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3.0 INTRODUCTION

Most firms build and maintain inventories in the course of doing business. Manufacturing firms hold raw material, work in process, finished goods and spares in inventories. Financial services firms hold inventories in the form of portfolio of marketable securities consisting of debt, equity and hybrid instruments. Retails firms (Shops, shopping malls, super markets etc.) hold inventories to meet demand for products from customers.

In case of manufacturing firms inventories represents largest asset category, next only to plant and machinery. The proportion of inventory to total assets ranges between 15 to 30 percent.

Inventory management is not an isolated activity; it requires coordination among the production, purchasing and marketing departments. Decisions regarding of the purchase raw material are taken by the purchasing and production department, whereas work in process inventory is influenced by the production department. Finished goods inventory levels are decided by both the production and marketing departments. Since all these decision end up in tying of resources the financial manager has the responsibility to ensure that the inventories are properly monitored and controlled.

3.1 OBJECTIVES

After going through this unit, you will be able to:

- highlight the need for and nature of inventory;
- explain the techniques of inventory management;
- highlight the need for analysing inventory problems, and
- understand the process for managing inventory.

3.2 REASONS FOR HOLDING INVENTORY

The dictionary defines the word ‘inventory’ as *stock of goods*. But, inventory means such type of assets that will be disposed of in future in the ordinary course of business. Bolten S.E. has defined it as, “inventory refers to the stock-pile of the product a firm is offering for sale and the components that make up the product.” In other words, inventory is used to represent the aggregate of those items of tangible assets which are (i) held for sale in ordinary course of the business; (ii) in process of production for such sale; or (iii) to be currently consumed in the production of goods or services to be available for sale.

Inventories are held basically to smoothen the operations of the firm. Shortage of inventory at any point would disrupt operations resulting in either idle time for men and machine or lost sales. A manufacturing firm may have inventories of different stages in the production process.

1) Inventory of raw material are held to ensure that the production process is not disrupted due to shortage of raw material. The amount of raw material inventory would depend upon the speed at which the raw material can be procured; the greater the speed, lower would be the level of raw material inventory. Higher the uncertainty in the supply of raw material, higher would be the level of raw material inventory.

2) Work in process (WIP) inventories arise in the process of production. These type of inventories are also referred to as "Process Inventories". In case of simple products the WIP inventories would be less, whereas in case of complex products requiring various sub-processes and sub-assemblies the work in process inventory would be high.

3) Finished goods inventories are held to meet customers requirement promptly. The quantum of finished goods inventory would depend upon:

   - time required to fill an order from the customer. If the products is of such nature that any unexpected demand can be met at short notice the level of inventories would be lower, and

   - diversity of the product line: Firms selling a wide range of products generally need to invest more in finished goods.

4) Inventories are also held, so that the order cost is reduced.

5) Spares: An inventory of spare items which are required for the smooth running of business is also kept.

6) Transaction/Precautionary and Speculative Motives: Inventories which are held for conducting normal day to day business are known as transaction inventory. Precautionary inventories are those inventories which are held to ensure that in case of shortage or adverse price movement, the production process will not be stopped due to the lack of inventory.

3.3 OBJECTIVES OF INVENTORY MANAGEMENT

The twin objectives of inventory management are operational and financial. The operational objective means that the materials and spares would be available in sufficient quantity on time so that work is not disrupted for want of inventory. The financial objective means that investment in inventories should not remain idle and minimum amount of capital should be locked in inventories. The objectives of inventory management are summarised as follows:

Operating Objectives

1) to ensure continuous supply of materials
2) to ensure uninterrupted production
3) to minimise risks and losses

4) to ensure better customer service 5) to avoiding stock out danger.

Financial Objectives

1) to minimise investment
2) to minimise inventory related costs and
3) to ensure economy in purchasing

Factors Affecting Level of Inventory

As stated in the previous sections the firm should maintain its inventory at reasonable level. The quantum of inventory depends upon several factors, some of the important factors are mentioned below:

• **Nature of Business** • **Inventory Turnover** • **Nature and Type of Product** • **Market Structure** • **Economies of Production** • **Inventory Costs** • **Financial Position** • **Period of Operating Cycle** • **Attitude of Management**

3.4 TECHNIQUES OF INVENTORY CONTROL

Inventory control signifies a planned approach of ascertaining when to buy, how much to buy and how much to stock so that costs involving buying and storing are optimally minimum, without interrupting production or affecting sales. There are various techniques used to control inventory. These techniques are divided into two categories Traditional Techniques and Modern Techniques

3.4.1 Traditional Techniques

Inventory Control Ratios

For purposes of monitoring the effectiveness of inventory management it is helpful to look at the following ratios and indexes:

$$\text{Overall Inventory Turnover Ratio} = \frac{\text{Cost of goods sold}}{\text{Average total inventories at cost}}$$

$$\text{Raw Material Inventory Turnover Ratio} = \frac{\text{Annual consumption of raw material}}{\text{Average raw material inventory}}$$

$$\text{Work-in-process Inventory Turnover Ratio} = \frac{\text{Cost of manufacture}}{\text{Average workin process inventoryat cost}}$$

$$\text{Finished Goods Inventory Turnover ratio} = \frac{\text{Cost of goods sold}}{\text{Average inventory of finished goods at cost}}$$

$$\text{Average Age of Raw Materials in Inventory} = \frac{\text{Average Raw Material Inventory at cost}}{\text{AverageDaily Purchase of Raw Materials}}$$

$$\text{Average Age of Finished Goods Inventory} = \frac{\text{Average finished goods inventory at Cost}}{\text{Average cost of goods manufactured per day}}$$

$$\text{Out-of-stock Iindex} = \frac{\text{Number of times out of stock}}{\text{Number of times requisitioned}}$$

$$\text{Spare Parts Index} = \frac{\text{Value of SpareParts Inventory}}{\text{Valueof Capital Eeuipment}}$$

Two Bin System

Under this system all inventory items are stored in two separate bins (two bins for each type of inventory items). In the first bin a sufficient supply of inventory is stored which is going to be used over a designated period of time. In the second bin a safety stock is maintained which is going to be used during lead times. As soon as material in the first bin is consumed an order for further stock is placed and in the meantime inventory from the second bin is used. On receipt of new order, second bin is restored and the balance is put in the first bin. In this system depletion of inventory in the first bin automatically generates a signal to re-order that particular inventory.

Perpetual Inventory System

In this type of system store balances are computed and recorded after each and every issue and receipt. The main focus of this system is to make available details about the quantity and value of stock at all points of time. If the balance of any item of inventory falls below a particular pre-determined level the order is placed for a further quantity of inventory. In this system physical verification is done after every issue and receipt as a result of which this system is costly, but at the same time materials statement, monitoring and follow up action can be smoothly carried out.

Periodic Inventory System

Under this system all stock levels are reviewed after a fixed time interval, depending upon the importance of the item. Imported items may require a shorter review cycle, whereas slow moving items may require a longer review cycle. In practice the review of stock items takes place at the end of the accounting period. At the time of review, orders are placed for further stocking up to a pre-determined level. Under this system the order point is not actually determined but the time of review itself is an indication to place further orders.

Check Your Progress 1

1) A Publishing house purchases 2,000 units of a particular item per year at a unit cost of Rs. 20. The ordering cost per order is Rs. 50 and carrying cost is Rs. 25. Find the optimal order quantity and minimum total cost including purchase cost.

If a 3% discount is offered by the supplier for purchases in lots of 1,000 or more, should the publishing house accept the proposal?

2) Keshar Limited uses annually 24,000 kgs. of a chemical which costs Rs. 1.25 per kg. Placing each order costs Rs. 22.50 and the carrying cost is 15% per year of the inventory cost. Find Economic Order Quantity, number or orders to be placed per year and the total inventory cost (including cost of material).

   (a) If procurement time is 12 days and safety stock (minimum stock) 500 kgs.
   Find the maximum inventory, re-order point and average inventory.
   (b) What will be your decision if the company can get a concession of 5% on purchase price if it orders 3000 kgs. or more?
   (Assume 300 days in a year).

3) Calculate the minimum stock level, maximum stock level and reordering level from the following information.

   (a) Minimum consumption = 100 units per day (b) Maximum consumption = 150 units per day (c) Normal consumption = 120 units per day
   (d) Re-order period = 10 – 15 days (e) Re-order quantity = 1,500 units (f) Normal Re-order period = 12 days.

4) Two components A and B are consumed as follows:

   Normal usage – 100 units per week each
   Minimum usage – 50 units per week each
   Maximum usage – 150 units per week each
   Re-order quantity – A - 400 units; B - 600 units Re-order period – A 6 to 8 weeks; B 3 to 5 weeks.

   Calculate the following for each component:

   (i) Re-order Level
   (ii) Minimum Level
   (iii) Maximum Level
   (iv) Average Stock Level

3.4.2 Modern Techniques

Economic Order Quantity (EOQ) Graphical

Methods:

The economic order quantity can also be determined with the help of a graph. Under this method ordering cost, carrying cost and total inventory costs according to different lot sizes are plotted on the graph. The point at which the line of inventory carrying cost and the ordering cost intersect each other is the economic order quantity. At this point the total inventory cost is also minimum. The function of EOQ is illustrated below in *Figure. 3.1.*

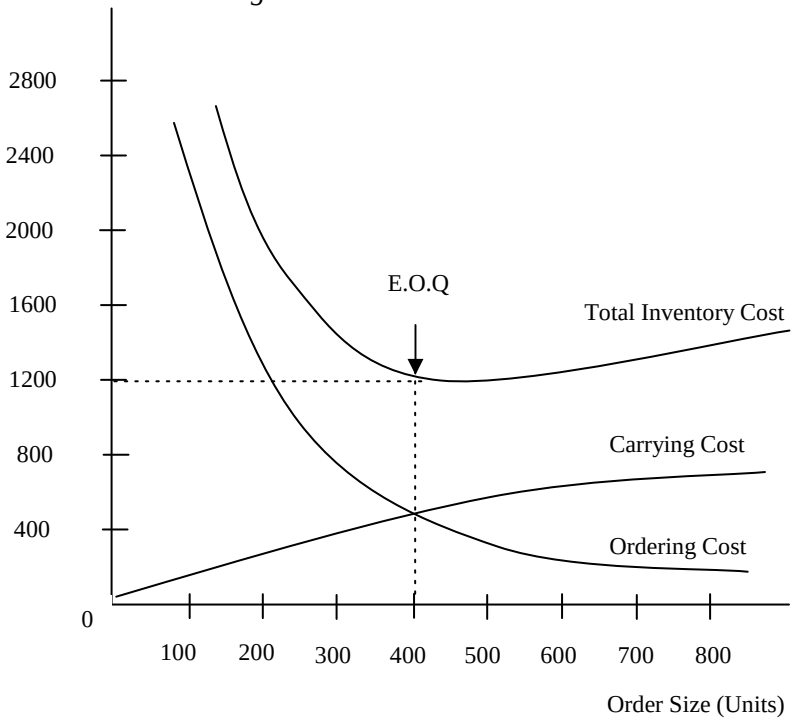

Figure 3.1: Function of E.O.Q

In *Figure. 3.1* costs like carrying, ordering and total cost are plotted on the vertical axis (y) and order size is shown on the horizontal axis (x). From *Figure. 3.1* one can easily see that there is an inverse relationship between inventory carrying cost and ordering cost i.e., inventory carrying cost increases and ordering cost decreases as the order size increases. In the first instance the total cost line decreases as the order size increases, but it starts increasing when decrease in ordering cost is more than off set by the increase in carrying cost.

Assumption of the EOQ Model

Cost (Rupees)

The basic EOQ model is based on the following assumption:

1) The forecast usage/demand for a given period, usually one year, is known
2) The usage/demand is even throughout that period
3) Inventory orders can be replenished immediately (There is no delay in placing and receiving orders).

There are two distinguishable costs associated with inventories: costs of ordering and costs of carrying.

Figure 3.1 shows a graph illustrating the behaviour of the carrying cost, the ordering cost, and the sum of these two costs. The carrying cost varies directly with the order size (since the average level of inventory is one-half of the order size), whereas the ordering cost varies inversely with the order size.

EOQ Formula

For determining the EOQ formula we shall use the following symbols:

U = annual usage/demand
Q = quantity ordered
F = cost per order
C = per cent carrying cost
P = price per unit
TC = total costs of ordering and carrying

Given the above assumptions and symbols, the total costs of ordering and carrying inventories are equal to

$$TC = \frac{U}{Q} \times F + \frac{Q}{2} \times P \times C$$

In the equation, the first term on the right-hand side is the ordering cost, obtained as the product of the number of orders (U/Q) and the cost per order (F) and the second term on the right-hand side is the carrying cost, obtained as the product of the average value of inventory holding (QP/2) and the percentage carrying cost C.

The total cost of ordering and carrying is minimised when:

$$Q = \sqrt{\frac{2FU}{PC}}$$

which can be obtained by putting the first derivative of TC with respect to Q and equating it with zero.

$$\frac{dTC}{dQ} = -\frac{UF}{Q^2} + \frac{PC}{2} = 0$$

$$-2UF + Q^2 PC = 0$$

$$Q^2 PC + 2UF$$

$$Q_2 = \frac{2UF}{PC}$$

$$Q = \sqrt{\frac{2UF}{PC}}$$

assuming that the second derivative condition is satisfied.

The formula embodied in the equation is the EOQ formula. It is a useful tool for inventory management. It tells us what should be the order size for the purchase of items and what should be the size of production run for manufactured items.

The EOQ model may be illustrated with the help of the following data relating to the Ace Company.

U = annual sales = 20,000 units
F = fixed cost per order =Rs. 2,000
P = purchase price per unit = Rs. 12
C = carrying cost= 25 per cent of inventory value.

Plugging in these values in eq. (3.2) we get.

$$Q = \sqrt{\frac{2 \times 2{,}000 \times 20{,}000}{12 \times 0.25}} = 5.164$$

Quality Discount and Order Quantity

The standard EOQ analysis is based on the assumption that the price per unit remains constant irrespective of the size of the order. When quantity discounts are available, which is often the case, the price per unit is influenced by the order quantity. This violates the applicability of the EOQ formula. However, the EOQ framework can still be used as a starting point for analysing the problem. To determine the optimal order size when quantity discounts are available the following procedure may be used:

1) Determine the order quantity using the standard EOQ formula assuming no quantity discount, Call it Q*.
2) If Q* enables the firm to get quantity discount then it represents the optimal order size.
3) If Q* is less than the minimum order size required for quantity discount (call it Q′) compute the change in profit as a result of increasing the order quantity from Q* to Q' as follow:

$$\Delta\pi = UD + \left[Q^* U - Q' U \right] F - \left[Q' (P_2 - D) C - Q^* \right] PC_2$$

where $\Delta\pi$ = change in profit.
U = annual usages/demand
D = discount per unit when quantity discount is available
Q* = economic order quantity assuming no quantity discount
Q′ = minimum order size required for quantity discount
F = fixed cost of placing an order
P = unit purchase price without discount
C = inventory carrying cost expressed as a percentage.

On the right-hand side of the equation, the first term represents savings in price, the second term represents savings in ordering cost, and the third term represents the increase in carrying cost.

4) If the change in profit is positive, Q′ represents the optimal order quantity. If the change in profit is negative, Q* represents the optimal order quantity.

To illustrate the above procedure, consider the following data pertaining to Quantum Ltd.

U = annual usage=10,000 units
F = foxed cost per order =Rs. 150
P = purchase price per unit =Rs. 20
C = carrying cost=25 percent of inventory value
Q′ = minimum order size required for quantity discount=1,000 units D = discount per unit =Re.1.

The EOQ assuming no quantity discount is

$$Q^* = \sqrt{\frac{2FU}{PC}} = \sqrt{\frac{2\times150\times10{,}000}{20\times0.25}} = 775 \text{ units}$$

Since Q* is less than Q′ (1,000), the change in profit as a result of increasing the order quantity from Q* to Q′ is

$$UD + \left[\left[QU^* - UQ'\right]F - \left[\left[Q\ P\ DC\ Q\ PC'\left(\frac{}{2}\right) - {}^*2\right]\right]\right]$$

$$= 10{,}000 \times 1 + \left[\frac{10{,}000}{775} - \frac{10{,}000}{1{,}000}\right]150$$

$$- \left[\left[\frac{1{,}000\ 20\left(-1\ 0.25\right)}{2} - \frac{775\times20\times0.25}{2}\right]\right]$$

= 10,000 + 435 – (2,375 − 1,938)
= Rs. 9,998.

Since the change in profit is positive, Q′=1,000 represents the optimal order quantity. It should be noted that the above procedure is based on the principle of marginal analysis. This involves comparing incremental benefits with incremental costs in moving from one level of inventory to another. This principle may be used to compare a proposed order quantity with the present order quantity and more generally for comparing any set of alternatives.

Levels Mini-Max System

Under this method the maximum and minimum level for each item of inventory are fixed. These levels serve as a basis for initiating action so that the quantity of each item is controlled. These levels are not permanent and likely to change with the level of activity. The maximum level indicates the maximum quantity of an item of inventory which can be held at a point of time. The maximum level of inventory would depend upon the following factor:

- availability of storage space
- lead time (time required in receiving the goods ordered)
- availability of working capital
- average rate of consumption of material
- cost of storage and insurance
- risk of obsolescence and deterioration
- quantity discounts

Minimum level indicates the quantitative balance of an item of inventory, which must be maintained in hand at all times. It is a level below which the inventories should not fall. This level of inventory is held to avoid stock out and consequent stoppage of production. The minimum level would depend upon:

- rate of consumption of material
- the maximum and minimum time required to acquire fresh supplies
- the re-order level.

Re-order Period (ROP)

The standard EOQ model assumes that materials can be procured instantaneously and hence implies that the firm may place an order for replenishment when the inventory level drops to zero. In the real world, however, procurement of materials takes time and hence the order level must be such that the inventory at the time of ordering suffices and meet the needs of production during the procurement period which is also known as Lead Time.

If the usage rate of materials and the lead time for procurement are known with certainly then the ordering level would simply be:

Lead-time in days for procurement X Average daily usage

When the usage rate and lead time are likely to vary: the reorder level should be higher than the normal consumption period requirement during the procurement period in order to provide a measure of safety in the face of variability of usages and lead time. Put differently, the reorder level should be equal to:

Normal consumption + Safety stock

Safety Stock

What should be the level of safety stock? In a simple situation where only the usage rate is variable and the maximum usage rate can be specified, the safety stock required to seek total protection against stock out is:

(Maximum usage rate − Average usage rate) × Lead time

When both the lead time and usage rate vary, which is often the case and the range of variation is wide, complete protection against stockout may require an excessively large safety stock. For example, if the lead time various between 60 days and 180 days with an average value of 90 days and the usage rate varies between 75 units and 125 units per day with an average value of 100 units per day, a safety stock of 13,500

units is required for complete protection against stockout. This has been worked out as follows:

Maximum possible usage	-	Normal or Average usage
Maximum daily usage	-	Average or Normal daily usage
X Maximum lead time	×	Average lead time
125 × 180	-	100 × 90 = 13,500

Since inventory-carrying costs are proportional to the level of inventories carried, it rarely makes sense to seek total protection against stockout. In view of the trade-off between stockout cost and inventory carrying cost, the optimal level of safety stock is usually much less than the level of safety stock required to achieve total protection against stockout.

A manufacturing company will require 50,000 units of a product during the next year. The cost of processing an order is Rs.20 and the carrying cost per units is 50 paise per year. Lead-time of an order is 5 days and the company will keep a safety stock of two days usage.

You are required to calculate − (i) Economic Order Quantity; (ii) Re-order Point; (iii) Minimum Inventory; (iv) Maximum inventory and (v) average Inventory. (Assume 250 days in a year.)

Solution

(i) Economic Order Quantity

$$EOQ = \sqrt{\frac{2RO}{C}}$$

Where; R = Annual Requirements or Usage

O = Ordering cost per order

C = Carrying cost per unit per year

$$EOQ = \sqrt{\frac{2 \times 50{,}000 \times Rs.20}{Re.0.5}}$$

$$= \sqrt{40{,}00{,}000} = 2{,}000 \text{ Units}$$

(ii) Re-order Point

R.O.P. = (L× UR) + S

Where; L = Lead Time;

U = Usage Rate (50,000 ÷ 250) = 200 (units per day);

S = Safety Stock

R.O.P. = (5 × 200) + (2 × 200)

= 1,000 + 400 = 1,400 Units

(iii) Minimum Inventory

Minimum Inventory is the Safety Stock kept by the company, which are 400 units. If there is no safety stock, minimum inventory will be zero.

(iv) Maximum Inventory

Maximum Inventory = EOQ + Safety Stock
= 2,000 + 400 = 2,400 units.

(v) Average Inventory

$$\frac{\text{Maximum Inventory} + \text{Minimum Inventory}}{2}$$

$$\frac{2{,}400 + 400}{2} = 1{,}400 \text{ Units}$$

Order Point Formula

The analysis discussed above tends to be somewhat cumbersome when probability distributions are most complex and dependent and multi-period cases are involved. In view of this many firms would find the following formula helpful for calculating the reorder point.

$$\text{Recorder Point} = S(L) + \sqrt{SR(L)}$$

Where S = Usage
L = lead time needed to obtain additional inventory when the order is placed
R =average quantity ordered
F = stockout acceptance factor.

The value of F, the stockout acceptance factor, depends on the stockout percentage rate.

Selective Inventory Control (Classification) ABC

Analysis:

ABC analysis [Always Better Control] is an application of the principle of 'Management by Exception' to the field of inventory control. If we look at the inventory mix of a firm, it would constitute of hundreds of items. Most of these items would be inexpensive and the frequency of their use would be less. The remaining items would be expensive, more frequently used and account for large proportion of firm's investment in inventories.

It would be an expensive and cumbersome act to adopt a common policy and determination of economic order quantity and reorder point for management of all these items of inventory. In this technique all the items of inventory are classified in three categories viz., A, B and C based on the usage rate, rupee value and criticality of the item.

- **A** category items are those inventory items which have maximum usage rate and constitute 70% to 80% of inventory value, but only 5% to 10% of the inventory volume. These type of inventories requires frequent monitoring and strict control.
- **B** category items are those inventory items which have moderate value and usage rate and constitute 20% to 25% of inventory value, but only 20% to 30% of the inventory volume. These types of inventories require less monitoring and control.
- **C** category items are of low or negligible value and usage rate. The remaining items of inventory representing 5% to 10% of inventory value, but 60% to 70% of the total quantity of inventory fall in this category and require general control.

Process of ABC Analysis

- **Classification:** On the basis of expected use, the items of inventory are classified according to their categories and per unit Price of each item is determined.
- **Ascertainment of Total Cost:** The total cost is calculated by multiplying the expected units to be used by the per unit cost.
- **Rank Determination:** Cost-wise rank is determine for each item of inventory. First rank is assigned to the item with the highest total cost.
- **Computation of Ratio or Percentage:** Two ratios/percentages are calculated (i) Percentage of number of units of each item to total units of all items. (ii) Total cost of each item to the total cost of all items.
- **Determination of ABC Category:** ABC categories are formed by combining the items on the basis of their relative values.

Example 2.1: Dinesh Limited is considering selective control for its inventories. Using the following datas, prepare the ABC plan.

Items	A	B	C	D	E	F	G
Unit	8,000	15,000	5,000	7,5000	5,000	7,000	2,500
Unit Cost (Rs.)	5.50	1.70	30.40	1.50	0.65	5.14	51.20

Solution:

ABC Analysis

Item	**Per Unit Cost (Rs.)**	**Inventory**			**Total Value**			**Category**
		Units	**% of Total**	**Cumul-ative %**	**Total Cost Rs.**	**% of Total**	**Cumul-ative %**	

C	30.40	5,000	10	15%		1,52,000			
G	51.20	2,500	5		15%	1,28,000	38	70%	70%	A
A	5.50	8,000	16	30%	45%	44,000	32		90%	
F	5.14	7,000	14			36,000	11	20%		
B	1.70	15,000	30			25,000	9			B
D	1.50	7,500	15	55%	100%	11,250	6.38		100%	
E	0.65	5,000	10			3,250	2.80	10%		C
							0.82			
Total		50,000	100%			4,00,000	100%			

VED Analysis:

VED (Vital, Essential, Desirable) analysis is a technique used for spare part inventory analysis and is widely used in the automobile industry specially for the maintenance of the spare parts inventory. According to this technique, inventory items are classified as follows:

- **Vital (V)** items constitute such items of inventory, which are vital for continuous operations. Shortage or absence of these items will bring the production activity to a halt. These items of inventory are critical for continuous production and therefore require close monitoring.
- **Essential (E)** items are those items of inventory, which are essential for continuous production. The difference between vital and essential items is that the shortage of essential items can be tolerated for a few hours viz., it will not bring the production process to a halt. The level of these type of inventory is moderately low.
- **Desirable (D)** items do not have any immediate impact on the production process, hence inventory of these items may or may not be maintained.

In VED analysis the focus is not on the value of the inventory, but the focus is on their likely impact on production.

SED Analysis

SDE (Scarce, Difficult and Easy) analysis evaluates the importance of inventory items on the basis of their availability. As per SDE analysis the inventory items are grouped into the following categories:

- **Scarce (S)** items are those items which are in short supply. Most of the time these items are important and essential for continuous production.
- **Difficult (D)** items are those items which can not be produced easily.

- **Easy (E)** items are those items which are readily available in the market. In SDE analysis the main focus is on the availability of the inventory. This type of analysis is resorted to when the markets are regulated and input and output is controlled by the government.

FSN Analysis:

Under this method inventory items are classified according to the usage/consumption pattern. They are classified as follows:

- **Fast Moving (F)** items are stored in large quantities as their usage rate is high. Special attention is given to the inventory level of these types of items.
- **Slow Moving (S)** items are not frequently required by the production department, hence moderate quantities with moderate supervision are maintained.
- **Non Moving (N)** items are rarely required by the production department, hence small number of items are kept in stores and less supervision is required for these kind of inventory items.

In this method the focus is on the frequency of usage of a particular item.

☽ Check Your Progress 2

1) A Precision Engineering Factory consumes 50,000 units of a component per year. The ordering, receiving and handling costs are Rs.3 per order while the trucking costs are Rs.12 per order. Further details are as follows:

   Interest cost Rs. 0.06 per unit per year.
   Deterioration and obsolescence cost Rs. 0.004 per unit per year.
   Storage cost Rs. 1,000 per year for 50,000 units.
   Calculate the economic order quantity.

2) A company requires 1,250 units per month of a particular item. Ordering costs is Rs.50 per order. The carrying cost is 15% per year, while unit cost of the item is Rs. 10.

Determine economic lot size and minimum total variable cost.

3) The following relations to inventory cost have been established for ABC Ltd.

   (a) Orders must be placed in multiples of 100 units.
   (b) Requirement for the year are 3,00,000 units.
   (c) The purchase price per unit is Rs. 3.
   (d) Carrying cost is 25% of the purchase price of goods.
   (e) Cost per order placed is Rs. 20.
   (f) Desired safety stock is 10,000 units, this amount is on hand initially. (g) Three days are required for delivery.

   Calculate the following:

   (i) E.O.Q.
   (ii) How many orders should the company place each year. (iii) At what inventory level should an order be placed?

3.5 SUMMARY

Inventories constitute a significant portion of the current assets ranging form 40 to 60% for manufacturing companies. The manufacturing companies hold investments in the form of raw material, work in process and finished goods. The three main motives for holding inventories are transaction, precautionary and speculative. The various factors which need to be considered while formulating inventory policy are:

(a) Costs (b)
Returns
(c) Risk Factors.

There are two type of costs associated with inventory maintenance which are: (a) Ordering Costs
(b) Carrying Costs.

The Economic Order Quantity (EOQ) is that order quantity which minimises the sum of ordering and carrying cost. The inventory level at which the firm places order for further inventory is known as reorder point and it depends on:

(a) lead time (b)
the usage rate.

There are many inventory control systems, the most widely used one is ABC and FSN System.

3.6 SELF-ASSESSMENT QUESTIONS/EXERCISES

1) Distinguish between process or movement inventories and organisation inventories.
2) What purpose is served by inventories?
3) What costs are incurred in the context of inventory managements?
4) What assumptions underlie the basic EOQ model?
5) What is the formula for EOQ? Device it.
6) How would you go about determining the optimal order size when quantity discount is available? Illustrate your approach with a suitable example.
7) What modification is required in the basic EOQ analysis to cope with the problem of inflation?

3.7 SOLUTIONS/ANSWERS

Check Your Progress 1

1) EOQ 4.226 units

2) EOQ 1,000 units; Minimum Total Variable Cost Rs. 1,500

3) (i) 4,000 units
(ii) 75
(iii) 12,500

Assume 360 days in a year.

Check Your Progress 2

1) EOQ – 200 units; Total Cost Rs. 41,000; Net increase in total cost Rs. 325, (Not to accept the offer.)

2) EOQ – 2,400 kg; No. of orders 10; Total Purchase cost Rs. 30,450.

(a) Maximum Inventory 2,900 kg; ROP 1,460 kg; Average Inventory 1,700 kg.

(b) Discount should be availed; Saving Rs. 1,503.

3) ROL– 2,250 units; Minimum Level – 810 units; Maximum Level – 2,750 units.

4) (i) A –1,200; B –750 (ii) A – 500; B – 350
(iii) A – 1,300; B – 1200 (iv)
A – 900; B – 775.