Inventory Control Models

1. Economic Order Quantity

Notation

- D = Annual Demand rate
- C_o = Ordering Cost per order
- C_h = Holding Cost per unit per year
- L = Lead time
- W = Working days per year

Sample Problem:

Manuel, the Purchasing Manager of JVC Flat Screen TV, wants to determine the most optimum inventory practice for the company. He was able to determine the demand and inventory costs needed in his analysis. The annual demand is 1,000 units. The ordering cost is $10,000 per order and the holding cost is $500 per unit per year. It will take 20 days for an order to arrive and there are 250 working days per year.

Questions:

1. What is the economic order quantity?
2. How much is the total annual inventory cost?

3. What is the reorder point? ROP

Steps in EOQ (Q*)

1. **Determine the EOQ (Q*)** $Q^* = \sqrt{\frac{2DC_o}{C_h}}$
2. **Determine the total inventory cost.**
   a. Compute the number of orders (**O**):
   $$O = \frac{D}{Q^*}$$
   b. Compute the total ordering cost ($\mathbf{C_o}$):
   $$TotalC_o = OC_o$$
   c. Compute the average inventory (**I**)
   $$I = \frac{BeginningInventory + EndingInventory}{2}$$

Steps in EOQ (Q*)

d. Compute the total holding cost (C_h):

$$TotalC_h = I * C_h$$

e. Compute the total annual inventory Cost

($Total\ C_I$):

$$TotalC_I = TotalC_O + TotalC_h$$

Steps in EOQ (Q*)

3. **Determine the Reorder Point:**

a. Compute the daily demand (***d***):

$$d = \frac{D}{W}$$

b. Compute the Reorder Point(***ROP***):

$$ROP = dL$$

Manuel, the Purchasing Manager of JVC Flat Screen TV, wants to determine the most optimum inventory practice for the company. He was able to determine the demand and inventory costs needed in his analysis. The annual demand is 1,000 units. The ordering cost is $10,000 per order and the holding cost is $500 per unit per year. It will take 20 days for an order to arrive and there are 250 working days per year.

Questions:

1. What is the economic order quantity?

$$Q^* = \sqrt{\frac{2DC_o}{C_h}}$$

$$Q^* = \sqrt{\frac{2(1000)(10000)}{(500)}}$$

$$\boldsymbol{Q^* = 200\ TVs}$$

2. Z How much is the total annual inventory cost?
   - Number of orders: $O = \frac{D}{Q^*}$

$$O = \frac{1000\ TVs}{200\ TVs}$$

$$O = 5\frac{orders}{year}$$

   - Total Ordering Cost =

$$TotalC_o = O * C_o$$

$$TotalC_o = 5 * 10000$$

$$TotalC_o = \$50000$$

- $I = \frac{BegI+EndI}{2}$

$$I = \frac{0 + 200}{2}$$

$$I = 100$$

- $TotalC_h = I * C_h$

$$TotalC_h = 100 * 500$$

$$TotalC_h = \$50000$$

- $TotalC_I = TotalC_o + TotalC_h$

$$TotalC_I = TotalC_o + TotalC_h$$

$$TotalC_I = \$50000 + \$50000$$

$$\boldsymbol{TotalC_I = \$100,000}$$

3. What is the reorder point?

Steps in EOQ (Q*)

3. **Determine the Reorder Point:**

   a. Compute the daily demand (***d***):

$$d = \frac{D}{W}$$

   b. Compute the Reorder Point(***ROP***):

$$ROP = dL$$

- $d = \frac{D}{W}$

$$d = \frac{1000\ TV}{250\ days}$$

$$d = 4\ \frac{TVs}{day}$$

- $ROP = dL$

$$ROP = 4\ \frac{TVs}{day} * 20\ days$$

$$\boldsymbol{ROP = 80\ TVs}$$