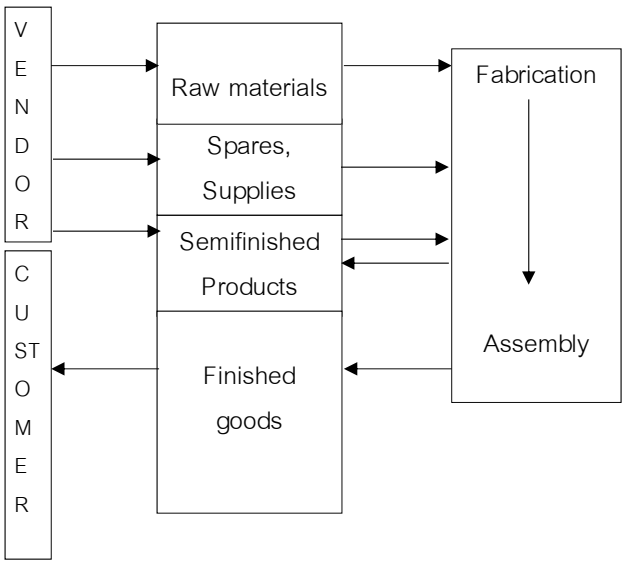
INVENTORY

- An inventory is any stock of economic resources that is stored for future use
- Cost of ordering -- paperwork, secretarial, etc.
- Holding cost
- "HOW FREQUENTLY SHOULD MATERIAL BE ORDERED ?"

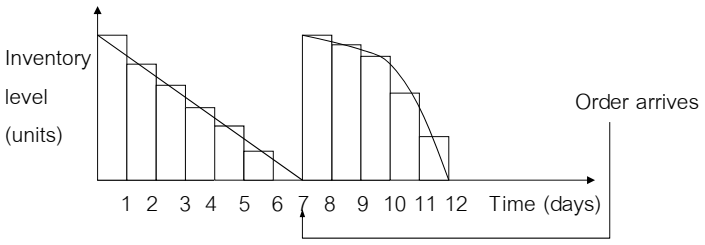


PURPOSE OF INVENTORY

- Protection against fluctuating demand
- Protection against delayed supply
- Protection against inflation
- Benefits of large quantities
- Saving on ordering cost
- Other reason
  - Bargaining power
  - machine shut down for overhauls

STRUCTURE OF THE INVENTORY SYSTEM

- Inventory Level -- size of the inventory
- Demand and depletion
  - Constant demand
  - Fluctuating demand



STRUCTURE OF THE INVENTORY SYSTEM

- Lead time
- Shortage and Surpluses
- Safety stock
- Average inventory
- Inventory problems and decisions
  - The appropriate inventory level
  - How much to order
  - When to order
  - Safety stock

INVENTORY COSTS

- Ordering cost (K)
  - Assumed to be a fixed cost per order (the same expenses occur regardless of how many units are ordered)
  - Paperwork expenses (purchasing and receiving)
  - dataprocessing
  - Expenses of delivery, postage, telephone charges)
- Holding Cost (H)
  - Cost of capital -- interest, opportunity loss
  - storage -- maintaining the storage space, rental fees, light, heat, security, janitorial services
  - Storekeeping operations
  - Insurance and taxes
  - Obsolescence and deterioration

INVENTORY COSTS

- Shortage Cost (G)
  - occur when an item is out of stock and demand is unsatisfied
  - Raw materials -- cost of idle production, spoilage of products or materials
  - Finished goods -- loss of customers, loss of future profits due to customers' dissatisfaction
  - Replacement parts -- cost of idle machines, idle labor, spoilage of materials and delays in shipment
  - Other cases -- shortage of blood may cost a life
- Item Cost (C)

ECONOMIC ORDER QUANTITY (EOQ)

- Determine the optimal quantity to order
- Assumptions:
  - The demand for the item is constant over time
  - the per-unit holding cost and ordering cost are independent of the quantity ordered.
  - The replenishment is scheduled in such a way that shipments arrive exactly when the inventory level reaches zero.
  - Only one item is being considered, orders for different items are independent of each other
  - Full orders are delivered in one batch

ECONOMIC ORDER QUANTITY (EOQ)

- **Everglades university uses 1,200 boxes of typing paper each year. The university is trying to determine how many boxes to order at one time (Q). The information it considers is:**
  Ordering cost (K) = 5 per order
  Holding cost (H) = 1.20 per box per year

- $TC = T_O + T_H$
- $T_O = NK$
- $N = D/Q$
- $T_O = NK = DK/Q$

ECONOMIC ORDER QUANTITY (EOQ)

- Average inventory = Q/2
- $T_H = HQ/2$
- TRIAL AND ERROR
- EOQ FORMULA
  - Q* = SQRT(2KD/H)
- When the demand is given in dollars rather than in units:
  - Unit cost is given, simply convert the demand to units by dividing the annual dollar amount by the unit cost.
  - Unit cost is not given, the holding cost must be expressed as a percentage

ECONOMIC ORDER QUANTITY (EOQ)

- **A recreation department's annual budget for supplies is 200,000. The ordering cost is 50, and the holding cost is 20% of the value of the item. Find the EOQ and the total inventory costs.**

QUANTITY DISCOUNTS

- A discount is offered at one price level
- A discount is offered at several levels
- **Example:**

  The city of Northstar uses 100 replacement lamps a month for its streetlights. Each lamp costs the city $8. Ordering costs are estimated at $27 per order and the holding costs (primarily the cost of capital) are 25%. The city orders according to the EOQ. The supplier has now offered the city a 2% discount if the city will buy 600 lamps at a time. Should the city accept the offer?

QUANTITY DISCOUNTS

- A discount is offered at several levels
- **Example:**

  General hospital buys a certain antibiotic from a large supplier. The drug can be bought at the following prices:
  Quantities of 1 up to 4,999 --- $2.75 a unit
  Quantities from 5,000 to 9,999 --- $2.60 a unit
  Quantities over 10,000 units --- $2.50 a unit
  The demand (D) for the drug in the hospital is 50,000 units a year. There is an ordering cost (K) of $50 per order and a holding cost (H) of 20% of the cost of item per unit per year. The problem is to find the optimal purchasing policy for the hospital