CHAPTER 20

Inventory Management

INVENTORY MANAGEMENT IN ORGANIZATIONS

- Inventory management includes planning, coordinating, and controlling activities related to the flow of inventory into, through, and out of an organization.

COSTS ASSOCIATED WITH GOODS FOR SALE, OVERVIEW

- Managing inventories to increase net income requires effectively managing costs that fall into these six categories:
  1. Purchasing costs.
  2. Ordering costs.
  3. Carrying costs.
  4. Stockout costs.
  5. Quality costs.
  6. Shrinkage costs.

COSTS ASSOCIATED WITH GOODS FOR SALE, DETAILS

1. Purchasing costs:
   - the cost of goods acquired from suppliers, including incoming freight costs.
   - Usually this is the largest cost category of goods in inventory.
2. Ordering costs:
   - the costs of preparing and issuing purchase orders,
   - receiving and inspecting the items included in the orders,
   - matching invoices received, purchase orders, and delivery records to make payments.

COSTS ASSOCIATED WITH GOODS FOR SALE, DETAILS, CONT'D

3. Carrying costs
   - the costs that arise while goods are being held in inventory.
   - include the opportunity cost of the investment tied up in inventory, and costs associated with storage (out of pocket).
4. Stockout costs:
   - the costs that arise when a company runs out of a particular item for which there is customer demand (stockout).
   - the company must act quickly to meet the demand or suffer the costs of not meeting it.

COSTS ASSOCIATED WITH GOODS FOR SALE, DETAILS, CONCLUDED

5. Costs of Quality – the costs incurred to prevent and appraise, or the costs arising as a result of, quality issues. There are four categories of quality costs:
   1. Prevention.
   2. Appraisal.
   3. Internal failure.
   4. External failure.

6. Shrinkage costs:
   - costs that result from theft by outsiders, embezzlement by employees, misclassifications and clerical errors.
   - Shrinkage is measured by the difference between the cost of inventory on the books vs the cost of the physical count.

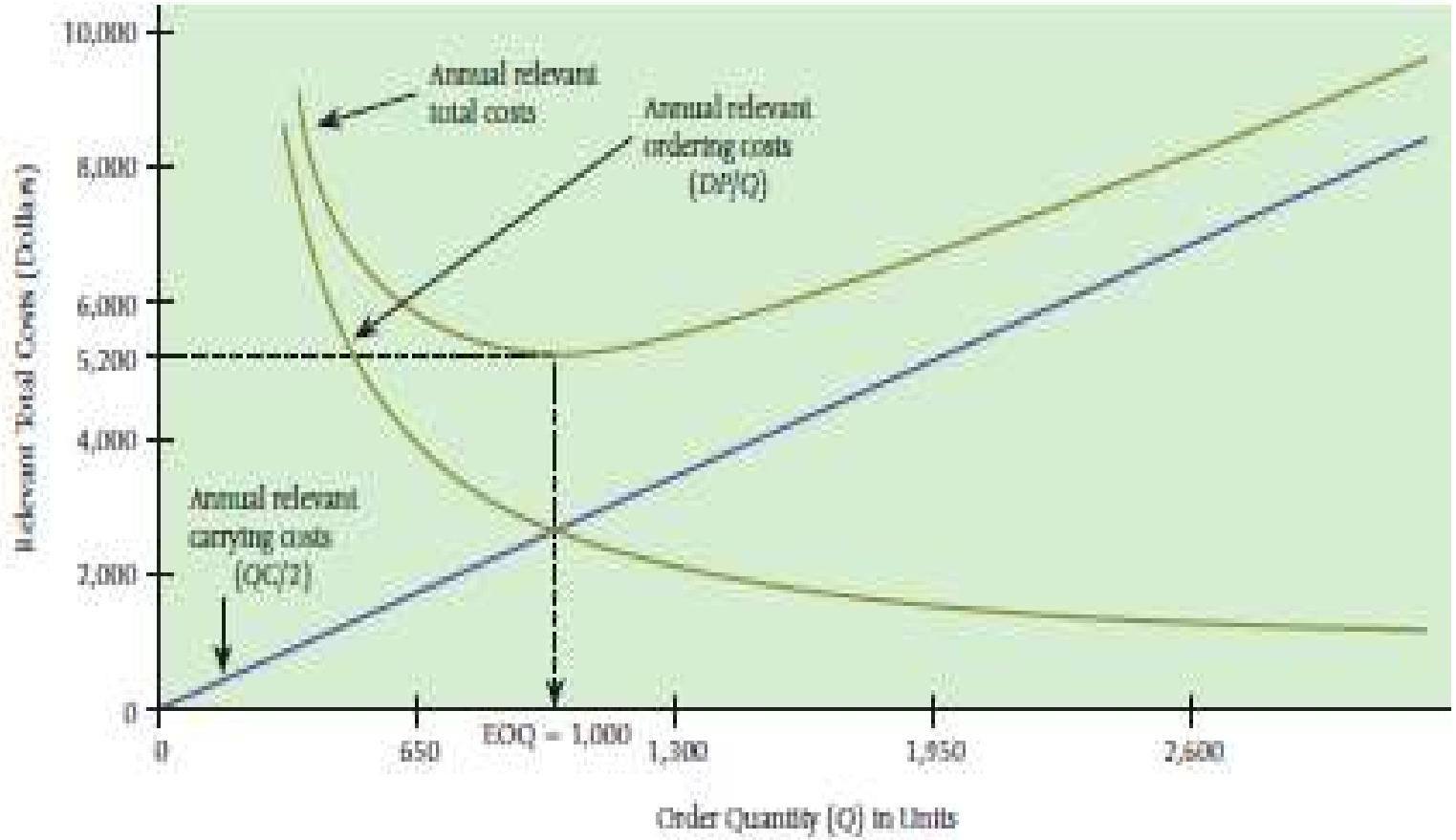
THE FIRST STEP IN MANAGING GOODS FOR SALE: THE ECONOMIC ORDER QUANTITY

- The first decision in managing goods for sale is how much to order of a given product.
- Economic order quality (EOQ) is a decision model that calculates the optimal quantity of inventory to order under a given set of assumptions.

BASIC EOQ ASSUMPTIONS

- There are only ordering and carrying costs.
- The same quantity is ordered at each reorder point.
- Demand, purchase-order lead time, ordering costs, and carrying costs are known with certainty.
- Purchasing costs per unit are unaffected by the quantity ordered. (Therefore, purchasing costs are irrelevant.)
- No stockouts occur.
- Managers consider the costs of quality and shrinkage costs only to the extent that these costs affect ordering or carrying costs.

ORDERING AND CARRYING COSTS ILLUSTRATED



BASIC EOQ ASSUMPTIONS

Total Cost is minimum when

Ordering Costs= carrying Costs

Ordering cost = number of orders *cost per order
= D/Q * P

Carrying costs = average Q * c.c per unit
= Q/2 * C

Solve for Q
D/Q * P = Q/2 *C  EOQ Model

EOQ FORMULA-RESULTS IN THE QUANTITY THAT MINIMIZES ANNUAL RELEVANT TOTAL COSTS

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

D = Demand in units for specified period

P = Relevant ordering costs per purchase order

C = Relevant carrying costs of one unit in stock for the time period used for D

WHEN TO ORDER (ASSUMES CERTAINTY OF DEMAND AND LEAD TIME)

- The second decision in managing goods for sale is when to order a given product.
- Reorder point—the quantity level of inventory on hand that triggers a new purchase order.

Reorder Point = **Number of units sold per unit of time** X **Purchase Order Lead Time**

EOQ EXAMPLE

- Purchase cost: $14 per unit
- Annual demand: 13,000 units
- Required rate of return: 15%
- Relevant cost per order: $200
- Relevant cost of insurance, handling, shrinkage ---- etc: $3.1 per unit

<u>Calculate the following:</u>

1. Carrying cost per unit.
2. EOQ.
3. Number of deliveries per year.
4. Annual total costs at EOQ.
5. Reorder point ,assuming 52 working weeks and 2 weeks lead time.

ANSWER

1. Carrying cost per unit.

- C = out of pocket + opportunity cost

  = 3.1 + 14*15%

  = $5.2

2. EOQ.

- $EOQ = \sqrt{\frac{2(13,000)(200)}{5.2}} = 1000$ units

3. Number of deliveries per year= D/Q = 13,000/1000= 13 deliveries or orders

4. Annual total costs at EOQ= QC/2 + DP/Q

   = **2600 + 2600**

   = $5,200

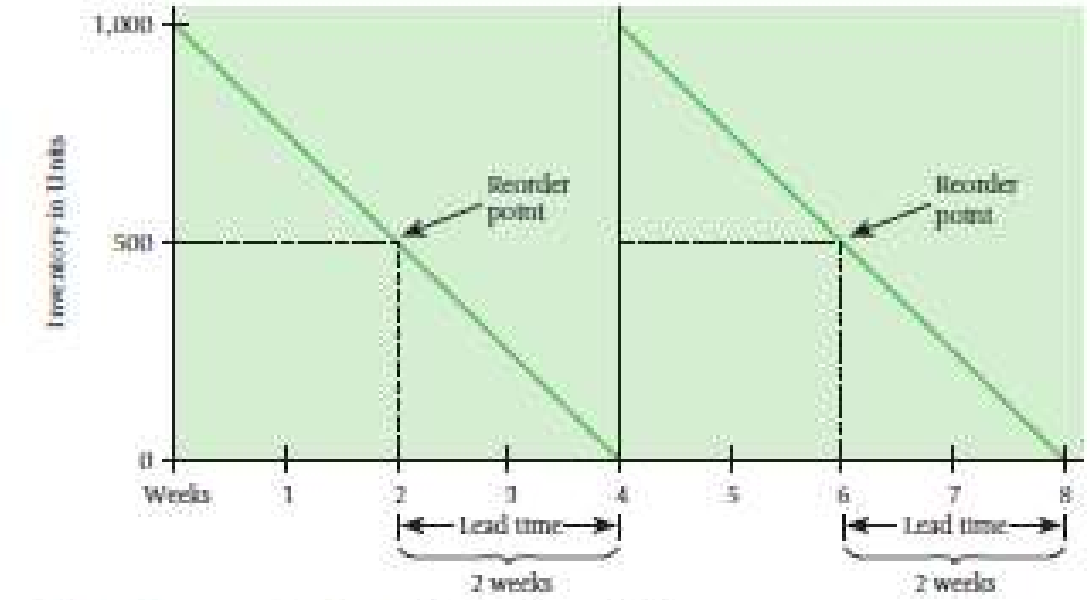
ANSWER

5. Reorder point ,assuming 52 working weeks and 2 weeks lead time.

Reorder point = (13,000/ 52)* 2

= 500 units

ORDERING POINTS ILLUSTRATED



[a] This exhibit assumes that demand and purchase-order lead time are certain:
Demand = 250 UX1 sunglasses per week
Purchase-order lead time = 2 weeks

SAFETY STOCK (DEMAND AND LEAD TIME UNCERTAIN)

- Safety stock is inventory held at all times regardless of the quantity of inventory ordered using the EOQ model.
  - Safety stock is a buffer against unexpected increases in demand, uncertainty about lead time, and unavailability of stock from suppliers.
  - Managers use a frequency distribution based on prior daily or weekly levels of demand to compute safety-stock levels.

ESTIMATING INVENTORY-RELATED RELEVANT COSTS AND THEIR EFFECTS

The relevant costs are categorized as follows:

- Carrying costs – see next slide
- Ordering costs – those ordering costs that change with the number of orders placed

CARRYING COSTS

- Relevant inventory carrying costs consist of relevant incremental costs and the relevant opportunity cost of capital.
- Relevant incremental costs—those costs of the purchasing firm that change with the quantity of inventory held.

OPPORTUNITY COSTS

- Relevant opportunity cost of capital—the return foregone by investing capital in inventory rather than elsewhere.
- It is calculated as the required rate of return multiplied by the per-unit costs of acquiring inventory, such as the purchase price of units, incoming freight, and incoming inspection.