FACULTY OF COMMERCE AND MANAGEMENT

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LECTURE-24

The EOQ and the Re-order point have been explained so far on the assumption of certainly conditions, i.e., on the assumption that there is constant or fixed usage/ requirement of inventory and instantaneous replenishment of inventory. But in reality, the same is not always possible since there is uncertainty.

For example, the demand for inventory is likely to fluctuate from time to time, particularly, the demand may exceed the anticipated level at certain points. In short, a discrepancy may arise between the expected usage and the actual usage of inventory.

Besides, the receipt of fresh inventory from the supplies may be delayed due to some abnormal situations, e.g., strikes, flood, transportation and so on, which is beyond the expected lead time.

Therefore, there will be a shortage of inventory either due to increase usage or due to slower delivery, i.e., the firm will have to face a stock-out situation which may disrupt the production schedule. As a result, it is advantageous on the part of the firm to maintain a sufficient safety margin by having surplus additional inventory against such stock-out position.

These stocks are known as Safety Stocks which will act as a buffer against the possible shortage of inventory. The safety may be defined as the 'minimum additional inventory to serve as a safety margin or buffer or cushion to meet an unanticipated increase in usage resulting from an unusually high demand and/or an uncontrollable late receipt of incoming inventory.

Now, the question arises how do we determine the safety stock? It should be remembered that safety stock requires two types of costs, viz., stock-out costs and carrying costs.

Therefore, appropriate level of safety stocks depends on the basis of trade-off between these two costs:
Stock-Out Costs:
These relate to the costs which are associated with the shortage, of inventory. It may be considered as an opportunity cost since the firm would be deprived of certain benefits due to the shortage of inventory, viz., the loss of profits which the firm could have earned if there was no shortage of inventory and damage the relationship with the customers.

Carrying Costs:
These costs are associated with the maintenance of inventory. Additional carrying costs are involved since the firm is to maintain additional inventory in excess of normal usage.

Practically, the above two costs are counterbalancing. That is, the larger the safety stock, the larger will be the carrying costs or smaller will be the stock-out costs. In short, if carrying costs are minimized, there will be an increase in stock-out costs and vice-versa.

Therefore, the duty of the financial manager will be to have the lowest total costs, (i.e., carrying cost + stock-out costs). In other words, the appropriate level of safety stock is determined by the trade-off between the stock-out and the carrying costs.

Assume in the previous example, the reasonable expected stock-out is 40 units per week. The firm should maintain a safety stock of (40 x 3) 120 units. So, the Re-order point will be 240 + 120 = 360 units. As such, the maximum inventory will be equal to EOQ plus the safety stock, i.e., 800 units + 120 = 920 units.
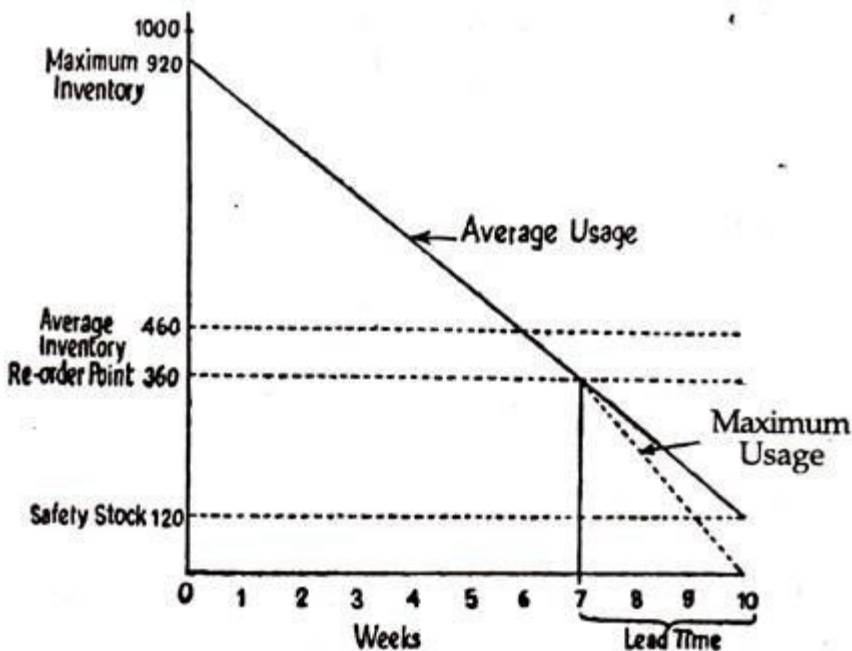

Fig.8.13 Re-order Point under Uncertainty.

Illustration:

Calculate the re-order point from the following particulars:

Annual Demand — 1,04,000 units.

Lead time — 5 weeks.

Safety Stock may be assumed to be 1,000 units.

(Sales will be made evenly through-out the period).

Solution:

1.04.000

Weekly usage/sales = 1,04,000/52 = 2,000 units.

Lead time — 5 weeks.

Re-order Level:

(i) When there is no safety stock:

2,000 units $\times$ 5 = 10,000 units.

(ii) When there is safety stock of 1,000 units:

= 10,000 + 1,000

= 11,000 units.

Problem:

Your factory buys and uses a component for production at Rs. 10 per piece. Annual requirement is 2,000 numbers Carrying cost of inventory is 10% p a. and ordering cost is Rs. 40 per order.

The purchase manager argues that as the ordering cost is very high, it is advantageous to place a single order for the entire annual requirement. He also says that if we order 2,000 at a time we can get a 3% discount from the supplier. Evaluate the proposal and make your recommendation.

Solution:

Before taking any decision, we are to find out the EOQ number which is nothing but the optimum ordering quantity where the total costs are minimum.

The same can be understood from the table presented below:

Annual Demand	No. of orders	Ordering Quantity (1) ÷ (2)	Value per order (3) × Rs. 10	Average Inventory value (4) ÷ 2	Carrying cost @ 10% on (5)	Ordering cost Rs. 40 per order	Total cost (6) + (7)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
2,000 units	1	2,000	19,400	9,700	970	40	1,010
	2	1,000	10,000	5,000	500	80	580
	4	500	5,000	2,500	250	160	410
	5	400	4,000	2,000	200 ⟷	200	400
	8	250	2,500	1,250	125	320	445
	10	200	2,000	1,000	100	400	500

(After discount @ 3%)

Hence, it is justified to purchase 400 units at a time.