$\Rightarrow Q^2 = \frac{2DS}{H}$

Lecture-12
07/03/2018

$Q = \sqrt{\frac{2DS}{H}}$

Q. A company has got a demand for a particular part at 1000 units per month. The cost per unit is Rs. 50 and it costs Rs. 500 to place an order and to process the delivery. The inventory carrying costs at 20% of the average inventory investment cost (cost per unit) Determine

i) Economic order quantity (EOQ)
ii) Optimum no. of orders placed per annum
iii) Min ~~no. of~~ total cost of inventory per annum

Sol^n Given:

Demand (D) = 1000 units/month
= 12000 units/year

Ordering cost (S) = 500 Rs.

Annual holding/carrying inventory cost (H)
H = 20% of average inventory investment
= 0.2 × 50

i) $\therefore EOQ = \sqrt{\frac{2DS}{H}}$

$= \sqrt{\frac{2 \times 12000 \times 500}{0.2 \times 50}} \simeq 1096$ units

ii) Optimum no. of orders = $\frac{\text{Demand } (D)}{EOQ}$

$= \frac{12000}{1096} \simeq 11$

iii) $TIC = DC + \frac{D}{Q} \times S + \frac{Q}{2} \times H$

$= 12000 \times 50 + \frac{12000}{1096} \times 500 + \frac{1096}{2} \times 10$

$\simeq$ Rs. 610954

Q. A company makes bicycle. It produces 450 bicycles a month. It buys tyres at a cost of Rs. 20/tyre. Inventory carrying cost is 15% of the cost and the ordering cost is Rs. 50/order. Calculate EOQ, # of orders placed per year, average annual ordering cost, average annual inventory carrying cost, total cost of inventory per annum.

Sol^n We have:

Demand (D) = 450 bicycles/month = $450 \frac{\text{bicycles}}{\text{month}} \times 2 \frac{\text{tyres}}{\text{bicycle}}$

= 900 tyres/month

= 12 × 900 tyres/year

Ordering cost (S) = Rs. 50 / sales
Annual holding cost (H) =
15% of cost per unit
= 0.15 × 20
Cost per unit (C) = 20

∴ i) EOQ = $\sqrt{\frac{2 \times 12 \times 900 \times 50}{0.15 \times 20}}$ = 600 units

ii) # of orders = $\frac{\text{Demand (D)}}{\text{EOQ}}$

= $\frac{12 \times 900}{600}$ = 18

iii) Average annual ordering cost
= # of orders × ordering cost
= 18 × 50 = 900

iv) Average annual inventory carry cost
= $\frac{Q}{2} \times H = \frac{600}{2} \times 0.15 \times 20$ = 900 Rs.

v) TIC = $DC + \frac{D}{Q} \times S + \frac{Q}{2} \times H$

= 12×900 × 20 + 900 + 600
= 2,17,500

Quantity discount mode

Steps
- Calculate the EOQ at different price level
- Decide the quantity to be purchased at each price level
  - Consider EOQ or min quantity to be ordered to avail discount and take whichever is higher.
- Calculate the total ~~annual~~ annual cost at different price level and EOQ.
- Select the optimal purchase quantity when annual total cost is min.

Q. A company has got a demand for a particular part at 1000 units per month. The cost per unit is Rs 50 and it costs Rs. 500 to place an order and to process the delivery. The inventory carrying costs at 20% of average inventory investment cost.

Supplier offered a discount proposal which says that
- if the quantity ordered per occasion is 2000, he will give Rs. 10 discount per piece, and
- if the quantity ordered per occasion is 5000 units, he will gives Rs. 20 per piece as discount.

Advise the optimum ordering quantity.

We have (without discount)

$D = 12 \times 1000$

$C_1 = Rs\ 50$

$S = Rs\ 500$

$H_1 = 0.20 \times 50 = Rs.\ 10$

With 2000 orders	With 5000 orders
$D_2 = 12 \times 2000$	$D_3 = 12 \times 5000$
$C_2 = Rs\ (50 - 10) = Rs\ 40$	$C_3 = Rs\ (50 - 20) = Rs.\ 30$
$S_2 = Rs\ 500$	$S = Rs\ 500$
$H_2 = 0.20 \times 40 = 8$	$H_3 = 0.2 \times 30 = Rs\ 6$

$\therefore EOQ_1 = \sqrt{\frac{2D_1S_1}{H_1}} = \sqrt{\frac{2 \times 12 \times 1000 \times 500}{10}} = 1096$ units

Accepted

$EOQ_{2000} = \sqrt{\frac{2D_2S_2}{H_2}} = \sqrt{\frac{2 \times 12 \times 2000 \times 500}{8}} = 1732$ units

$EOQ_{5000} = \sqrt{\frac{2D_3S_3}{H_3}} = \sqrt{\frac{2 \times 12 \times 5000 \times 500}{6}} = 3162$ units

$EOQ_2 = \sqrt{\frac{2 \times 12000 \times 500}{8}} = 1225$ units

↓

less than min requirement of 2000, hence higher value of 2000 is accepted.

$$EOQ_2 = \sqrt{\frac{2 \times 12000 \times 50}{6}} = 1414 \text{ units}$$

less than min requirement of 5000, hence higher value of 5000 accepted.

Then,

Annual cost$_1$ $(TC_1) = DC_1 + \frac{D}{Q_1} \times S + \frac{Q_1}{2} \times H_1$

$$12000 \times 50 + \frac{12000}{1096} \times 500 + \frac{1096}{2} \times 10$$

$$= \text{Rs. } 610955$$

$$TC_2 = 12000 \times 50 + \frac{12000}{2000} \times 500 + \frac{2000}{2} \times 10$$

$$=$$