

OPERATIONS MANAGEMENT **PRODUCTION PLANNING**

The role of production function is to turn inputs into outputs by changing factors of production into finished goods and services as efficiently as possible. The role of production planning is to establish short-term and long-term production schedules. In order to observe efficient production functions, the production planning must be realistic and achievable. Production controls also play a vital role in efficient production function. It ensures that the plans made are being properly followed and deadlines are timely met. Following are the areas of control:

1. Cost Control
2. Progress Control
3. Stock Control
4. Quality Control

STOCK MANAGEMENT – STOCK CONTROL

Basic objective of stock control is to minimize cost of stock by maintaining adequate levels of stock. Firms have the following reasons for holding stock:

1. Stock of raw materials is kept in order to meet production requirements
2. Stock of work in progress is maintained to continue the production process and allowing greater flexibility and better utilization of time and machinery.
3. Stocks of finished goods is maintained in order to provide services and to meet customer demands on time
4. Stocks of equipment and spares are kept in order to support sales and production
5. For valuation purposes
6. To control cash tied up in stocks
7. To control wastage

COSTS OF HOLDING HIGH LEVELS OF STOCK

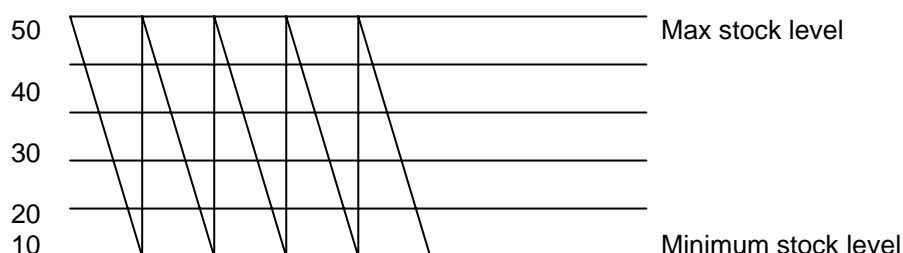
1. Opportunity cost as capital is tied up in stored stocks.
2. Storage Costs
3. Spoilage Costs
4. Administration and financial costs e.g. insurance
5. Risk of wastage in case of lower demands in the market
6. Risk of thefts

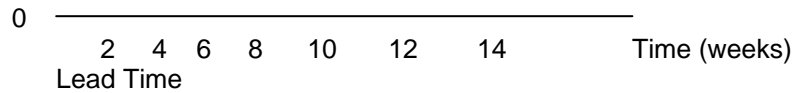
COSTS OF HOLDING INADEQUATE OR LOW LEVEL OF STOCK

1. Lost sales (also known as out of stock costs)
2. Idle production resources
3. Special and sudden orders could be expensive as the firm is less able to cope with unexpected shortages
4. Firm holding very low level of stock may have to place more number of orders. This will raise local ordering costs and the advantages of bulk buying cannot be achieved

STOCK CONTROL TECHNIQUES

STOCK CONTROL CHARTS (Graphical Approach)





MINIMUM STOCK LEVEL

Also called buffer stock. This is the minimum number of stock that should be held to ensure that production could still continue in case of a delay in the delivery of raw materials.

MAXIMUM STOCK LEVEL

It is the maximum amount of stock kept and is limited by space or the financial costs of holding higher levels. One way to calculate this is to add the EOQ (Economic order quantity) to the minimum stock level.

REORDER LEVEL

This is the level of stock at which a new order is placed with the supplier. The quantity of this order or the re-order quantity will be influenced the EOQ concept.

LEAD TIME

It is the amount of time it takes for a stock purchased to be placed, achieved, inspected and made ready for use. The longer the lead time, the higher the minimum level of stock needed.

RESOURCE QUANTITY

It is the quantity of stock that is ordered at the re-order level. Management will seek to discover the re-order quantity that minimizes the total cost of holding and ordering the stock. If stocks are purchased from an outside supplier the optimum level is known as economic order quantity (EOQ). If the orders are obtained from internal suppliers, the equivalent is known as economic batch quantity.

Therefore EOQ is defined as the order quantity which minimizes the balance of costs between stock holding costs and re-order costs. EOQ is the point where the total cost is minimized. It can be calculated with the help of the following formula:

$$EOQ = \sqrt{\frac{2OD}{h}}$$

where O = Ordering Cost
D = Annual Demand
h = Holding Cost of one unit per annum

JUST-IN-THE INVENTORY CONTROL (JIT)

Just in time or JIT involves both production and stock control systems. For this the work flow has to be scheduled very precisely so that minimal amount of work-in-progress has to be held. JIT does not require

any buffer stocks to be held. The components arrive just at the time that they are needed and the finished goods are delivered to customers as soon as they are completed.

JIT is basically a Japanese approach towards production and is an important part of the team production on the Kaizen approach.

JIT production has reversed the conventional approaches to manufacturing.

Mega Lecture

REQUIREMENTS FOR JIT PRODUCTION

If the business really wishes a successful introduction of JIT production then it must make sure that a few very important requirements of JIT are met:

1. Excellent relationships with suppliers
JIT production essentially depends upon the very precise delivery of raw materials and other suppliers. Therefore, the business suppliers should be ready to supply at a very short lead time. The firm therefore can have only one or two suppliers at the most for mutual benefits.
2. Employee flexibility
The workers and employees of the business have to be multi-skilled and should be able to switch jobs quickly so that no excess stocks of goods built up while those in demand are produced quickly for orders to be met.
3. Flexibility of machinery
Old fashioned equipment can only produce one type or range of product in large quantities. Modern, computerized machinery is required for JIT production as it can produce a wide variety of products just by changing a single software. This adaptability would produce small batches of single products to keep the stocks to a minimum.
4. Accurate demand forecasts
This would enable to produce a reliable production schedule which would help in the calculation of precise number of goods to be produced over a certain time. If forecasts or demand is fluctuating then keeping no stocks would be a very risky strategy.
5. Extensive use of IT
Computerised records of sales, sales trends and stock levels would allow minimal stocks to be held. Electronic communication with suppliers would enable accurate delivery of supplies
6. Employee commitment
Workers must work smoothly for JIT to be effective. Therefore empowerment i.e. giving employees power to undertake decisions as well as team working is essential for worker motivation as well as for the meeting of customer orders.
7. Strict Quality control or zero-defect
Since there are no spare stocks, therefore goods have to be produced correctly the first time otherwise customer orders will not be completed on time.

BENEFITS OF JIT This also is part of evaluation

- i. the right quantities are produced or purchased at the right time
 - ii. higher quality
 - iii. improved customer service
 - iv. reduced space requirement leads to reduced storage costs
 - v. system flexibility leads to quicker response to change in demand
 - vi. space released from stock holding used for more production purposes
 - vii. reduction in manufacturing lead time
 - viii. increased equipment utilization
 - ix. simpler planning systems
 - x. increased worker participation
 - xi. multiskilled and adaptable staff gain from improved motivation
 - xii. continuous emphasis on improvement and problem solving
 - xiii. less chance of stock being outdated or obsolescent
 - xiv. less stock reduces risk of damage and wastage
 - xv. reduces capital invested or tied in stock and reduces opportunity cost of stock holding
 - xvi. higher multi factor productivity
 - xvii. higher profits due to overall decrease in costs
- Evaluation does not only mean disadvantages. It includes advantages.

Evaluation of JIT Disadvantages

JIT is not suit for all businesses at all times. It is a very expensive system to implement i.e. it has very high start-up costs. Other control systems are often referred to as JIC-Just in case as stock are kept in case they are required. JIT requires a very different organizational culture than this.

There are several problems that have to be overcome for successful JIT working:

- i. requires a high degree of delegation
 - ii. requires change in the philosophy and culture of business
 - iii. advantages of bulk buying are lost
 - iv. business is vulnerable to a break in supply including breakdown in machinery
 - v. doesn't work in case of irregularly used parts or specially ordered materials
 - vi. reputation depends significantly on outside factors
 - vii. requires atmosphere of close cooperation and mutual trust between work force and managers
 - viii. delivery costs rise as frequent small deliveries are essential
 - ix. purchasing requires reliable and flexible suppliers
 - x. order admin costs rise as so many small orders need to be processed
- However JIT is an important aspect of the move to wards lean production and is definitely a principle which is widely accepted.

LEAN PRODUCTION

It is an approach to production developed in Japan. Its aim is to reduce the quantity of resources used up in production. Lean production uses less of everything including factory space, materials, stocks, suppliers, labour, capital and time. It is the term used to describe the concept of managing the production process more efficiently with minimum of resources. The objective is to eliminate wastage of resources and time from original stock ordering through to the financial customer service.

With the help of this production method better quality and variety of output with fewer resources is produced with less wastage and less duplication. Lean means cutting out anything in the production process which adds complicity cost and time and does not add any value for the customers. With team production the number of defective products is reduced, lead times are cut down and reliability improves. It involves the range of practices designed to improve productivity and quality and to reduce wastage of resources.

FEATURES AND PRACTICES RELATED TO LEAN PRODUCTION

1. Simultaneous engineering
2. Flexible specialists
3. Just-in-time manufacturing and stock control techniques
4. Kaizen production
5. Karban system
6. Empowerment
7. Time-based management
8. Team-working
9. Quality circles
10. Cellular or Cell Production

QUALITY MANAGEMENT

Quality could be described as those features of a product or a service that allow it to satisfy customers needs wants and expectations.

Quality does not necessarily mean the best that can possibly be produced because high costs will then make the product unsaleable. Therefore a high quality product is one that best fulfills the particular needs of consumers at a price that they are willing to pay. Consumers judge quality every time they purchase, therefore the minimum standard demanded by consumers is that the product should work and fit to the purpose intended.

Quality might be assessed on the basis of physical appearance design, specifications, reliability, durability, suitability, special features, after sales services, image and reputation.

Advantages of producing high quality products and services are as follows:

1. Consumer loyalty
2. Low level of complaints (reduces costs)
3. Longer product life cycles
4. Less promotion efforts may be required
5. High price can be charged

6. Better corporate image
7. Generates future sales in other product lines also

QUALITY CONTROL

It means inspecting and checking the work to ensure that products and services come up to an agreed standard of quality. It is an important element in production control through its identification and scrapping of unsuitable output. The method of production, employed workforce, technology and management style affect the quality of goods being produced.

QUALITY CONTROL TECHNIQUES

1. Inspection and testing
2. Random sampling
3. Involving the work force in making their own decisions about quality checking
4. Quality control charts and statistical measures to control quality

Mega Lecture