

CLASS 8

SOLVED PROBLEMS BASED ON ECONOMIC ORDER QUANTITY (EOQ) MODEL

Question 1:

A company X Ltd. uses EOQ logic to determine the order quantity for its various components and is planning its orders. The Annual consumption is 80,000 units, Cost to place one order is Rs. 1,200, Cost per unit is Rs. 50 and carrying cost is 6% of Unit cost. Find EOQ, No. of orders per year, Ordering Cost and Carrying Cost and Total Cost of Inventory.

Solution 1:

Given that the annual consumption is 80,000 units.

Therefore, the annual demand = $D = 80,000$ units

Given that the ordering cost per unit per year = $C_o = 1,200$ Rs

Given that the unit cost per unit per year = $C = 50$ Rs

Given that the carrying (holding) cost per unit per year = $C_h = 6\%$ of unit cost per unit per year

$$\Rightarrow C_h = 6\% \text{ of } C$$

$$\Rightarrow C_h = \frac{6}{100} \times 50$$

$$\Rightarrow C_h = 3$$

Therefore, the carrying (holding) cost per unit per year = $C_h = 3$ Rs

$$\text{Now, EOQ} = \sqrt{\frac{2 \times D \times C_o}{C_h}} \text{ units}$$

$$\Rightarrow \text{EOQ} = \sqrt{\frac{2 \times 80,000 \times 1,200}{3}} \text{ units}$$

$$\Rightarrow \text{EOQ} = \sqrt{2 \times 80,000 \times 400} \text{ units}$$

$$\Rightarrow \text{EOQ} = \sqrt{64,000,000} \text{ units}$$

$$\Rightarrow \text{EOQ} = 8000 \text{ units}$$

$$\text{No. of orders per year } N = \frac{D}{\text{EOQ}} = \frac{80,000}{8000} = 10.$$

$$\text{Ordering Cost of the inventory} = \text{OC} = \frac{D}{\text{EOQ}} \times C_o$$

$$\Rightarrow \text{OC} = \left(\frac{80,000}{8000} \times 1,200 \right) \text{ Rs}$$

$$\Rightarrow \text{OC} = 12,000 \text{ Rs}$$

$$\text{Carrying Cost of the inventory} = \text{HC} = \frac{\text{EOQ}}{2} \times C_h$$

$$\Rightarrow \text{OC} = \left(\frac{8000}{2} \times 3 \right) \text{ Rs}$$

$$\Rightarrow \text{HC} = 12,000 \text{ Rs}$$

$$\text{Total Cost of the inventory} = \text{TC} = (\text{OC} + \text{HC}) = (12,000 + 12,000) \text{ Rs}$$

$$\Rightarrow \text{TC} = 24,000 \text{ Rs}$$

Question 2:

Midwest Precision Control Corporation is trying to decide between two alternate Order Plans for its inventory of a certain item. Irrespective of the plan to be followed, demand for the item is expected to be 1,000 units annually. Under Plan 1st, Midwest would use a teletype for ordering; order costs would be Rs. 40 per order. Inventory holding costs (carrying cost) would be Rs. 100 per unit per annum. Under Plan 2nd order costs would be Rs. 30 per order. And holding costs would 20% and unit Cost is Rs. 480. Find out EOQ and Total Inventory Cost than decide which Plan would result in the lowest total inventory cost?

Solution 2:

Let us first consider the 1st plan.

Under 1st plan,

The annual demand = $D = 1,000$ units

Given that the ordering cost per unit per year = $C_o = 40$ Rs

Given that the unit cost per unit per year = $C = 100$ Rs

$$\text{Now, } \text{EOQ} = \sqrt{\frac{2 \times D \times C_o}{C_h}} \text{ units}$$

$$\Rightarrow \text{EOQ} = \sqrt{\frac{2 \times 1,000 \times 40}{100}} \text{ units}$$

$$\Rightarrow \text{EOQ} = \sqrt{800} \text{ units}$$

$$\Rightarrow \text{EOQ} \approx 28.284271 \text{ units}$$

Let us take $\text{EOQ} = 28$ units

Thus EOQ under the 1st plan is 28 units

Now, the total inventory cost under the 1st plan = $\text{TC} = \sqrt{2 \times D \times C_o \times C_h}$

$$\Rightarrow \text{TC} = \sqrt{2 \times 1,000 \times 40 \times 100} \text{ Rs}$$

$$\Rightarrow \text{TC} = \sqrt{8000000} \text{ Rs}$$

$$\Rightarrow \text{TC} \approx 2828.42712 \text{ Rs}$$

Let us take $\text{TC} = 2828$ Rs

Thus the total inventory cost under the 1st plan is 2828 Rs.

Let us now consider the 2nd plan.

Under 2nd plan,

The annual demand = $D = 1,000$ units

Given that the ordering cost per unit per year = $C_o = 30$ Rs

Given that the unit cost per unit per year = $C = 480$ Rs

Given that the carrying (holding) cost per unit per year = $C_h = 20\%$ of unit cost per unit per year

$$\Rightarrow C_h = 20\% \text{ of } C$$

$$\Rightarrow C_h = \frac{20}{100} \times 480$$

$$\Rightarrow C_h = 96$$

Therefore, the carrying (holding) cost per unit per year = $C_h = 96$ Rs

$$\text{Now, } \text{EOQ} = \sqrt{\frac{2 \times D \times C_o}{C_h}} \text{ units}$$

$$\Rightarrow \text{EOQ} = \sqrt{\frac{2 \times 1,000 \times 30}{96}} \text{ units}$$

$$\Rightarrow \text{EOQ} = \sqrt{\frac{60,000}{96}} \text{ units}$$

$$\Rightarrow \text{EOQ} = \sqrt{625} \text{ units}$$

$$\Rightarrow \text{EOQ} = 25 \text{ units}$$

Thus EOQ under the 2nd plan is 25 units

Now, the total inventory cost under the 1st plan = $\text{TC} = \sqrt{2 \times D \times C_o \times C_h}$

$$\Rightarrow \text{TC} = \sqrt{2 \times 1,000 \times 30 \times 96} \text{ Rs}$$

$$\Rightarrow \text{TC} = \sqrt{5760000} \text{ Rs}$$

$$\Rightarrow \text{TC} = 2400 \text{ Rs}$$

Thus the total inventory cost under the 2nd plan is 2400 Rs.

The total inventory cost under the 1st plan is 2828 Rs whereas the total inventory cost under the 2nd plan is 2400 Rs.

Clearly, the total inventory cost under the 2nd plan is lesser than that of the total inventory cost under the 1st plan.

Therefore, the 2nd plan is the best.