

# INVENTORY PLANNING & PRODUCTION CONTROL

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## INVENTORY

Inventory is a complete list of items such as property and goods in stock, or the items in a shop or a house or a company. The items could be raw materials, partly finished products or finished products.

The three major motives for holding stocks are:

1. **Transaction motive:** This is the most basic reason for holding inventory, which is to meet customer demand and ensure a steady supply of products.
2. **Precautionary motive:** This motive involves holding extra inventory as a safety net to avoid stockouts and lost sales due to unexpected demand or supply chain disruptions.
3. **Speculative motive:** This motive involves holding inventory in anticipation of future price increases, supply shortages, or other market fluctuations, with the aim of profiting from the expected changes.

These motives help businesses manage their inventory levels and make strategic decisions to balance supply and demand, minimize costs, and maximize profits.

## INVENTORY COSTS

There are four types of inventory costs:

- a) **Ordering or procuring costs:** These are all the costs relating to the placement of orders for the stocks. They could be internal (production set-up costs in terms of production planning, preparation of the necessary machinery and the work force) or external (administrative costs in placing and receiving orders, and transport costs).
- b) **Stock costs:** These refer to the suppliers' price or the direct costs of production. These costs are considered particularly when bulk purchase discounts are offered or savings in the direct costs of production are available with longer "batch runs"
- c) **Holding or carrying costs:** These are cost of capital including interest; handling and storage costs; insurance and security costs; loss from pilferage and vermin damage; loss from deterioration and obsolescence; and stock taking, auditing and perpetual inventory costs.
- d) **Shortage or stock-out costs:** These are incurred as a result of running out of stock. These include loss of sales and contribution earned from the sale, loss on production stoppages, loss on emergency purchase of stock at a higher price, and loss of customers.

## Terminologies

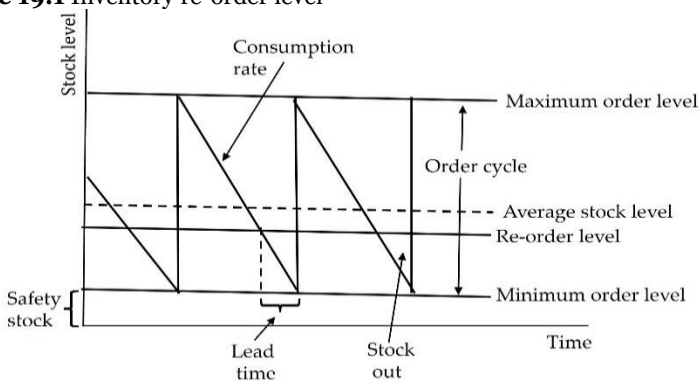
- **Free stock** is the physical stock plus awaiting orders minus unfulfilled demands.
- **Lead time or Procurement time** is the time which elapses between ordering and eventual delivery.
- **Maximum stock** is the level to indicate when stock has gone too high.
- **Minimum stock or buffer stock or safety stock** is the level to indicate when stocks are too low.
- **Physical stock** is the number of items physically in stock.
- **Re-order quantity** is the number of items in one order.
- **Stock-outs** is a condition where demand exists for an item of stock but the item is out of stock.
- **Safety stock** is the extra stock kept to avoid stockouts.
- **Daily average usage** is the average number of items sold per day.

## Inventory Re-order Level

Re-Order Level (ROL) triggers a purchase requisition when stock reaches a certain level, ensuring production needs are met until new supplies arrive. Re-Order Quantity (ROQ) is the amount ordered when stock reaches the RO. By carefully determining the ROQ, businesses can ensure they have enough stock to meet demand without overstocking, which can tie up capital and increase storage costs. Figure 19.1 shows how stock levels fluctuate due to consumption and replenishment. When stock reaches the ROL, a new order is placed, and after the lead time, the stock is replenished, preventing stockouts and ensuring smooth operations.

*Significance of re-order level:* Ensures timely replenishment of stock. Prevents overstocking and associated holding costs. Avoids stockouts and potential loss of sales

**Figure 19.1** Inventory re-order level



Re-order quantity ( $Q$ ) = Maximum stock level – Current stock level

Average Stock =  $Q/2 = (\text{Maximum stock level} - \text{Current stock level})/2$

For instance, if the maximum stock level is 500 units and the current stock level is 200 units, the re-order quantity ( $Q$ ) would be:

$$Q = 500 - 200 = 300 \text{ units}$$

### Re-order level Formula

1. With safety stock:  $\text{ROL} = \text{Daily average} \times \text{Lead time} + \text{Safety stock}$
2. Without safety stock:  $\text{ROL} = \text{Daily average} \times \text{Lead time}$

*Example:* For a perfume retailer with a daily sale of 200 bottles, a lead time of 7 days, and a safety stock for 5 days:

Safety stock = 5 days  $\times$  200 bottles/day = 1000 bottles

ROL = 200 bottles/day  $\times$  7 days + 1000 bottles = 2400 bottles

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