

LESSON 8

PRODUCTION PLANNING AND CONTROL

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STRUCTURE

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8.0 INTRODUCTION

After taking decisions about the type of business, its location, layout etc. the entrepreneur steps into the shoe of production manager and attempts to apply managerial principles to the production function in an enterprise.

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.

8.1 OBJECTIVES

After studying this lesson, you should be able to

- Describe the production function and its component
- Define production management
- Analyze various factors, which are crucial for designing the production
- Explain the design of production system and manufacturing process
- List out the factors influencing the choice of production process
- Discuss the benefits, which a small entrepreneur can reap by having properly designed production planning, and control system
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8.2 PRODUCTION MANAGEMENT

Production system is a system whose function is to convert a set of inputs into a set of desired outputs. Production system is depicted under with help of chart

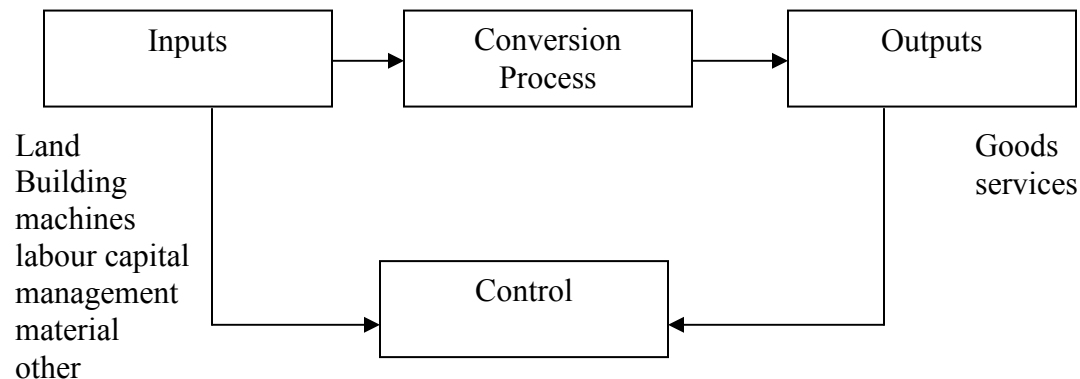


Figure 8.1: Production System

Production management involves the managerial decisions regarding design of the product and design of the production system i.e. determination of production processes and production planning and control.

8.3 PRODUCT DESIGN

Product design is a strategic decision as the image and profit earning capacity of a small firm depends largely on product design. Once the product to be produced is decided by the entrepreneur the next step is to prepare its design. Product design

consists of form and function. The form designing includes decisions regarding its shape, size, color and appearance of the product. The functional design involves the working conditions of the product. Once a product is designed, it prevails for a long time therefore various factors are to be considered before designing it. These factors are listed below: -

- (a) Standardization
- (b) Reliability
- (c) Maintainability
- (d) Servicing
- (e) Reproducibility
- (f) Sustainability
- (g) Product simplification
- (h) Quality Commensuration with cost
- (i) Product value
- (j) Consumer quality
- (k) Needs and tastes of consumers.

Above all, the product design should be dictated by the market demand. It is an important decision and therefore the entrepreneur should pay due effort, time, energy and attention in order to get the best results.

8.4 DESIGN OF PRODUCTION SYSTEM

Production system is the framework within which the production activities of an enterprise take place. Manufacturing process is the conversion process through which inputs are converted into outputs. An appropriate designing of production system ensures the coordination of various production operations. There is no single pattern of production system which is universally applicable to all types of production system varies from one enterprise to another.

8.4.1 TYPES OF PRODUCTION SYSTEM

Broadly one can think of three types of production systems which are mentioned here under: -

- (a) Continuous production
- (b) Job or unit production
- (c) Intermittent production

(a) Continuous production: - It refers to the production of standardized products with a standard set of process and operation sequence in anticipation of demand. It is also known as mass flow production or assembly line production. This system ensures less work in process inventory and high product quality but involves large investment in machinery and equipment. The system is suitable in

plants involving large volume and small variety of output e.g. oil refineries reform cement manufacturing etc.

(b) Job or Unit production: - It involves production as per customer's specification each batch or order consists of a small lot of identical products and is different from other batches. The system requires comparatively smaller investment in machines and equipment. It is flexible and can be adapted to changes in product design and order size without much inconvenience. This system is most suitable where heterogeneous products are produced against specific orders.

(c) Intermittent Production: Under this system the goods are produced partly for inventory and partly for customer's orders. E.g. components are made for inventory but they are combined differently for different customers. . Automobile plants, printing presses, electrical goods plant are examples of this type of manufacturing.

8.5 MANUFACTURING PROCESS

The nature of the process of production required by these three different types of production system are distinct and require different conditions for their working. Selection of manufacturing process is also a strategic decision as changes in the same are costly. Therefore the manufacturing process is selected at the stage of planning a business venture. It should meet the basic two objectives i.e. to meet the specification of the final product and to be cost effective.

8.5.1 TYPES OF MANUFACTURING PROCESS

The manufacturing process is classified into four types.

- (i) Jobbing production
- (ii) Batch production
- (iii) Mass or flow production
- (iv) Process Production

(i) *Jobbing Production*: - Herein one or few units of the products are produced as per the requirement and specification of the customer. Production is to meet the delivery schedule and costs are fixed prior to the contract.

(ii) *Batch Production*: - In this, limited quantities of each of the different types of products are manufactured on same set of machines. Different products are produced separately one after the other.

(iii) *Mass or flow production*: Under this, the production run is conducted on a set of machines arranged according to the sequence of operations. A huge quantity of same product is manufactured at a time and is stocked for sale. Different product will require different manufacturing lines. Since one line can produce only one type of product, this process is also called as line flow.

(iv) *Process Production*: Under this, the production run is conducted for an indefinite period.

8.5.2 FACTORS AFFECTING THE CHOICE OF MANUFACTURING PROCESS

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.

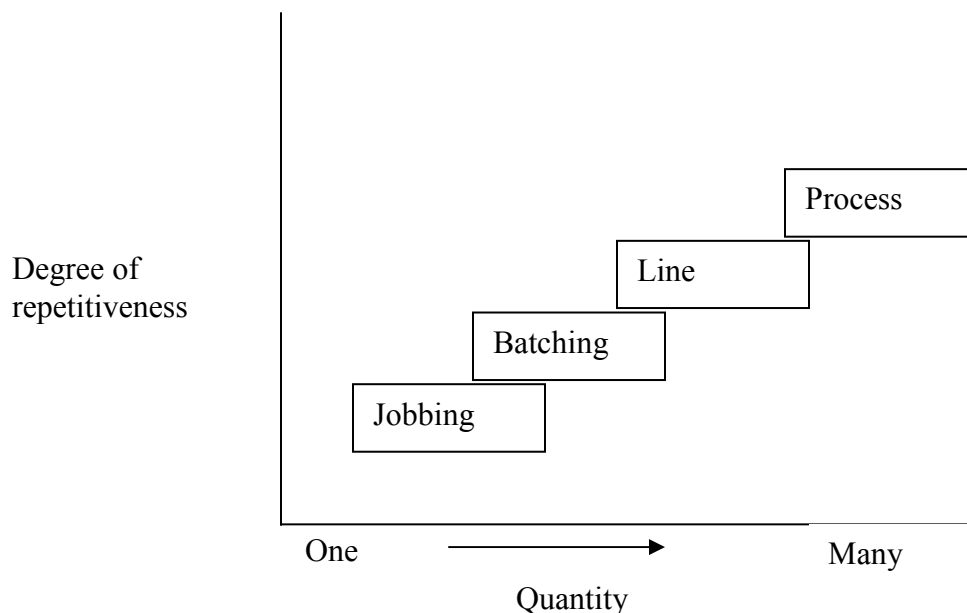


Figure 8.2: Types of Production Processes

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

at low volume it would be cheaper to install and maintain a batch process and line process becomes economical at higher volumes.

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.

8.6 PRODUCTION PLANNING AND CONTROL

Once the entrepreneur has taken the decisions regarding the product design and production processes and system, his next task is to take steps for production planning and control, as this function is essentially required for efficient and economical production. One of the major problems of small scale enterprises is that of low productivity small scale industries can utilise natural resources, which are otherwise lying.

Small scale sector can play an important role, similar to the one played by small scale industries in other developed countries.

Planned production is an important feature of the small industry. The small entrepreneur possessing the ability to look ahead, organize and coordinate and having plenty of driving force and capacity to lead and ability to supervise and coordinate work and simulates his associates by means of a programme of human relation and organization of employees, he would be able to get the best out of his small industrial unit.

Gorden and Carson observe production; planning and control involve generally the organization and planning of manufacturing process. Especially it consists of the planning of routing, scheduling, dispatching inspection, and coordination, control of materials, methods machines, tools and operating times. The ultimate objective is the organization of the supply and movement of materials and labour, machines utilization and related activities, in order to bring about the desired manufacturing results in terms of quality, quantity, time and place.

Production planning without production control is like a bank without a bank manager, planning initiates action while control is an adjusting process, providing corrective measures for planned development. Production control regulates and stimulates the orderly flow of materials in the manufacturing process from the beginning to the end.

8.6.1 BENEFITS TO SMALL ENTREPRENEUR

Production planning and control can facilitate the small entrepreneur in the following ways

(1) Optimum Utilisation of Capacity:

With the help of Production Planning and Control [PPC] the entrepreneur can schedule his tasks and production runs and thereby ensure that his productive capacity does not remain idle and there is no undue queuing up of tasks via proper allocation of tasks to the production facilities. No order goes unattended and no machine remains idle.

(2) Inventory control:

Proper PPC will help the entrepreneur to resort to just- in- time systems and thereby reduce the overall inventory. It will enable him to ensure that the right supplies are available at the right time.

(3) Economy in production time:

PPC will help the entrepreneur to reduce the cycle time and increase the turnover via proper scheduling.

(4) Ensure quality:

A good PPC will provide for adherence to the quality standards so that quality of output is ensured.

To sum up we may say that PPC is of immense value to the entrepreneur in capacity utilization and inventory control. More importantly it improves his response time and quality. As such effective PPC contributes to time, quality and cost parameters of entrepreneurial success.

8.6.2 STEPS OF PRODUCTION PLANNING AND CONTROL

Production Planning and Control (PPC) is a process that comprises the performance of some critical; functions on either side, viz., planning as well as control. See figure 8.3.

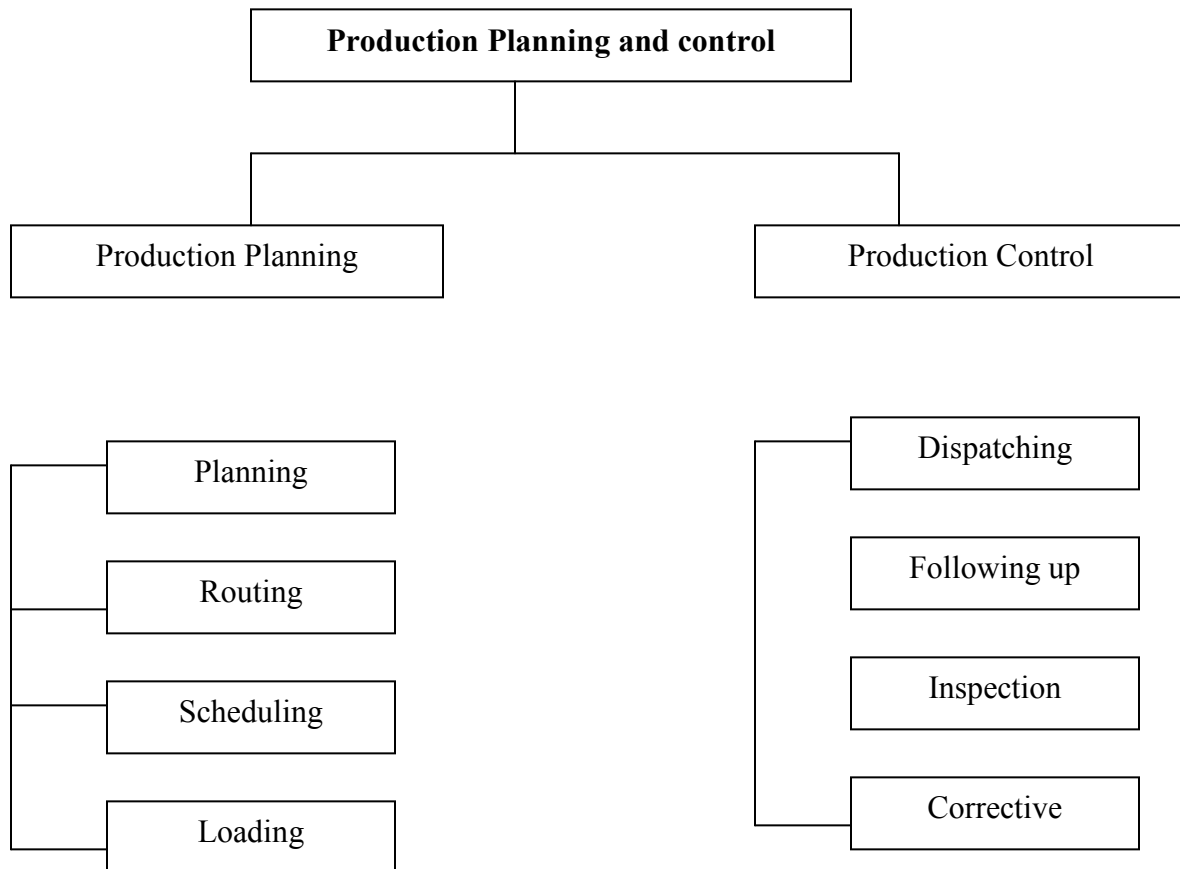


Figure 8.3: PPC Process

Production planning: Production planning may be defined as the technique of foreseeing every step in a long series of separate operations, each step to be taken at the right time and in the right place and each operation to be performed in maximum efficiency. It helps entrepreneur to work out the quantity of material manpower, machine and money requires for producing predetermined level of output in given period of time.

Routing: Under this, the operations, their path and sequence are established. To perform these operations the proper class of machines and personnel required are also worked out. The main aim of routing is to determine the best and cheapest

sequence of operations and to ensure that this sequence is strictly followed. In small enterprises, this job is usually done by entrepreneur himself in a rather adhoc manner. Routing procedure involves following different activities.

- (1) An analysis of the article to determine what to make and what to buy.
- (2) To determine the quality and type of material
- (3) Determining the manufacturing operations and their sequence.
- (4) A determination of lot sizes
- (5) Determination of scrap factors
- (6) An analysis of cost of the article
- (7) Organization of production control forms.

Scheduling: It means working out of time that should be required to perform each operation and also the time necessary to perform the entire series as routed, making allowances for all factors concerned. It mainly concerns with time element and priorities of a job. The pattern of scheduling differs from one job to another which is explained as below:

Production schedule: The main aim is to schedule that amount of work which can easily be handled by plant and equipment without interference. Its not independent decision as it takes into account following factors.

- (1) Physical plant facilities of the type required to process the material being scheduled.
- (2) Personnel who possess the desired skills and experience to operate the equipment and perform the type of work involved.
- (3) Necessary materials and purchased parts.

Master Schedule: Scheduling usually starts with preparation of master schedule which is weekly or monthly break-down of the production requirement for each product for a definite time period, by having this as a running record of total production requirements the entrepreneur is in better position to shift the production from one product to another as per the changed production requirements. This forms a base for all subsequent scheduling activities. A master schedule is followed by operator schedule which fixes total time required to do a piece of work with a given machine or which shows the time required to do each detailed operation of a given job with a given machine or process.

Manufacturing schedule: It is prepared on the basis of type of manufacturing process involved. It is very useful where single or few products are manufactured repeatedly at regular intervals. Thus it would show the required quantity of each product and sequence in which the same to be operated

Scheduling of Job order manufacturing: Scheduling acquires greater importance in job order manufacturing. This will enable the speedy execution of job at each center point.

As far as small scale industry is concerned scheduling is of utmost importance as it brings out efficiency in the operations and reduces cost price. The small entrepreneur should maintain four types of schedules to have a close scrutiny of all stages namely an enquiry schedule, a production schedule, a shop schedule and an arrears schedule out of above four, a shop schedule is the most important most suited to the needs of small scale industry as it enables a foreman to see at a glance.

1. The total load on any section
2. The operational sequence
3. The stage, which any job has reached.

Loading: The next step is the execution of the schedule plan as per the route chalked out it includes the assignment of the work to the operators at their machines or work places. So loading determines who will do the work as routing determines where and scheduling determines when it shall be done. Gantt Charts are most commonly used in small industries in order to determine the existing load and also to foresee how fast a job can be done. The usefulness of their technique lies in the fact that they compare what has been done and what ought to have been done.

Most of a small scale enterprise fail due to non-adherence to delivery schedules therefore they can be successful if they have ability to meet delivery order in time which no doubt depends upon production of quality goods in right time. It makes all the more important for entrepreneur to judge ahead of time what should be done, where and when thus to leave nothing to chance once the work has begun.

Production control: Production control is the process of planning production in advance of operations, establishing the exact route of each individual item part or assembly, setting, starting and finishing for each important item, assembly or the finishing production and releasing the necessary orders as well as initiating the necessary follow-up to have the smooth function of the enterprise. The production control is of complicated nature in small industries. The production planning and control department can function at its best in small scale unit only when the work manager, the purchase manager, the personnel manager and the financial controller assist in planning production activities. The production controller directly reports to the works manager but in small scale unit, all the three functions namely material control, planning and control are often performed by the entrepreneur himself production control starts with dispatching and ends up with corrective actions.

Dispatching: Dispatching involves issue of production orders for starting the operations. Necessary authority and conformation is given for:

1. Movement of materials to different workstations.
2. Movement of tools and fixtures necessary for each operation.
3. Beginning of work on each operation.
4. Recording of time and cost involved in each operation.

5. Movement of work from one operation to another in accordance with the route sheet.
6. Inspecting or supervision of work

Dispatching is an important step as it translates production plans into production.

Follow up: Every production programme involves determination of the progress of work, removing bottlenecks in the flow of work and ensuring that the productive operations are taking place in accordance with the plans. It spots delays or deviations from the production plans. It helps to reveal defects in routing and scheduling, misunderstanding of orders and instruction, under loading or overloading of work etc. All problems or deviations are investigated and remedial measures are undertaken to ensure the completion of work by the planned date.

Inspection: This is mainly to ensure the quality of goods. It can be required as effective agency of production control.

Corrective measures: Corrective action may involve any of those activities of adjusting the route, rescheduling of work changing the workloads, repairs and maintenance of machinery or equipment, control over inventories of the cause of deviation is the poor performance of the employees. Certain personnel decisions like training, transfer, demotion etc. may have to be taken. Alternate methods may be suggested to handle peak loads.

CHECK YOUR PROGRESS

Activity 1: Circle the key words, which do not belong to this lesson.

Dispatching	Plant Layout	Inspection
Productivity Index	Loading	Marketing Mix

Activity 2: Match the following

Routing	Working out of time that should be required to perform each operation
Scheduling	To assign the work to the operations at machines or work place
Loading	To determine the best and cheapest sequence of operations

Activity 3: Explain the meaning of following key words in your own words

- (a) Production planning
- (b) Production control
- (c) Routing
- (d) Scheduling

8.7 SUMMARY

Small-scale industries have a challenge to manufacture products at economical prices. They need to embrace management principles surrounding production processes, which are effective for the products manufactured by them. An upfront planning and study of the critical factors of the manufacturing processes will not only help the small scale entrepreneurs to understand the steps they need to take in selecting the most appropriate manufacturing process but also help them identify areas of risk so that necessary control procedures are put in place. This will eventually help the small entrepreneur to eliminate the wastages and increase the production, productivity and profits.

8.8 GLOSSARY

Inventory	Stock of raw material, WIP or finished goods
Lead time	Time lag between placing an order or getting deliveries
Personnel	Team of persons who work for organization

8.9 SELF-ASSESSMENT QUESTIONS

1. Discuss with examples various manufacturing processes?
2. What factors affect the choice of manufacturing process?
3. Write short notes on
 - a. Production planning
 - b. Relationship between production planning and control
4. What do you understand by production planning and control? Discuss its elements in brief.
5. State the requirements for an effective system of production planning and control?
6. What benefits can small scale enterprises can derive by installing an effective system of production planning and control?

8.10 FURTHER READINGS AND SOURCES

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