

Lesson 7

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Production/Operations Planning & Control

❖ **Production** is a process whereby raw material is converted into semi finished products and thereby adds to the value of utility of products, which can be

- ❖ measured as the difference between the value of inputs and value of outputs.

❖ **Production** function encompasses the activities of procurement, allocation and utilization of resources. The main objective of **production** function is to produce the goods and services demanded by the customers in the most efficient and economical way. Therefore efficient management of the **production** function is of utmost importance in order to achieve this objective.

Production/Operations Planning & Control

Production/Operations Planning involves the organization of an overall manufacturing system to produce a product.

The various activities involved are:

- ❖ Designing a product
- ❖ Determining the equipment & capacity requirements
- ❖ Designing layout of physical facilities.
- ❖ Designing material handling system
- ❖ Designing sequence of operations

Factors determining Production Planning Procedures

The three major factors determining production planning procedures are:

1. Volume of production: The amount & intensity of production planning is determined by the volume and character of the operations & nature of manufacturing process. Production planning is expected to reduce manufacturing costs.

2. Nature of production Process: In job shop, the production planning may be informal and the development work methods is left to individual workman who is highly skilled

3. Nature of operations: Detailed production planning is required for repetitive operations for example continuous production of single standardized product

Production Planning System

There are two interrelated subsystems in the production planning system

- ❖ Product Planning System
- ❖ Process Planning System

A generic business process, which has

- ❖ • Data embedded systems at all levels, namely,
- ❖ • Plant operation level,
- ❖ • Physical variable controls level.
- ❖ • Process **control** levels, and at
- ❖ • Information **control** level
- ❖ • resulting in vertical and horizontal system interfaces between its all external and internal system modules, and

Production Planning System

- ❖ Which is characterized by the real world feedback information in respect of:
 - ❖ (a) customer requirements, which are becoming increasingly local and instant, product needs,
 - ❖ (b) process costs and capabilities,
 - ❖ (b) input orders, innovation desired, and
 - ❖ (c) questions, etc. presents itself as an an open system.
- ❖ This leads to modeling the business process as integral to a close loop information and **control** system.

Production Control

Importance of Control function:

- ❖ Provide the production of parts, assemblies & products of required quantity and quality at the required time
- ❖ Co-ordinate ,monitor,and feedback to manufacturing management,the result of production activities,analyzing and interpreting there importance& taking correct actions
- ❖ Provide optimum utilization of all resources
- ❖ Achieve the broad objectives of low cost production and reliable customer service

Production Control

Benefits of Control function:

Improvement in profit through:

- 1. Maintenance of balance inventory of material**
- 2. Balanced and stabilized production**
- 3. Maximum utilization of equipment**
- 4. Minimum investment in inventory**
- 5. Reduction in set up cost**
- 6. Reduction in scrap**
- 7. Minimum investment in inventory**

Competitive advantage

- 8. Reliable delivery to customer**
- 9. Shortened delivery schedule to customer**
- 10. Lower production costs**

Elements of Production Control

1. Control of Planning:
2. Control of Materials
3. Control of tooling
4. Control of manufacturing capacity
5. Control of activities
6. Control of Quantity
7. Control of material handling
8. Control of due dates
9. Control of information

Elements of Production Control

The production Control System consists of a group of procedural elements that operate as a whole to fulfill four functions

- ❖ **Means of setting the system in motion such as production orders**
- ❖ **Methods to determine Lead time for production**
- ❖ **Methods to control & monitor production**
What, where & How work is to be done
- ❖ **Techniques for measuring & recording data on machine utilization**

Factors Determining Production Control procedures

Nature of Production: The manufacturing firms are classified as Intermittent, continuous, or composite production firms, depending upon length of processing time

Complexity of operations: Generally Complexity increases with increase in the variety of operations

1. Number of ultimate parts in the product
2. No of different operations
3. Extent to which processes are dependent on previous operations.
4. Variation in production rates of machines used in the process
5. Receipt of many small lot orders

Factors Determining Production Control procedures

Magnitude to operations:

- ❖ The size of operation, (time taken to complete operation) and the distance traveled by the parts from operations to operations are important in establishing proper production control procedures.
- ❖ Generally the need is greater for centralized production control organization and the formal procedures as the size of the operations increases and dependent operations are more physically separated

Factors Determining Production Control procedures

Following factors need to be considered before making a choice of manufacturing process.

a) **Effect of volume/variety**: This is one of the major considerations in selection of manufacturing process. When the volume is low and variety is high, intermittent process is most suitable and with increase in volume and reduction in variety continuous process become suitable. The following figure indicates the choice of process as a function of repetitiveness. Degree of repetitiveness is determined by dividing volume of goods by variety.

Factors Determining Production Control procedures

b) **Capacity of the plant:** Projected sales volume is the key factor to make a choice between batch and line process. In case of line process, fixed costs are substantially higher than variable costs. The reverse is true for batch process thus

Jobbing

Batching

Line

Process

Degree of
repetitiveness

Quantity

Many

Factors Determining Production Control procedures

c) **Lead time**: - The continuous process normally yields faster deliveries as compared to batch process. Therefore lead-time and level of competition certainly influence the choice of **production** process.

d) **Flexibility and Efficiency**: - The manufacturing process needs to be flexible enough to adapt contemplated changes and volume of **production** should be large enough to lower costs. Hence it is very important for entrepreneur to consider all above mentioned factors before taking a decision regarding the type of manufacturing process to be adopted as far as SSI are concerned they usually adopt batch processes due to low investment.

Objectives of Production Planning & Control

1. To deliver Quality goods in required quantities
2. To ensure maximum utilization
3. To ensure production of Quality products
4. To maintain optimum inventory levels.
5. To maintain flexibility in manufacturing operations
6. To coordinate between labor & machine.
7. To ensure effective cost reduction and cost control
8. To prepare production schedule
9. To produce effective results for least total cost
10. To remove bottlenecks in production

Role of Production Planning & Control in Operations Management

There are a variety of production /operations management responsibilities such as:

- 1.Product Design
- 2.Job & process Design
- 3.Equipment Selection & replacement
- 4.Labor skills
- 5.Input material selection
- 6.Plant selection and layout
- 7.Scheduling steps of the plan
- 8.Implementing & controlling the schedule
- 9.Operating the production system

Role of Production Planning & Control in Operations Management



Scope of Production Planning & Control

Production Planning and control encompasses the following areas:

1. Materials
2. Methods
3. Machine & equipment
4. Manpower
5. Routing
6. Estimating
7. Loading & scheduling
8. Dispatching
9. Expediting
10. Evaluating
11. Cost Control

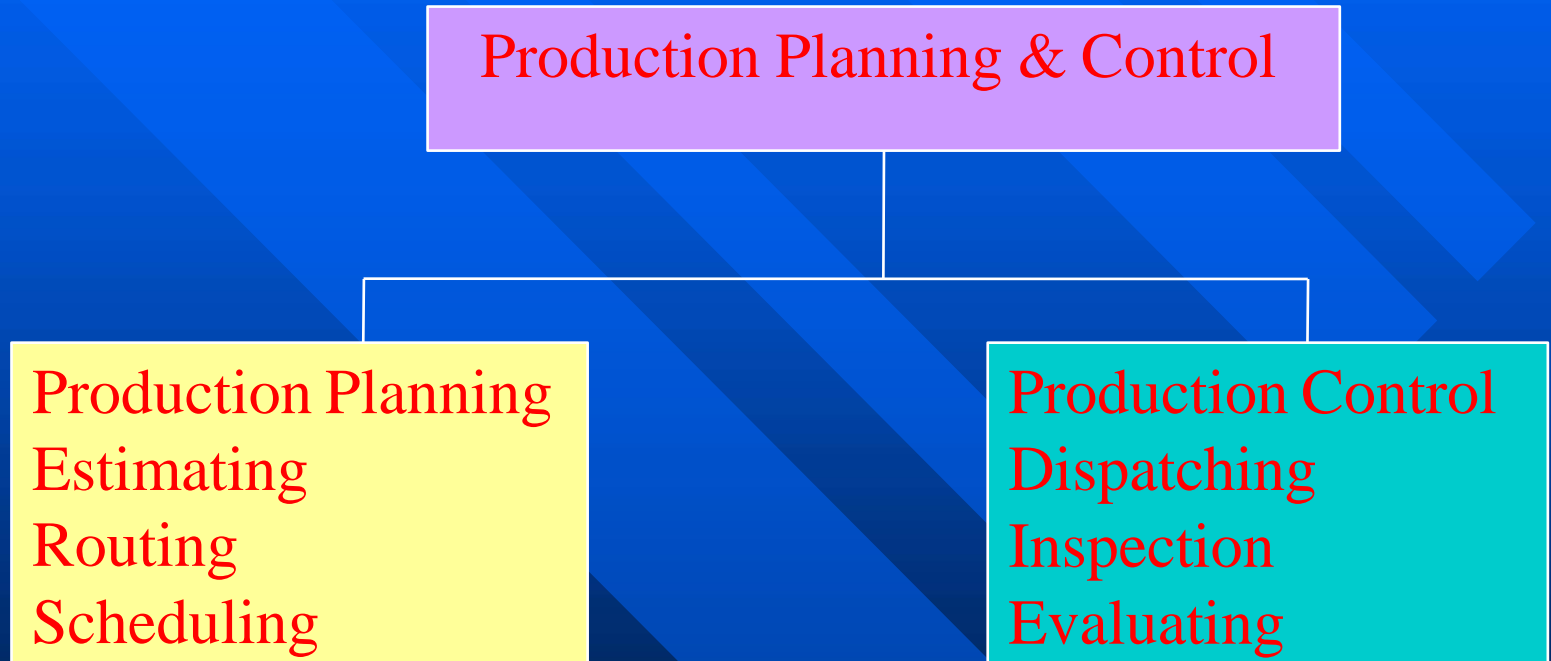
Principles of Production Planning & Control Functions

1. Types of production determines the kind of production planning & control
2. Number of parts involved in the product
3. Complexity off PPC function
4. Time is common denominator for all scheduling activities
5. PPC permits “management by exception”
6. Cost control should be a by product of PPC function
7. The size of the plant has relatively little to do with the type of ppc system needed
8. The highest efficiency in production is obtained by manufacturing the required quantity of a product

Phases in Production Planning & Control Function

1. Planning Phases
 - a)Pre planning: Activity involves product planning & development ,resource planning ,Plant planning
 - b)Active Planning: involves planning for quality
2. Action Phase : Execution or implementation phase includes dispatching and progressing function
3. Control Phase : Includes status Reporting Material control, Tool control,Quality control

Main Functions of Production Planning & Control Department



Levels of Production Planning

- ❖ Management control fits in between Strategy formulation & Task control
- ❖ Strategy formulation focuses on long run & Task control on short run activities
- ❖ Strategy formulation uses rough approximations of future & Task control uses current accurate data

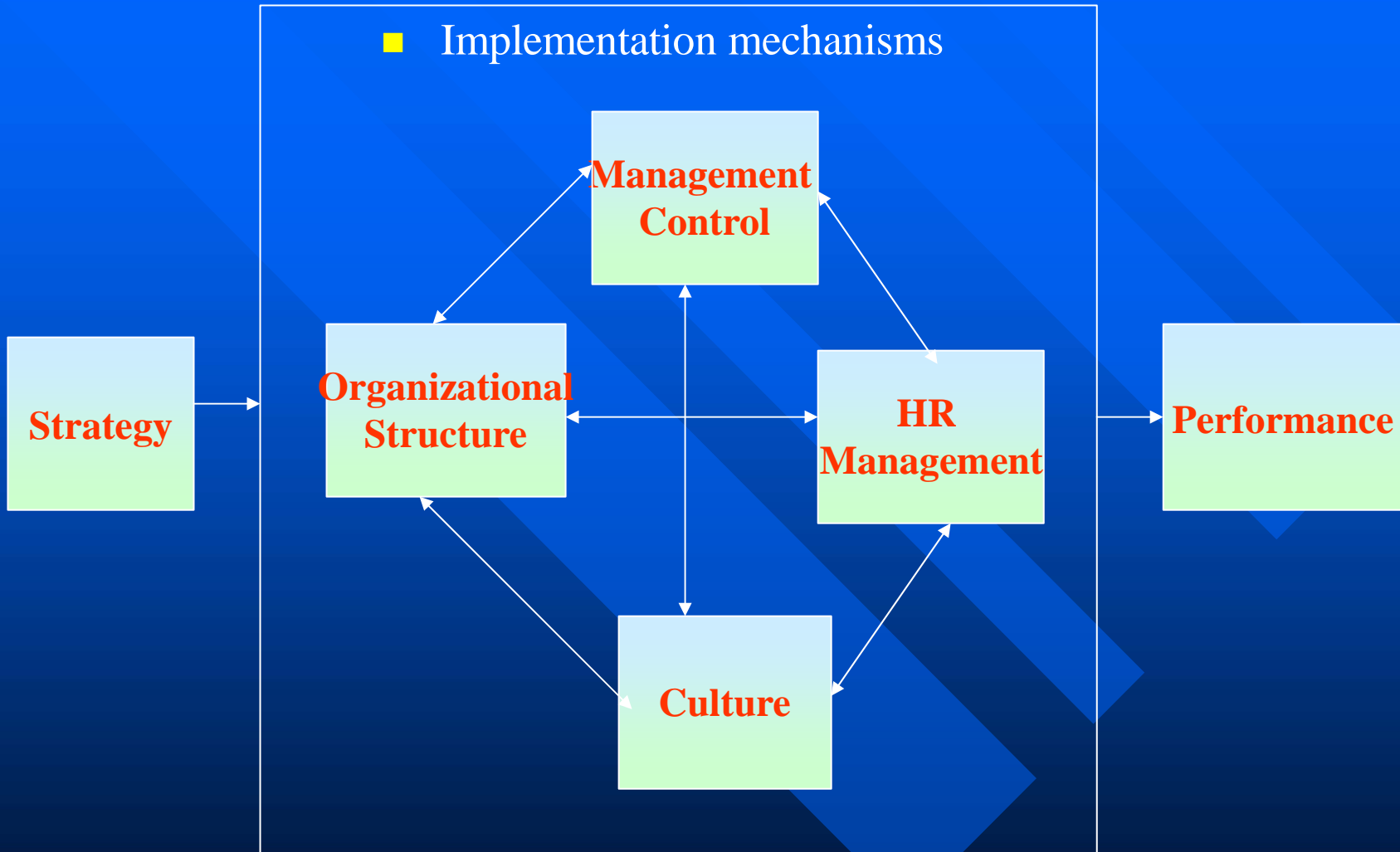
Levels of Production Planning



Management Control

- Management control is the process by which managers influence other members of the organization to implement the organizations strategies. Several aspects of this is amplified below.
- Management Control Activities
- Planning What the organization should do.
- Co-Ordination The activities of several parts of organization
- Communicating information
- Evaluating information
- Deciding What if any action should be taken
- Influencing people to change there behavior

Framework for Strategy Implementation



Strategy Formulation & task control

Strategy formulation	Management control	Task Control
Acquire Business	Introduce new product	Coordinate order entry
Enter new Business	Expand a plant	Schedule Production
Add direct mail selling	Determine ad budget	Book 6v Commercials
Decide magnitude & direction of research	Control research organization	Run individual Research project
Device inventory Speculation policy	Decide inventory levels	Reorder an item

Production Planning Function

- The main functions of production planning are:
- Estimating: Decides the quantity of products to be produced & cost involved on the basis of sales forecast
- Routing :This is process of determining sequence of operations to be performed in the production process
- Scheduling : Involves fixing priorities for each job and determining the starting time & finishing time
- Loading:Loading facility or work center& deciding or machine which job is assigned to which work center

Production Control Function

- The main functions of Production Control are:

- **Dispatching:**

Setting of production activities in motion through release of orders

Providing movement of Raw material

Issuing Job orders

Issue of Drawings ,process sheets,job log sheets to machine & assembly shop

Obtaining inspection Schedules

- **Expediting /follow up/ progressing**

Expediting ensures that the work is carried out as per plan and delivery schedules are met

Limitation of PPC Function

- Production planning functions are based on certain assumptions or forecast of customer demand, plant capacity.
- Employees may resist changes in production
- Production planning process is time consuming.
- Production planning is difficult when when the environmental factors change rapidly, such as Technology changes, Government policies, Customers taste regarding fashion.

Measuring Effectiveness of PPC Function

- There are four specific areas in which effectiveness of PPC function can be measured
- **Delivery:** This can be measured by finding out the number of deliveries effected on time and those delayed over period of time
- **Inventory levels.** The value of average inventory held annually.
- **Production & operations management:** Comparison of planned & actual production indicates the performance of PPC function
- **The expenditure incurred** for carrying out various functions of PPC department

PPC In different Production Systems

- PPC in job Production
- job production **Job production involves producing a one-off product for a specific customer.** Job production is most often associated with small firms (making railings for a specific house, building/repairing a computer for a specific customer, making flower arrangements for a specific wedding etc.) but large firms use job production too. Examples include:
 - Designing and implementing an advertising campaign
 - Auditing the accounts of a large public limited company
 - Building a new factory
 - Installing machinery in a factory
 - **Benefits and disadvantages**
 - Key benefits of job production include:

PPC In different Production Systems

- work is generally of a high quality
- a high level of customization is possible to meet the customer's exact requirements
- significant flexibility is possible, especially when compared to mass production
- workers can be easily motivated due to the skilled nature of the work they are performing
- Disadvantages include:
 - higher cost of production
 - requires the use of specialist labor (compare with the repetitive, low-skilled jobs in mass production)
 - slow compared to other methods (batch production and mass production)

PPC In different Production Systems

Batch Production

- This approach to design production—producing individual designs in limited quantities—was common amongst many smaller companies or craft workshops for much of the 20th century, allowing them to respond quickly to different commissions and market opportunities without the necessity of being tied down to the relatively inflexible and expensive technologies associated with the modes of mass-production Fordism.

- With the rise of Computer-Aided Manufacturing systems larger manufacturers have also been able to be more flexible and swiftly responsive to the increasingly diverse consumer demands of the global market place.

PPC In different Production Systems

- This ability to produce smaller production runs had the added economic advantage of dispensing with the need for large storage areas to hold stock and was an integral part of the Just in Time manufacturing and distribution systems that were introduced increasingly from the 1980s
- **Batch production** is a manufacturing process used to produce or process any product in batches, as opposed to a continuous production process, or a one-off production.
- Batch production is popular in bakeries and in the manufacture of sports shoes, pharmaceutical ingredients, inks, paints and adhesives.

PPC In different Production Systems

- There are inefficiencies associated with batch production. The production equipment must be stopped, re-configured, and its output tested before the next batch can be produced. Time between batches is known as 'down time'.
- Batch production is useful for a factory that makes seasonal items or products for which it is difficult to forecast demand.

PPC In different Production Systems

- There are several advantages of batch production; it can reduce initial capital outlay because a single production line can be used to produce several products.
- Also, companies can use batch production as a trial run. If a retailer buys a batch of a product that does not sell then the producer can cease production without having to sustain huge losses. Other types of production include: assembly line, job production, continuous, cell, and project.



PPC In different Production Systems

- Mass Production Manufacturing or processing of uniform products in large quantities using interchangeable parts and machinery. Mass production is either a wholly automated process or a series of short, repetitive procedures.

- mass production

Application of the principles of specialization, division of labor, and standardization of parts to the manufacturing of goods on a large scale. Modern mass-production methods have led to such improvements in the cost, quality, quantity, and variety of goods available that the largest global population in history is now sustained at the highest general standard of living ever.

PPC In different Production Systems

- **Mass Production** is a system of manufacturing based on principles such as the use of interchangeable parts, large-scale production, and the high-volume Assembly Line.
- Although ideas analogous to mass production existed in many industrialized nations dating back to the eighteenth century, the concept was not fully utilized until refined by Henry Ford in the early twentieth century and then developed over the next several decades.
- Ford's success in producing the Model T automobile set the early standard for what mass production could achieve. As a result, mass production quickly became the dominant form of manufacturing around the world, also exerting a profound impact on popular culture.

Requirement of effective PPC System

- Sound organization structure with mechanism of proper delegation of authority.
- Information feedback system
- Standardization of material, tool, equipment & manufacturing process.
- Trained personnel
- Flexibility to accommodate changes
- Appropriate management policies
- Accurate assessment of lead times
- Plant capacity should be adequate to meet the demands

Make or Buy analysis

- The capacity of a firm to produce finished product depends on at what stage the firm begins the manufacturing process
- Make or buy decisions are basically questions of specialization & vertical integration
- The product design specializes product structure which indicates number of sub units & piece part that comprise a product.
- The process engineer has to make decision “Make or buy” after studying drawings of parts & assemblies .

Plant Planning & Facility Planning

- How to establish the long range production capacity to produce the products /services for a firm is a critical part of setting operations strategy.
- Facilities planning refers to the determination of how much of long range production capacity is needed.,where production facilities should be located,and layout & characteristics of these facilities.

■ Importance of Plant Planning

Plant planning is along range planning begin with the choice of suitable location

Plant Planning & Facility Planning

- The right plant enables the firm to produce the desired quantity & quality of the products
- The choice of right plant helps to minimize the capital investment.
- It produces job satisfaction to employees

Objectives of Plant Planning

- To set optimum plant system that will provide highest efficiency
- Effective integration of all factors such as man, material, & machine

Plant Planning & Facility Planning

- Objectives of Plant Planning
- Logical work flow & smooth sequence of operations
- Compactness to minimum movement of material & labor and space
- Provisions of facilities for future expansion
- System flexibility to adopt changes in product design
- Satisfaction ,safety and convenience to all employees

Plant Planning & Facility Planning

■ Scope of of Plant Planning

- Selection of production of system and plant design
- Design of plant building
- Manufacturing process design
- Selection of equipment & machinery
- Design of plant layout and shop layout
- Selection of material handling system.
- Design of communication System and control system