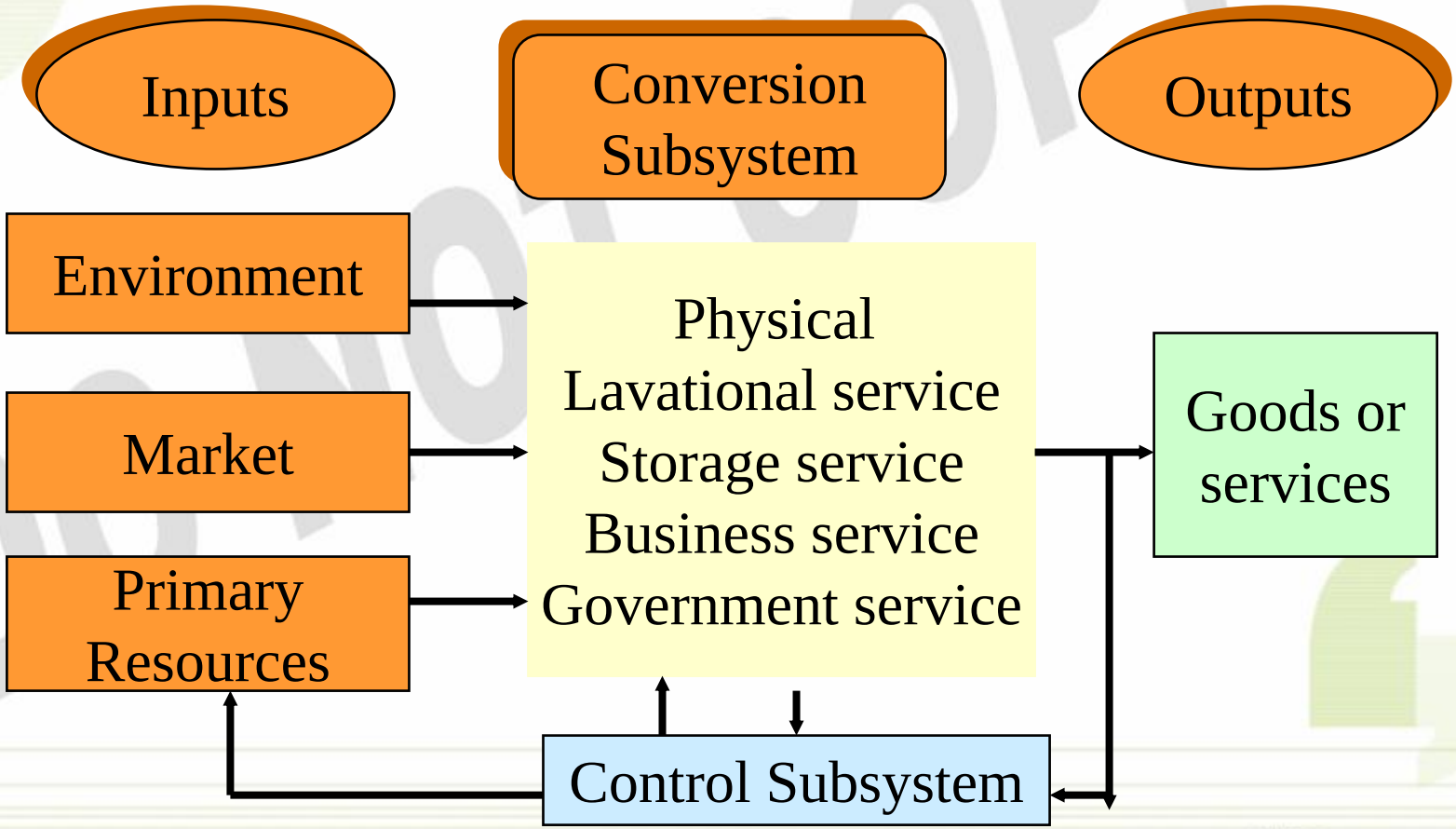
Production System Concept

1. **Production System:**
A system whose function is to convert a set of inputs into a set of desired outputs

2. **Conversion Sub-System:**
A Sub-System of larger production system where inputs are converted into outputs

3.**Control Subsystem:**
A subsystem of a larger production system where a portion of the output is monitored for feedback signals

Production System Model



Production System Concept

Outputs of a Production System

- Direct
  - Products
  - Services
- Indirect
  - Waste
  - Pollution
  - Technological Advances

Decision making in Production

•Operations managers are often required to make a series of decisions in the production function.

•Operations managers plan, organize, staff, direct and control all the activities in the process of converting inputs into finishes goods.

•The decisions made by operations mangers about the activities of production fall into three general categories

1)Strategic decisions.

2) Control decisions.

3) Operating decisions.

Cont..

Decision making in Production

Strategic Decisions

•These decisions are of strategic importance and have long-term significance for the organization.

•Examples include deciding:

the design for a new product's **production** process

where to locate a new factory

Whether to launch a new-product development plan

Cont..

Decision making in Production

•Planning for the optimal distribution of scarce resources amongst product lines' can be considered as an **Strategic** decisions

•**Operating decisions** considered to ensure that the ongoing production of goods and services meets the market demand

Cont..

Decision making in Production

•**Control** decisions concern the day to day activities of the workers, quality and product of services, production and the overhead costs and maintenance of machines

•Planning materials and capacity is an activity that can be considered as a result of Operating decisions.

'Resource requirements and planning systems' can be considered as an area of involvement under **Operations** decisions.

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Decision making in Production

Production Function can offer competitive advantage in Following of the below mentioned areas

1) Higher Quality.
2) Greater flexibility.
3) Reduced wastage.
4) Shorter product lead time
5) Better customer service

Cont..

Production Management

•Examples include deciding:
Labor cost standards for a new product
Frequency of preventive maintenance
New quality control acceptance criteria

What Controls the Operations System?

•Information about the outputs, the conversions, and the inputs is fed back to management.

•This information is matched with management's expectations

•When there is a difference, management must take corrective action to maintain control of the **system**

Production Functions

•**Production function** asserts that the maximum output of a technologically-determined production process is a mathematical production of input factors of production.

• Considering the set of all technically feasible combinations of output and inputs, only the combinations encompassing a maximum output for a specified set of inputs would constitute the production function.

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Production Functions

•Alternatively, a production function can be defined as the specification of the minimum input requirements needed to produce designated quantities of output, given available technology.

• It is usually presumed that unique production functions can be constructed for every production technology.

Production Functions

•By assuming that the maximum output technologically possible from a given set of inputs is achieved, economists using a production function in analysis are abstracting away from the engineering and managerial problems inherently associated with a particular production process.

• The engineering and managerial problems of technical efficiency are assumed to be solved, so that analysis can focus on the problems of allocative efficiency.

Production Functions

- The firm is assumed to be making allocative choices concerning how much of each input factor to use, given the price of the factor and the technological determinants represented by the production function.
- A decision frame, in which one or more inputs are held constant, may be used; for example, capital may be assumed to be fixed or constant in the short run, and only labor variable, while in the long run, both capital and labor factors are variable,

Cont…

Production Functions

•But the production function itself remains fixed, while in the very long run, the firm may face even a choice of technologies, represented by various, possible production functions.

•The relationship of output to inputs is non-monetary, that is, a production function relates physical inputs to physical outputs, and prices and costs are not considered. But, the production function is not a full model of the production process:

Cont…..

Production Functions

•It deliberately abstracts away from essential and inherent aspects of physical production processes, including error, entropy or waste.

•Moreover, production functions do not ordinarily model the business processes, either, ignoring the role of management, of sunk cost investments and the relation of fixed overhead to variable costs.

• The primary purpose of the production function is to address allocative efficiency in the use of factor inputs in production

Production Functions

Area of Productivity

1. Improving Volume of productivity
2. Reducing rejection rate
3. Minimizing rework rate
4. Maintaining delivery schedule
5. Controlling Machine & manpower hours
6. Establishing engineering norms
7. Updating production process
8. Maintaining timeless MIS
9. Decreasing Machine set up time.
10. Controlling overtime

Production Functions

Area of Productivity

11. Good house keeping
12. Checking absenteeism
13. Eliminating accidents
14 Effective grievance handling
15 Efficient training & team building
16 Minimizing inventory
17 Enhancing customer satisfaction
18 Total Quality management
19 Business process reengineering
20 Automation

Scope of Production Management

The Industrial Revolution

The industrial revolution spread from England to other European countries and to the United Sates.

- In 1790 an American, Eli Whitney, developed the concept of interchangeable parts.
- The first great industry in the U.S. was the textile industry.
- In the 1800s the development of the gasoline engine and electricity further advanced the revolution.
- By the mid-1800s, the old cottage **system** of **production** had been replaced by the factory **system**.

Scope of Production Management

The Industrial Revolution

Post-Civil War Period

- During the post-Civil War period great expansion of **production** capacity occurred.
- By post-Civil War the following developments set the stage for the great **production** explosion of the 20th century:
  - increased capital and **production** capacity
  - the expanded urban workforce
  - new Western U.S. markets
  - an effective national transportation **system**

Scope of Production Management

Scientific Management

- Frederick Taylor is known as the father of scientific management. His shop **system** employed these steps:
  - Each worker's skill, strength, and learning ability were determined.
  - Stopwatch studies were conducted to precisely set standard output per worker on each task.
  - Material specifications, work methods, and routing sequences were used to organize the shop.
  - Supervisors were carefully selected and trained.
  - Incentive pay systems were initiated.

Scope of Production Management

Scientific Management

- In the 1920s, Ford Motor Company's operation embodied the key elements of scientific management:
  - standardized product designs
  - mass **production**
  - low manufacturing costs
  - mechanized assembly lines
  - specialization of labor
  - interchangeable parts

Scope of Production Management

Human Relations Movements

In the 1927-1932 period, researchers in the Hawthorne Studies realized that human factors were affecting **production**.

- Researchers and managers alike were recognizing that psychological and sociological factors affected **production**.
- From the work of behaviorists came a gradual change in the way managers thought about and treated workers.

Scope of Production Management

Operations Research

- During World War II, enormous quantities of resources (personnel, supplies, equipment, …) had to be deployed.
- Military operations research (OR) teams were formed to deal with the complexity of the deployment.
- After the war, operations researchers found their way back to universities, industry, government, and consulting firms.
- OR helps operations managers make decisions when problems are complex and wrong decisions are costly.

Scope of Production Management

Characteristics of Operations Research

- Essential characteristics

Three essential characteristics of operations research are

A systems orientation,

The use of interdisciplinary teams,

- The application of scientific method to the conditions under which the research is conducted
- refers to the use of mathematical techniques to solve management problems.
- Approaches problem solving from total system perspective.
- Primary focus is on decision making.
- Computers are used extensively.

Characteristics of Modern Production and operations function

Production management system is characterized by following features

1) Manufacturing as competitive advantage.
2) Services orientation.
3) Disappearance of smokestacks.
4) Small has become beautiful

Characteristics of Modern Production and operations function

Management needs to be geared to serve below mentioned options.

1) Intangible and perishable nature of services.
2) Constant interaction with customers.
3) Small volumes of production to serve local markets.

Why be interested in study

Why a general reader should study production & production management is a relevant question..
Factories occupy unique place in India
Study of Factories helps in appreciating the role played by people in people in goods and services.
A study about factories helps us appreciate the role played by people in producing goods & services
The total picture about factory becomes clear by a close study of the subject.
Factory study helps in selecting a career

Production & Operations Management

End Of

Chapter 1