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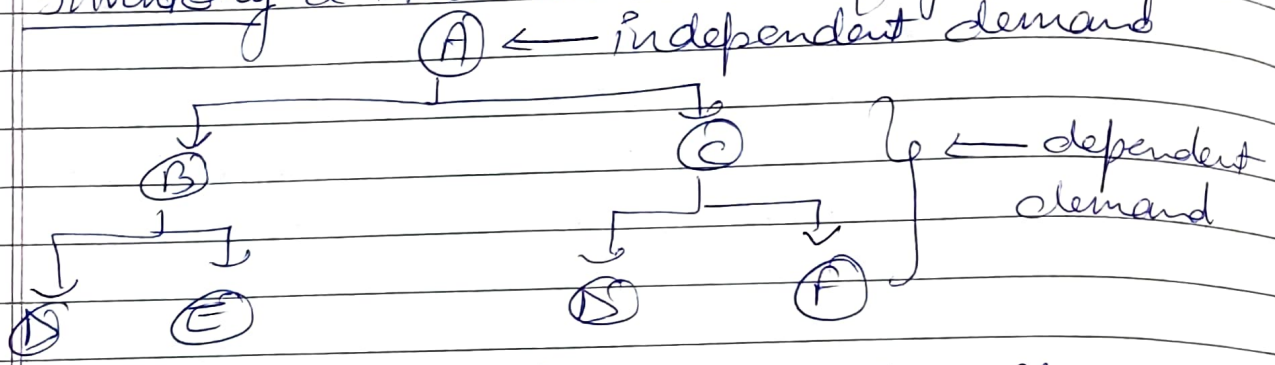
Unit-5 Inventory Management

Inventory a stock or store of goods



Independent demand is uncertain while dependent demand is certain

Inventory Models

- Independent demand - finished goods, items ready for sale. Eg computer
- Dependent demand - components of finished goods. Eg - parts that make up computer.

Types of Inventories

- Raw material & purchased parts
- Partially completed goods (work-in-progress)
- finished goods inventories
- Replacement parts, tools & supplies
- Goods in transit to warehouse or customer

functions of Inventory

- to meet anticipated demand
- to smooth production requirements
- to decouple operations
- to protect against stock-outs.
- to take advantage of order cycles
- to help hedge against price increases

- to permit operations
- to take advantage of quantity discounts

Objectives of Inventory control
- to achieve satisfactory levels of customer service while keeping inventory costs within reasonable bounds.
  - level of customer service
  - cost of ordering & carrying inventory.

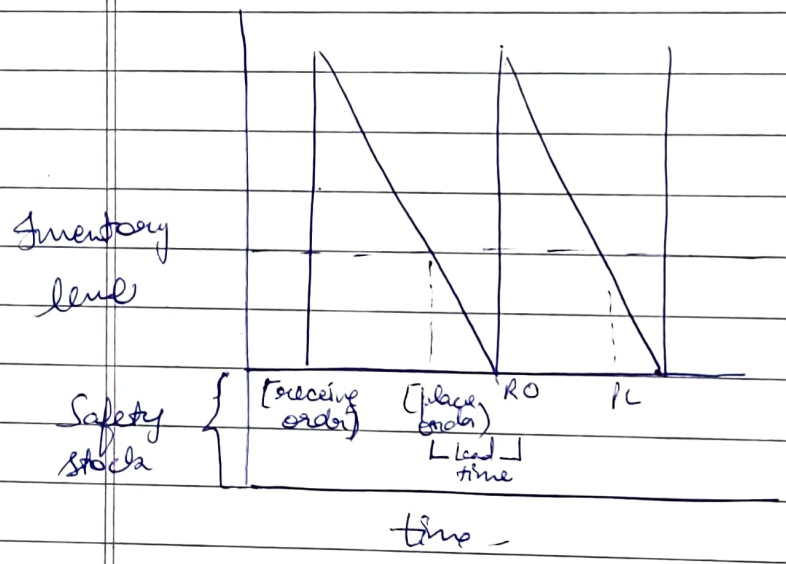
Inventory turnover - is the ratio of average cost of goods sold to average inventory investment.

Effective inventory management
- a system to track inventory
- a reliable forecast of demand
- knowledge of lead times
- reasonable estimates of holding cost, ordering cost and shortage cost
- a classification system

Inventory counting systems
- Periodic system - physical count of items made at periodic intervals.
- Perpetual inventory system
  - a system that keeps track of removals from inventory continuously, thus, monitoring current levels of each item.
- Two bin system - two containers of inventory; reorder when first is empty.

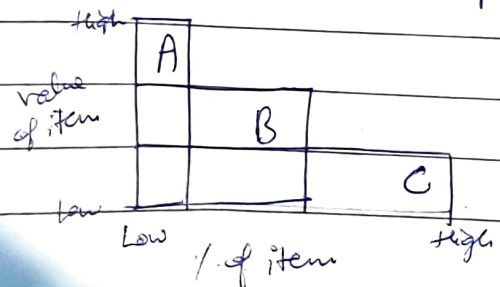
- Universal bar code - printed on a label that has information about item to which its attached

Key Inventory terms
- Lead time - time interval between ordering and receiving the order
- Holding (Carrying) cost - cost to carry an item in inventory for a length of time usually a year
- Ordering cost = ordering & receiving inventory
- Shortage cost - when demand exceeds supply



Always Better Control

ABC classification system classify inventory according to some measure of importance & allocating control efforts accordingly.
A - Very Imp. B - moderate imp. C - least imp.

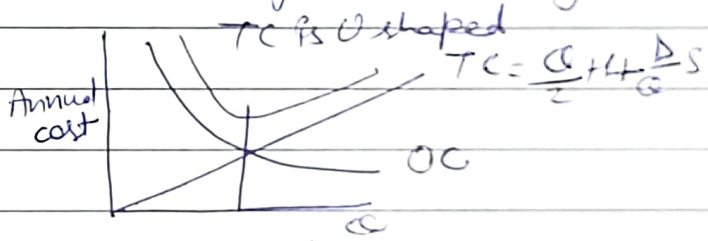


[Selective Inventory Control]

Cycle counting? a physical count of items in inventory
Cycle counting management:-
- how much accuracy is needed?
- when should cycle counting be performed?
- who should do it?

Economic Order Quantity [EOQ] Model. order size that minimizes total annual cost.
Economic production model / quantity discount model
Assumptions - only one product involved
- annual demand requirements known
- demand even throughout the year
- lead time doesn't vary - no quantity discounts
- each order is received in a single delivery

Cost minimization goal



$$EOQ = \sqrt{\frac{2 \times A \times O}{C}}$$

A = annual purchase requirement
O = ordering cost
C = carrying cost

Deriving EOQ

$$Q_{opt} = \sqrt{\frac{2DS}{H}}$$ (Annual demand X Order setup cost) / (holding cost)

$$\text{Total cost} = DC + \frac{D}{Q}S + \frac{Q}{2}H \quad \text{OR}$$

TC = Annual purchase cost + Annual ordering cost + Annual holding cost

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Ques. $D = 10,000$, $H = \$6$ $OC = \$75$. Calculate EOQ, Reorder level & TC. assume 250 working days, purchasing lead time = 5 days

$$EOQ = \sqrt{\frac{2DS}{H}} = \sqrt{\frac{2 \times 10000 \times 75}{6}} = 500 \text{ units}$$

$$\text{Reorder point} = \frac{D}{WD} \times \text{Lead time}$$

$$= \frac{10000}{250} \times 5 = 200 \text{ units}$$

$$TC = \left(\frac{10,000}{500} \times 75\right) + \left(\frac{500}{2} \times 6\right) = 3000$$

$$TC = \frac{Q}{2}H + \frac{D}{Q}S$$

Economic production quantity (EPQ) production done in batches or lots. Capacity to produce a part exceeds the part's usage or demand rate. Assumptions of EPQ are same to EOQ except orders are received incrementally during production

- one item involved - no quantity discounts
- annual demand known - usage rate constant
- usage occurs continually - production rate constant
- lead time doesn't vary

TC with purchasing cost

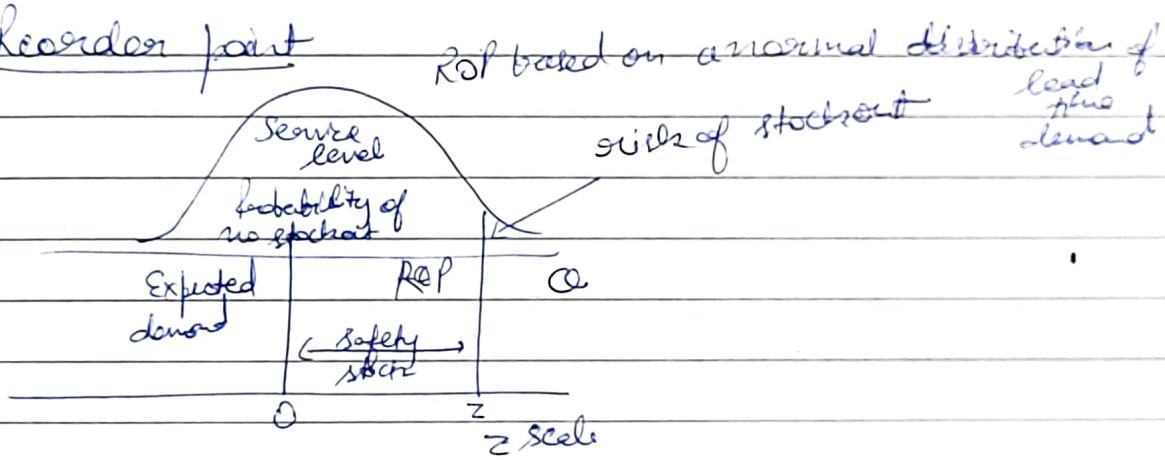
$$TC = \frac{Q}{2}H + \frac{D}{Q}S + \text{Purchasing cost}$$

(Carrying cost) (ordering cost) PD

Reorder point - When quantity on hand of item drops to this amount, item is reordered
Safety stock held in excess of expected demand due to variable demand rate or/and lead time
Service level probability that demand will not exceed supply during lead time

Determinants of reorder point
- rate of demand - lead time - stockout risk
- demand/lead time variability (safety stock)

Reorder point



Fixed-order interval made orders placed after fixed intervals. Supplier might encourage fixed intervals may require only periodic checks of inventory levels. Risk of stockout, fill rate - % of demand filled by stock on hand
Benefits - tight control on inventory level, maybe practical when inventories can't be monitored, items from same supplier may yield savings in ordering, packaging, shipping cost,
Disadvantages requires a larger safety stock, increases carrying cost, cost of periodic review