TOPIC 1V

COST ACCUMULATION:

Material cost control

Inventory refers to stock that's maintained by the firm. Inventory is divided into 3 categories depending on the nature of the firm.

a) **Raw materials**

- Stock awaiting processing
- Such stock is in its basic/initial status and can only be utilized after it has been processed and converted into finished goods. Finished products of one firm may be raw materials of another firm e.g. whereas wheat flour is a finished product of a flour milling firm.
- It is a raw material as far as bakery is concerned.

b) **Work in progress**

This is in-completed goods in one process of a particular period.
Closing work in progress is the opening W-I-P in the next manufacturing period. Such w-i-p must be completed before processing of new output starts. Both raw materials and wip are mainly a characteristic of manufacturing firms.

c) **Finished products**

It refers to stock that is in its final stages a waiting selling. Most traders deal with finished stock and do not have the above two characteristics of inventory.

Objectives of stock/material control

1. Ensure that goods are readily available when required. This is important because unavailability of goods or raw materials may distort the operation of the firm. Lack of finished goods however means low sales hence low profit.

2. **Proper accounting of purchases**

Purchases are expenses incurred by the firm and comprise a big portion of the total cost of the firm. They however have to be accounted for to prevent unnecessary losses.

3. **Reduce storage cost**

Poor inventory control may result to excessive stocking of materials. The organization may incur a lot in terms of extra space that may be needed. Other expenses as staffing cost, insurance etc. would also be incurred.

4. **Minimize risk of deterioration and theft**

Poor control procedures could mean that the firm is not able to trace a number of stock items in store. This may lead to theft. Excessive stock will also lead to losses through physical deterioration.

5. **To avoid over/understocking**

Overstocking could lead to extra cost and understocking to shortages resulting to loss of

customers.

6. **Economy in purchasing**

Proper accounts of inventories lead to buying of materials at the right place, time and most favourable price. Quantity discounts are also given when goods are bought on large quantities.

Factors affecting stock levels

1. **Lead time period**

It's the period between the placement of requisition to the suppliers and receipts of goods ordered. The longer the lead time the higher the stock levels to be maintained and vice versa.

2. **Scarcity of materials**

When materials are scarce producers have to buy them in large quantities to ensure continuous production.

3. **Future expectation in price change**

When prices of materials are expected to change, producers are unwilling to maintain high stock levels.

4. **Demand of finished products**

When demand of products is high, stock levels of raw materials is usually high to ensure no stock outs of finished goods.

Essential requirements of a system of material control

Material control must ensure the following requirements are fully met.

1. There must be proper co-ordination and co-operation between various departments dealing with materials e.g. purchasing department, store department, receiving and inspecting department, accounting department etc.
2. There should be a central purchasing department under the control of competent and expert purchase manager.
3. There should be proper classification and coding of materials.
4. Material requirements should be properly planned.
5. Perpetual inventory control system should be operated so that upto date information is available about quantity of materials in store.
6. Storage of all materials should be well planned subject to adequate safeguarding and supervision.
7. Various stock levels e.g. minimum, maximum etc should be fixed for each item of the material.
8. Purchase of materials should be controlled through budgets.
9. There should be a regular reporting to management regarding stock issue and stock or raw materials.

SELECTIVE CONTROL TECHNIQUE (Pareto analysis)

It's a system where items are grouped into 3 categories.

A items

Are normally few in number but of high value in business compared to B and C items. A

company should ensure that these items are available all the time because of their contribution in the company.

B items

Are more than A items in number but of less value than A items. The company keeps items in order to support A items.

C items

Are many in number but of less value than B and A items.

A, B, C items (Always Better Control methods) (Accounting Based Costing).

Stock levels

In order to guard against under an over stocking most firms adopt scientific approach of fixing stock levels. These levels are maximum, minimum, re-order quantity etc.

By adhering to these levels such items of material will automatically be held within appropriate limits of control.

NB: these levels are not permanent and must be changed to suit changing circumstances e.g. changes will take place if consumption of materials is increased/decreased if more capital is available.

1. **Maximum stock level**

It's that level above which stock should not normally be allowed to rise.

The idea of settling maximum stock level is to ensure that capital is not unnecessarily blocked in stocks and to avoid losses due to obsolescence and deterioration.

This level may however be exceeded in certain cases when unusually favourable purchasing condition arise.

Maximum stock level = re-order level + Re-order quantity –

Factors taken into account when setting this level

i. Rate of consumption of materials
ii. Risk of obsolescence and deterioration
iii. Storage space available
iv. Cost of storage and insurance
v. Availability of funds needed.

2. **MINIMUM STOCK LEVEL**

It's the level below which stock should not normally be allowed to fall.

This is essentially a safety stock and is not usually touched. In case of stock falling below this level there is a risk of stoppage in production and thus top priority should be given to acquisition of fresh.

Minimum stock level = Re-order level – (Normal consumption x Normal re-order period).

In fixing this level the following factors are considered:

Rate of consumption
Time required to acquire fresh supplies. This level is fixed somewhere that there is not stoppage in production.

3. Re-order level

It's that level of materials at which purchase requisition is initiated for fresh supplies. It's fixed somewhere between maximum and minimum stock levels.
Re-order level = Maximum consumption x Maximum re-order period

The following factors are considered in fixing this level:

i. Rates of consumption of materials.
ii. Minimum stock level
iii. Lead time i.e. time normally taken from time of initiating purchase requisition to the receipts of materials.

4. Average stock level

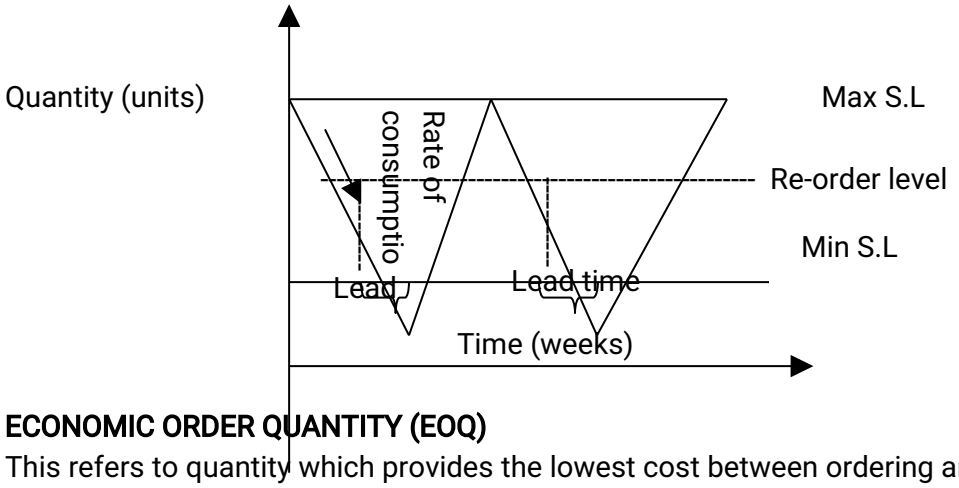
It's the stock level which a firm should operate at any given time. Has the average of minimum and maximum.

= ½ (Minimum stock level + Maximum stock level)

Minimum stock level + ½ (Re-order Quantity)

5. Danger level

It's generally below the minimum stock level. When stock level reaches danger level urgent action is needed for replenishment of stock level so that stoppage in production can be avoided. Purchasing materials on an urgent basis results to higher purchasing cost.



ECONOMIC ORDER QUANTITY (EOQ)

This refers to quantity which provides the lowest cost between ordering and holding cost.

The traditional model assumes

i. The rate of usage is constant throughout
ii. The order cost is constant per order.
iii. Holding cost per unit time is constant.
iv. Stock out doesn't happen in the company.
v. Purchase price for units is constant, since it's not affected by discounts.
vi. Demand per year is constant and known.
vii. EOQ shall be the same throughout and shall be ordered in the time when quantity held is zero.

The average stock held by the firm is given by: $\frac{1}{2}$ Q

If H is the cost of holding a single unit per time period then the holding cost will be given by

$\frac{1}{2}$QH

The number of orders will be given by the total amounts demanded divided by the quantity we order each time.

Number of orders = $\frac{\text{Demand}}{\text{EOQ}}$

If a C is the cost per order then the cost of ordering will be given by:

$\frac{D}{EOQ} \times C$ i.e. our EOQ $\frac{}{H}$

Example

A company uses 5000 pieces of raw materials per annum, the cost of each being shs 20, the cost per order is shs 80 and the cost of storage is 10% of the value of the item. Calculate EOQ and the total cost of stock.

EOQ = $\frac{}{H}$ EOQ = $\frac{}{2}$ = 632.46 EOQ = 632

D = 5000
C= 80
H = 10% 20 =2

Holding cost

$\frac{1}{2}$ x 632 x 2 = 632

Total cost = holding cost + ordering cost

$\frac{1}{2}$ QH + $\frac{D}{Q}$ x C $\frac{1}{2}$ x 632 x 2 + $\frac{5000}{632}$ x 80 632 + 632.9 = 1264

Example 2

ABC requires 2000 units of a component in its manufacturing process in the coming year. The unit cost is shs 50 and cost of each order is shs 50 and holding cost is shs 15 per year + 10% opportunity cost.

Required:

i) Economic order quantity and total relevant cost.

$$EOQ = \sqrt{\frac{2DC}{H}} = \sqrt{\frac{2000}{20}} \quad EOQ = 100$$

D = 2000

C = 50

H = 15 + 10% x 50 = 20

Total relevant cost = Holding cost + Ordering cost

$\frac{1}{2}$ QH + $\frac{D}{}$ x C $\quad \frac{1}{2}$ x 100 x 20 + $\frac{2000}{100}$ x 50 $\quad$ 1000 + 1000 = 2000

Total cost = shs 2000

Example 3

Bidii enterprise is located in Kariobangi light industry in Nairobi. The company manufactures a product comex which is used in building industries. The main raw material used in the manufacture is material B42. The following information relates to the material, annual requirements 144,000 Ordering cost 12500 per order, annual holding cost 20% of purchase price, purchase price per unit 500, no safety stock requirement .

Required:

a) EOQ
b) Number of orders needed per year
c) Cost of holding and ordering B42 per year.

a) $EOQ = \sqrt{\frac{2DC}{H}} = \sqrt{\frac{144000}{100}} \quad EOQ = 6000$

D = 144000

C = 12500

H = 20% 500 = 100

b) No of orders = $\frac{\text{Demand}}{\text{EOQ}} \quad \frac{144,000}{6000} = 24$

C) Holding cost $\frac{1}{2}$ QH = $\frac{1}{2}$ x 6000 x 100 = 300,000

Ordering cost $\frac{D}{}$ x C = $\frac{144,000}{}$ x 12500 = 300,000

Q 6000

Total cost = 300,000 + 300,000 = 600,000

Example 4

The following information relates to the usage of a certain product regarding purchase and carrying cost for raw materials.

Annual usage 800,000 units

Purchase cost per unit shs 80

Carrying cost is 5% of inventory value.

Currently the company applies a policy of purchasing 80,000 units per order. The cost of making/placing an order is 4000.

EOQ = $\sqrt{\frac{2DC}{H}}$ EOQ = $\sqrt{\frac{2 \times 800{,}000 \times 4000}{40{,}000}}$ = 40,000

D = 800,000

C = 80

H = 5% 800,000 = 40,000

Total cost = 800,000 x 80 + ½ x 40,000 x 4 + $\frac{800{,}000}{40{,}000}$ x 4000 = 64160,000

T.C = 800,000 x 80 + ½ x 80,000 x 4 + $\frac{800{,}000}{80{,}000}$ x 4000 = 64200,000

Savings = 64200,000 – 64160,000 = shs 40,000

The following information relates to soluble cutting compounds

i) Normal daily requirement 600 litres.
ii) Maximum daily requirement 800 litres.
iii) Minimum daily requirement 400 litres.
iv) Time to get fresh supplies 2-6 days.
v) Order quantity 1000 litres.

Required

i) Re-order level
ii) Minimum stock level
iii) Maximum stock level
iv) Average stock level

i) Re –order level = maximum consumption x maximum re-order period
800 litres x 6 = 4800

ii) Minimum stock level

Re – order - (Normal consumption x Normal re-order period)

4800 – (600 x 4) 4800 – 3200 = 1600

iii) Maximum stock level

Re-order level + Re-order Quantity – (Minimum consumption x Minimum re-order period)

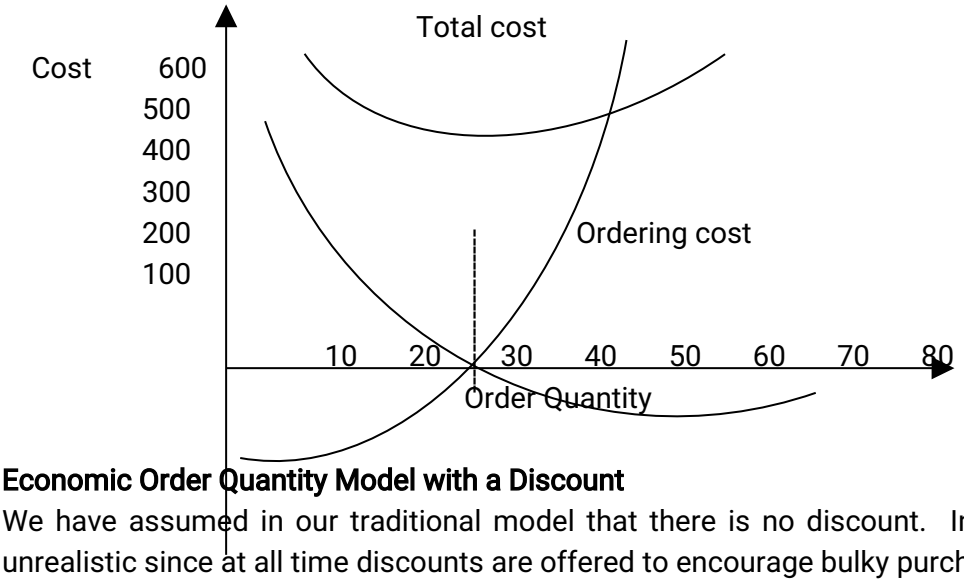
4800 + 400 – (400 x 2) = 4400

iv) Average stock level

½ (minimum stock level + Maximum stock level

½ (400 +800) = ½ x 1200 = 600

Economic Order Quantity graph (EOG)



Economic Order Quantity Model with a Discount

We have assumed in our traditional model that there is no discount. In practice this is very unrealistic since at all time discounts are offered to encourage bulky purchases.

The discount will reduce cost of purchasing; this should be incorporated in our calculations. If we incorporate it into our calculations it becomes more complicated and hence we go for a similar approach where we consider the total cost associated with basic economic order quantity mode and compare this cost with cost at each discount point.

The one that minimizes the total cost is the best quantity to order.

Costs involved

The discounts offered for quantity purchases have a financial effect to our firm in that the average stock held increase while at the same time the number of orders decreases.

This implies that the holding cost increase while ordering cost decrease.

At a higher quantity the purchase price will decrease by amount of discount thereby benefiting

the firm. A cost based analysis is used to decide the best order quantity.

Example

A company uses a special component in its manufacturing which it orders from outside suppliers. The following data is provided.

i) Annual demand is 2000 units p.a
ii) Ordering cost is 20% per order
iii) Carrying cost is 20% of item price
iv) Item price is shs 10 per unit

The company is offered the following discounts

400 - 799 2%
800 - 1599 4%
1600 above 5%

Required:

a) Establish the most Economic Order Quantity

Steps:

i) Establish economic order quantity using the basic item price
ii) Compare savings/losses from lower price with cost associated with the basic economic order quantity.
iii) For the level with economic order quantity we shall take the EOQ.
iv) If EOQ is less we take the lowest in the level. If the EOQ is higher we take the highest in the level.

$$EOQ = \sqrt{\frac{2DC}{H}} = \sqrt{\frac{2 \times 2000 \times 20}{20\% \times 10}} = 200$$

Order quantity	Holding cost ½ QH	Ordering cost $^{P}/_{Q} \times C$	Purchase price No of order x Cost	Total ½ QH+$^{P}/_{Q}$ x C + P.C
EOQ 200	½ x200x2=200	2000/200 x20=200	2000x10=20,000	20400
400	½ x400x20%x98%x10=392	2000/400 x20=100	2000x98%10=19600	20092
1800	½ x800x20%x96%x10=768	2000/800 x20=50	2000x96%10=19200	20018
1600	½ x1600x20%x95%x10=1520	2000/200 x20=25	2000x95%10=19000	20545

1600

Best quantity to order is 800 with a minimum total cost of shs 20018. It's therefore the most economic order quantity.

Question

A company consumes 60,000 sacks of maize in its milling production unit's p.a. Each sack cost shs 900, ordering cost is shs 2000 per order whereas maintenance cost is 20% of its value of sack per year. The supplier provides the following discounts for range of purchase as indicated below.

2000-3999 2%

4000-4999 6%

Required

a) Optimal quantity to order

$$EOQ = \frac{}{H} = \frac{}{180} = 1155$$

D = 60,000

C = 2000

H =20%x900=180

Order quantity	Holding cost	Ordering cost	Purchase price	Total cost
775	½ x1155x180=103950	60,000/1155 x2000=200	60,000x900=54000,000	= 54207846
400	½ x2000x20%x98% 900=176400	60,000/2000 x2000=60,000	60,000x98%900=52920000	=53156400
4000	½ x4000x20%x94%900=338400	60,000/4000 x2000=30,00	60,000x94%900=50760,000	=51128400

Optimal quantity to order is 4000 with a minimum total cost of 51,128,400

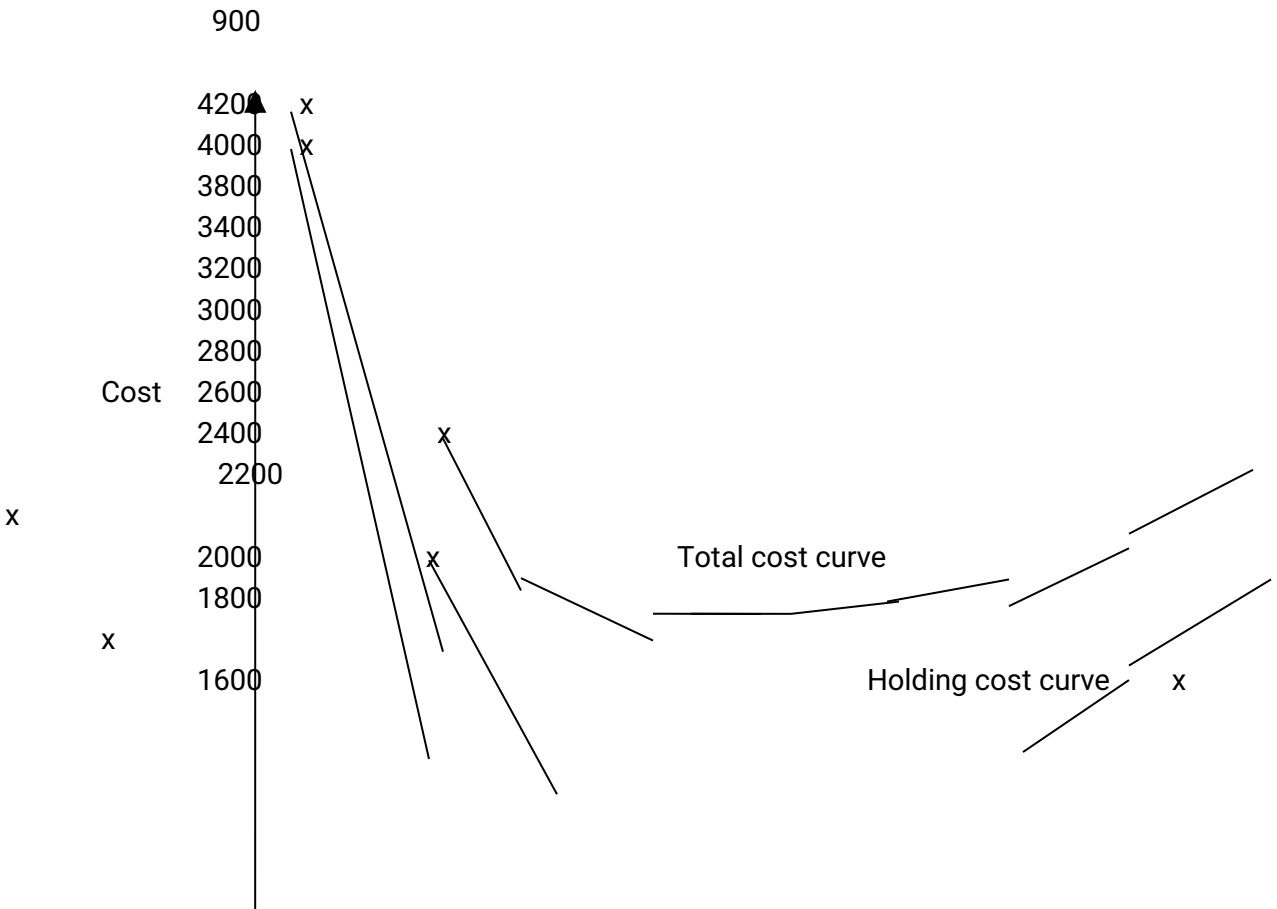
Question

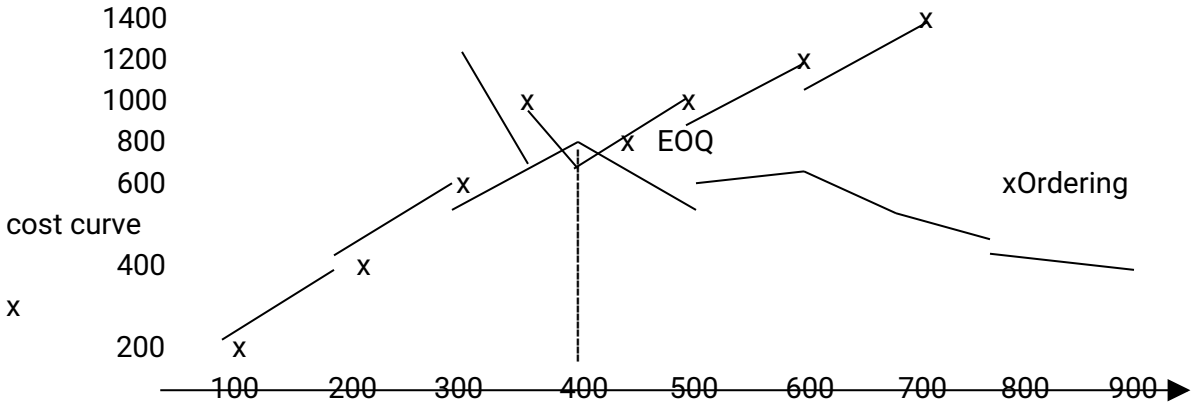
A company uses 5000 pieces of raw materials p.a. The cost of each being 20 the ordering cost is shs 80 while retention cost is 20% of value of item.

$$EOQ = \frac{}{H} = \frac{}{20\%x20}$$

Order quantity	Holding cost	Ordering cost	Total cost
100	½ x100x4=200	5000 x80=4000	4200

		100		
200	½ x300x4=400		5000 x80=2000	2400
		200		
300	½ x400x4=800	5000x80=1333	1933	
		300		
400	½ x500x4=800		5000x80=1000	1800
		400		
500	½ x500x4=1000	5000x80=800	1800	
		500		
600	½ x600x4=1200	5000x80=667	1867	
		600		
700	½ x700x4=1400	5000x80=571	1971	
		700		
800	½ x800x4=1600	5000x80=500	2100	
		800		
900	½ x900x4=1800	5000x80=444	2244	





Material Requirement planning

The basic EOQ model assumes that quantity required can be calculated in isolation from other things of the company. Material requirement planning incorporates the relationship between sales, production and material liquidation therefore it's an overall planning method that ensures the amount of stock for sale is available for the period.

The production is completed with necessary requirements in place and material used is sufficient.

Methods of valuing materials

There are various methods used to value material issues to production department or when it's sold. This includes:

i) FIFO (First in First Out)
ii) LIFO (Last in First Out)
iii) Simple average method
iv) Simple weighted Average method
v) Highest in First Out method (HIFO)
vi) Next in First Out(NIFO)
vii) Periodic simple average method
viii) Periodic weighted Average method