UNIT V

INVENTORY MANAGEMENT

Introduction

Inventories constitute the most significant part of current assets of the business concern. It is also essential for smooth running of the business activities.

A proper planning of purchasing of raw material, handling, storing and recording is to be considered as a part of inventory management. Inventory management means, management of raw materials and related items. Inventory management considers what to purchase, how to purchase, how much to purchase, from where to purchase, where to store and when to use for production etc.

Meaning

The dictionary meaning of the inventory is stock of goods or a list of goods. In accounting language, inventory means stock of finished goods. In a manufacturing point of view, inventory includes, raw material, work in process, stores, etc.

Kinds of Inventories

Inventories can be classified into five major categories.

A. *Raw Material*

It is basic and important part of inventories. These are goods which have not yet been committed to production in a manufacturing business concern.

B. *Work in Progress*

These include those materials which have been committed to production process but have not yet been completed.

C. *Consumables*

These are the materials which are needed to smooth running of the manufacturing process.

D. *Finished Goods*

These are the final output of the production process of the business concern. It is ready for consumers.

E. *Spares*

It is also a part of inventories, which includes small spares and parts.

Objectives of Inventory Management

Inventory occupies 30–80% of the total current assets of the business concern. It is also very essential part not only in the field of Financial Management but also it is closely associated with production management. Hence, in any working capital decision regarding the inventories, it will affect both financial and production function of the concern. Hence, efficient management of inventories is an essential part of any kind of manufacturing   process   concern

The major objectives of the inventory management are as follows:
- To efficient and smooth production process.
- To maintain optimum inventory to maximize the profitability.
- To meet the seasonal demand of the products.

- To avoid price increase in future.
- To ensure the level and site of inventories required.
- To plan when to purchase and where to purchase
- To avoid both over stock and under stock of inventory.

Techniques of Inventory Management

Inventory management consists of effective control and administration of inventories. Inventory control refers to a system which ensures supply of required quantity and quality of inventories at the required time and at the same time prevent unnecessary investment in inventories.

A. Techniques based on the order quantity of Inventories

Order quantity of inventories can be determined with the help of the following techniques:

1. Stock Level

Stock level is the level of stock which is maintained by the business concern at all times. Therefore, the business concern must maintain optimum level of stock to smooth running of the business process. Different level of stock can be determined based on the volume of the stock.

(a) Minimum stock Level

The business concern must maintain minimum level of stock at all times. If the stocks are less than the minimum level, then the work will stop due to shortage of material

Minimum stock level = Re-order level – (Normal consumption ×Normal re-order period)

(b) Re-order Level

Re-ordering level is fixed between minimum level and maximum level. Re-order level is the level when the business concern makes fresh order at this level.

Re-order level = maximum consumption × maximum Re-order period.

(c) Maximum stock Level

It is the maximum limit of the quantity of inventories, the business concern must maintain. If the quantity exceeds maximum level limit then it will be overstocking.

Maximum level = Re-order level + Re-order quantity – (Minimum consumption × Minimum re-order period)

(d)   Danger stock Level

It is the level below the minimum level. It leads to stoppage of the production process.

$$\text{Danger level} = \text{Average consumption} \times \frac{\text{Maximum re-order period for}}{\text{emergency purchase}}$$

(e)   **Average Stock level**: It is calculated as

Average stock level = Minimum stock level + ½ of re-order quantity

Lead Time

Lead time is the time normally taken in receiving delivery after placing orders with suppliers. The time taken in processing the order and then executing it is known as lead time.

Safety Stock

Safety stock implies extra inventories that can be drawn down when actual lead time and/ or usage rates are greater than expected. Safety stocks are determined by opportunity cost and carrying cost of inventories. If the business concerns maintain low level of safety stock, it will lead to larger opportunity cost and the larger quantity of safety stock involves higher carrying costs.

EOQ MODEL TECHNIQUE

In managing inventories, the firm's objective should be in consonance with the shareholder w

ealth maximization principle. To achieve this, the firm should determine the optimum level of inventory.

To manage inventories efficiency, answers should be sought to the following two questions:
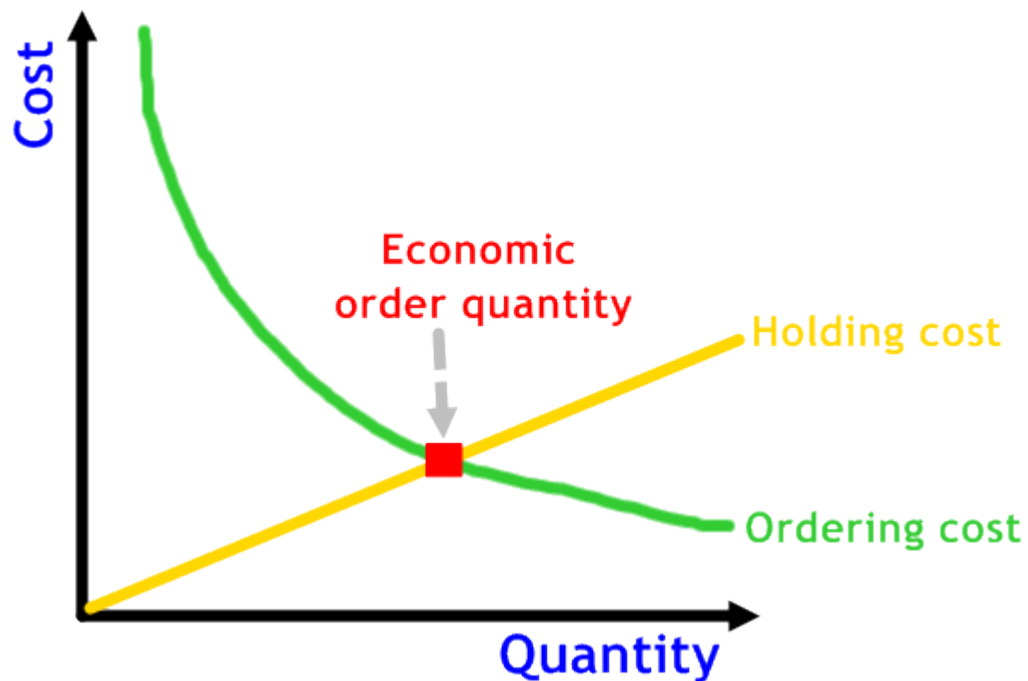
1. How should be ordered?
2. When it should be ordered?

The first question, how much to order, relates to the problem of determining Economic Order Quantity (EOQ) and is answered with an analysis of costs of maintaining certain level of inventories.

Two types of costs are involved in inventory maintenance

1. **Ordering costs**: The term ordering costs refer to the costs incurred for acquiring inputs. These costs include
    a. Cost of placing an order
    b. Cost of transportation

    c. Cost of receiving goods

    d. Cost of inspecting goods

2. **Carrying costs/Holding cost**: the term carrying costs refer to the costs incurred in maintaining a given level of inventory. These costs include

    a. Cost of storage space

    b. Cost of handling materials

    c. Cost of deterioration or obsolescence

    d. Cost of store staff

Importance of EOQ Model or technique

EOQ stands for Economic order Quantity. EOQ Model is the inventory management technique for determining optimum order quantity which is the one that minimises the total of its order & carrying costs. So, the EOQ of inventory will occur at a point where the total cost is minimum.

The model is based on the following assumptions

1. The total usage of particular item for a given period (usually a year) is known with certainty and that the usage rate is even throughout the period

2. There is no time gap between placing a order and getting its supply.

3. The cost per order of an item is constant and the cost of carrying inventory is also fixed and is given as a percentage of average value of inventory

4. There are only two costs associated with the inventory, and these are the cost of ordering and the cost of carrying the inventory.

Given the above assumptions, the following formula can be used to determine EOQ.

$EOQ = \sqrt{2AO/C}$
Where A= Annual consumption/usage of input (in units)
     O= ordering costs per order
     C= Carrying costs per unit p.a.

1. No. of orders per year = Total annual consumption in units ÷ Order size (EOQ)
2. Frequency of orders = 365 days ÷ No. of orders per year
3. Total Annual ordering and carrying cost at EOQ = $\sqrt{2AOC}$

Illustration 1:

Let us assume the following data for a firm:

Annual requirements 800 units

Ordering cost (per order) Rs. 50

Carrying cost (per unit) Rs. 2

Purchasing cost (per unit) Rs. 100

Now, using the EOQ formula, EOQ quantity will be as follows:

$EOQ = \sqrt{2 \times 800 \times 50/2}$

$= \sqrt{80,000/2}$

$= \sqrt{40,000}$

= 200 Units

Illustration 2:

H.Co Ltd produces a product which has a monthly demand 2200 units. Carrying Cost per unit Rs.1.50 p.a. The ordering cost is Rs.70 per order, you are required to find EOQ and no of orders p.a.

Solution :-

                     A = Annual Consumption

$EOQ = \sqrt{\dfrac{2AO}{C}}$ 2200x12 = 26400 units

               O = Ordering Cost Rs.70 per order

               C = Carrying cost Rs. 1.50

$$= \sqrt{\frac{2 \times 26400 \times 70}{1.50}}$$

$$= \sqrt{\frac{3695000}{1.5}}$$

$$= \sqrt{2464000} = 1569.7 \text{ units}$$

$$\boxed{\text{EOQ} = 1570 \text{ Units}}$$

No .of order p.a. $= \dfrac{\text{Annual consumption}}{\text{EOQ}}$

$$= \frac{26400}{1570} = 16.8 \text{ orders}$$

$$\boxed{\therefore \text{No.of orders p.a.} = 17}$$

Illustration 3:

Find out EOQ from the following information

Annual consumption   17500 units

Ordering Cost Rs 18 per order

Carrying cost 20% on cost per Unit

Cost per Unit Rs.5

$\text{EOQ} = \sqrt{\dfrac{2 \text{ AO}}{C}}$ A = 17500 units

O = Rs.18

C= 5x20% = 1

$$EOQ = \sqrt{\frac{2 \times 17500 \times 18}{1}}$$

$$= \sqrt{\frac{630000}{1}} \qquad = 793.7 \text{ units}$$

$$\therefore EOQ = 794 \text{ Units}$$

Illustration 4:

From the following information find out stock levels of material x.

Reorder quantity 250 units

Re-ordering period 4 to 6 weeks

Maximum usage/consumption   100 units

Minimum usage   50 units

Normal usage   70 units

Emergency delivery time   = 1 week

Solution :-

(I) Re-order level = (Max.consumption x Max.Re-order period)

= 100x6 = 600 Units

(ii) Min stock level = ROL - (NU x NROP)

= 600 – (70 x 5)

= 600-350

= 250 units

Normal Re order period = $\frac{\text{Max.ROP + Min ROP}}{2}$

$$= \frac{6+4}{2} \quad = \frac{10}{2} = 5 \text{ weeks}$$

(iii) Max. Stock level = ROL + ROQ - (Min. Usage x Min.ROP)

$$= 600 + 250 - (50x4)$$

$$= 850 - 200 = 650 \text{ Units}$$

Max.stock level 650 units

(iv) Danger level = Avg. Rate of Consumption x Emg delivery period

$$= 70 \text{ units x 1 week}$$

$\therefore$ Danger level = 70 units

(v) Average stock level = Min. stock level + ½ of reorder quantity

$$= 250 \text{ units} + ½ (250)$$

$$= 250 \text{ units} + 125$$

$$= 375 \text{ units}$$

TECHNIQUES BASED ON THE CLASSIFICATION OF INVENTORIES

A-B-C analysis

It is the inventory management techniques that divide inventory into three categories based on the value and volume of the inventories; 10% of the inventory's item contributes to 70% of value of consumption and this category is known as A category. About 20% of   the inventory item contributes about 20% of value of consumption and this category is called category B and 70% of inventory item contributes only 10% of value of consumption and this category is called C category.

Inventory Breakdown Between Value and Volume

Category	Volume (%)	Value (%)
A	10	70
B	20	20
C	70	10
Total	100	100

ABC analysis can be explained with the help of the following Graphical presentation.

Value of
Inventory
(%)

A   B   C

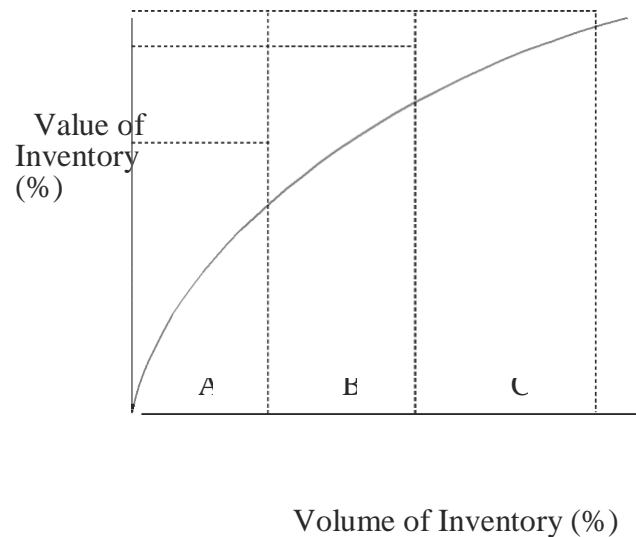Volume of Inventory (%)

Fig. ABC Analysis

Aging Schedule of Inventories

Inventories are classified according to the period of their holding and also this method helps to identify the movement of the inventories. Hence, it is also called as, FNSD analysis—

where,

$F =$ Fast moving inventories

$N =$ Normal moving inventories

$S =$ Slow moving inventories

$D =$ Dead moving inventories

This analysis is mainly calculated for the purpose of taking disposal decision of the inventories.

VED Analysis

This technique is ideally suited for spare parts in the inventory management like ABC analysis. Inventories are classified into three categories on the basis of usage of the inventories.

V = Vital item of inventories, E = Essential item of inventories, D = Desirable item of inventories

HML Analysis

Under this analysis, inventories are classified into three categories on the basis of the value of the inventories.

H = High value of inventories, M = Medium value of inventories, L = Low value of inventories