

ACCA F2

MANAGEMENT ACCOUNTING

Study Notes

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Cost Classification

Cost Accounting:

"Cost accounting involves applying a set of principles, method and techniques to determine and analyse costs within the separate units of a business".

This involves:

The establishment of budgets, standards costs and actual costs of operations, processes, activities or products and the analysis of variances, profitability or the social use of funds.

Cost:

"All expenses carried out to make one unit of a product is called a cost of that unit".

Cost Unit:

"A unit of product with which cost is attached".

Examples: Marker, Bike, Watch, etc.

Cost Per Unit:

"Cost of one unit of a product is called cost per unit".

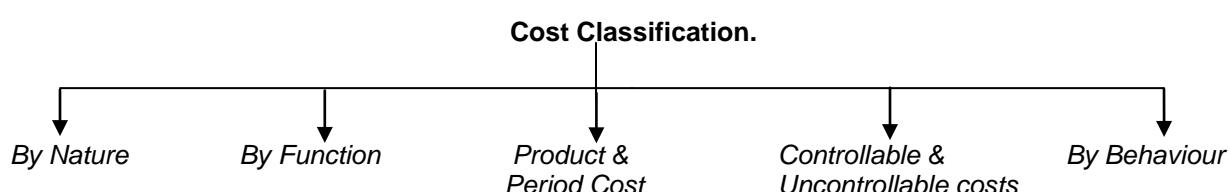
Cost Center:

"A cost center is a production or service location, function, activity or item of equipment for which costs are accumulated and analyzed".

Examples: Production department, Administration department, marketing, etc

Cost Object:

"A cost object is any activity or item for which a separate measurement of cost is desired". It could be a cost unit or cost center.



The aim of cost classification is to find the costs incurred in the production of a cost unit. This is important for a number of reasons:

- **Setting the selling price** (so that costs can be covered and a profit can be earned)
- **Decision making** (for example if a company is selling two products and has to make a decision to stop selling one of them, it will decide by determining which of the product is making less profit; which of course is determined after finding the cost).
- **Planning** future activities (as a company has limited resources, the planning is done after determining costs)
- **Control** of resources and cost of production (by comparing actual costs with planned costs we can investigate the reasons for variances)

- **Reporting** the results of the business (costs can only be reported if they are known as it will have an effect on the value of stocks/shares of company etc.)
- **Budgeting**(for the upcoming period)
- ✓ **By Nature:** *Cost has three elements by nature, which is Materials, Labour and Expense.*
The cost is further divided into direct and indirect cost.

Direct cost:

"A cost that can be directly identifiable with a specific cost unit or cost center is called direct cost".

Examples: Material used in production, Worker paid for making units, etc.

Indirect cost:

"A cost that cannot be directly identifiable with a specific cost unit or cost center is called indirect cost".

It is jointly incurred and must be shared out on an equitable basis.

Examples: Salaries, Rent of the building, etc.

- **Direct Material:**
 - Directly and easily associated/ related with a product.
 - Traceable to a specific cost unit or cost center
 - Form major part of the product.

Examples:

	<i>Chair.</i>		<i>Shirt.</i>
<i>Direct</i>		<i>Indirect</i>	
Wood		Nail	
Iron		Glue	
Foam		Paint	
Fabric		Polish	
Spring			Special buttons

- **Direct Labour:**

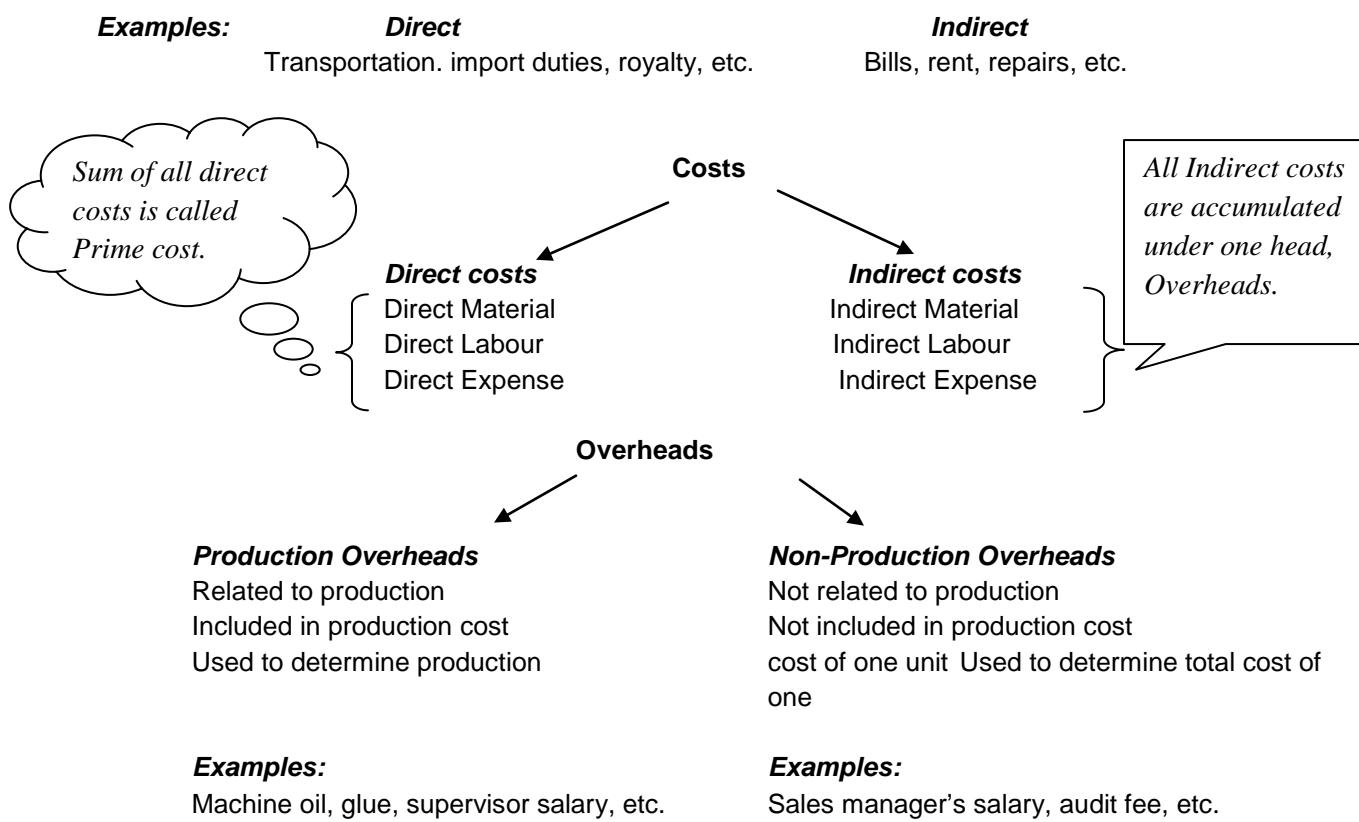
- Directly and easily associated/ related with a product.
- Traceable to a specific cost unit or cost center.
- Directly involved in making a product.

Examples:

<i>Direct</i>	<i>Indirect</i>
Carpenter	Salaries of all managers and other staff.
Machine operator	
Accountants in firm, etc.	

- **Direct Expense:**

- Directly and easily associated/ related with a product.
- Traceable with a specific cost unit or cost center.
- Incurred to bring raw material from point of purchase to company premises.

**Formulae:**

Prime Cost	=	Direct Material +	Direct Labour + Direct Expense.
Production Cost	=	Prime cost +	Production Overheads.
Total Cost	=	Production Cost +	Non-Production Overheads.
Conversion Cost	=	Direct Labour +	Direct Expense + Production Overheads.

✓ **By Function:****Function:**

"All activities and operations of the company are called functions".

In this classification we classify cost as per activity, operation, product, individual segment, division, department, etc.

Examples:**1. Production / Manufacturing Costs**

- Cost incurred in making the goods. There are three main elements of production costs
- Cost of Material
 - Cost of Labour
 - Cost of Expenses

2. Selling cost

It is an indirect cost incurred in promoting sales and retaining customers.

- Advertising cost
- Sales promotion

- Printing of catalogues and price list
- Salaries and commissions of salesmen
- Sales department's costs like staff, rent, rates and insurance of showroom
- Bad debts
- Cost of free samples to customers

3. Distribution cost

It is an indirect cost incurred in making the packed product ready for dispatch and delivering it to customers

- Packing cost
- Wages of packing staff, drivers, dispatch clerks
- Rent and rates, insurance and depreciation of finished goods warehouse
- Cost of delivery of finished goods

4. Administration Costs

- Office Cost
- General manager's salary
- Accountant's salary
- Auditor's fees
- Telephone and Postage costs
- Depreciation of Office Building and Equipment

5. Financial Costs

Cost incurred for the arrangement of funds either through Bank or a financial institution

- Interest paid on loans

6. Research Costs

Cost incurred before making a product like research work

Important: Functional classification may have more heads, depending on the size and number of activities of an organization

Uses:

- Cost control
- Inventory Valuation
- Financial Statements, etc.

✓ Product & Period Costs:

Product Costs:

"Cost of making or buying an item of inventory is called product cost".

Examples: Materials, Labour, Expenses.

Period Costs:

"A cost that does not change, which remains fixed. It relates to the passage of time rather than the output of individual product or service is called period cost".

Examples: Salaries, Rent of the building, etc.

Uses:

- Cost control
- Inventory valuation
- Absorption & Marginal costing, etc.

✓ Controllable & Uncontrollable Costs:

Normally all the cost incurred by an organisation are controllable for management. But some costs are uncontrollable for a particular manager.

Controllable:

"Costs which can be controlled by the manager are called controllable costs."

Examples: Material used for production, labour paid to production workers, etc.

Uncontrollable:

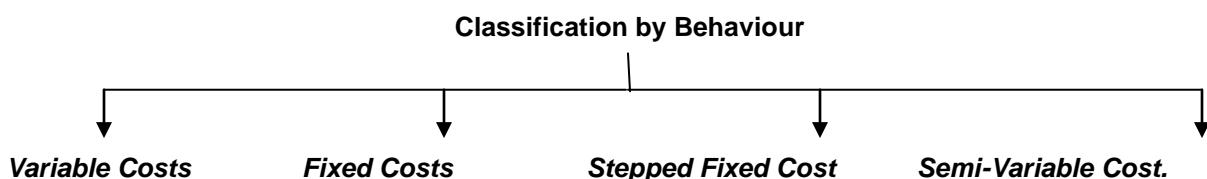
"Costs which cannot be controlled by the manager are called uncontrollable costs."

Example: Share in the rental cost of the building, share in the organisation's bills, etc.

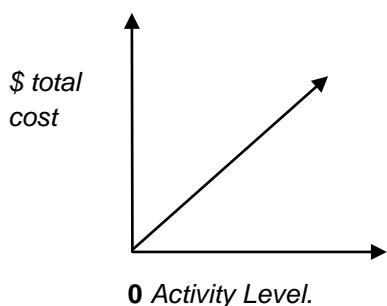
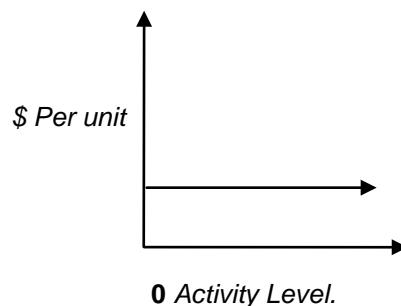
✓ By Behaviour:

In the cost behavior we will see the effect on costs with the change in activity level.

Activity Level: *"The amount of work done or the volume of production is called activity level".*

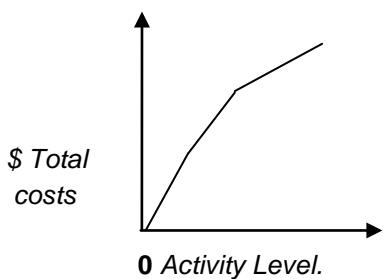
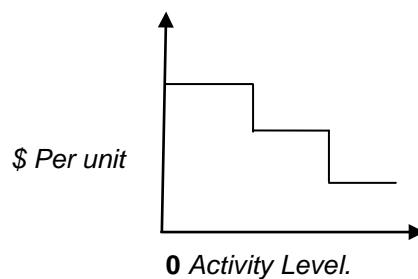


- **Variable Cost:** *"A cost that varies in total with the change in activity level but remains constant in per unit is called variable costs". Examples: Material purchased, worker paid per unit, royalty paid per unit, etc.*

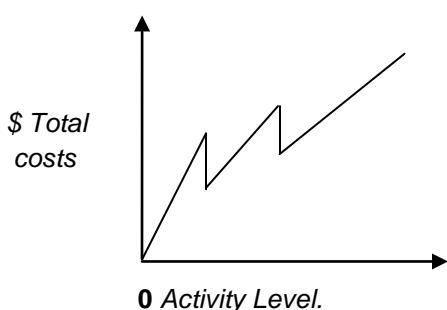
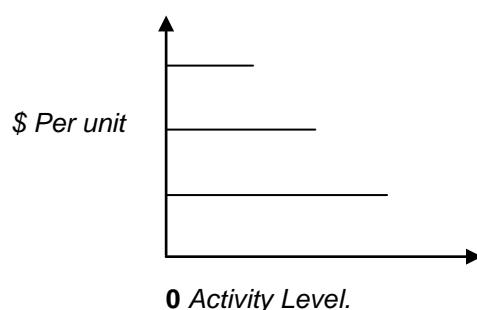
Charts: In Total:**In per unit:**

In case of discounts:

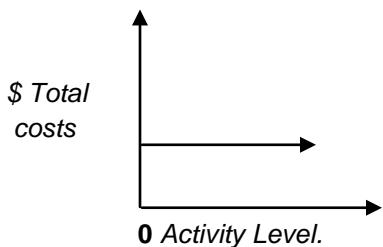
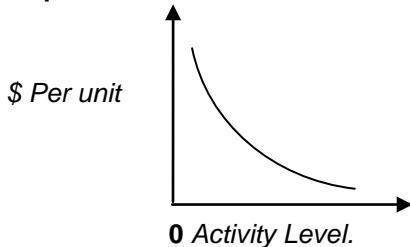
- **If discount is applicable on only excess units:**

In Total:**In per unit:**

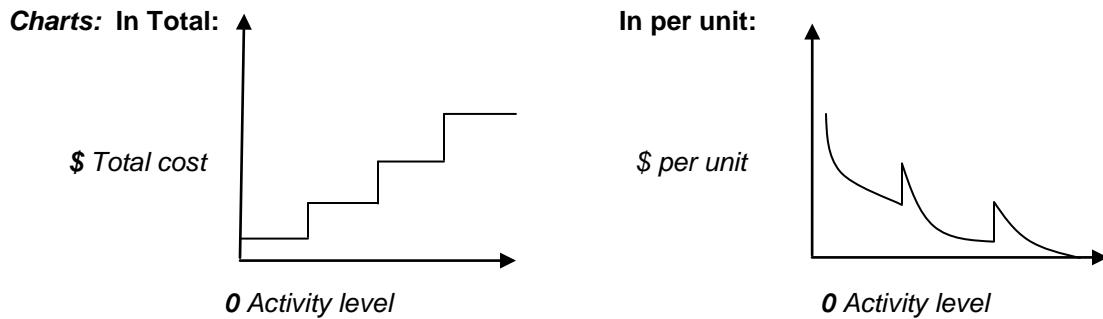
- **If discount is applicable on all units:**

In Total:**In per unit:**

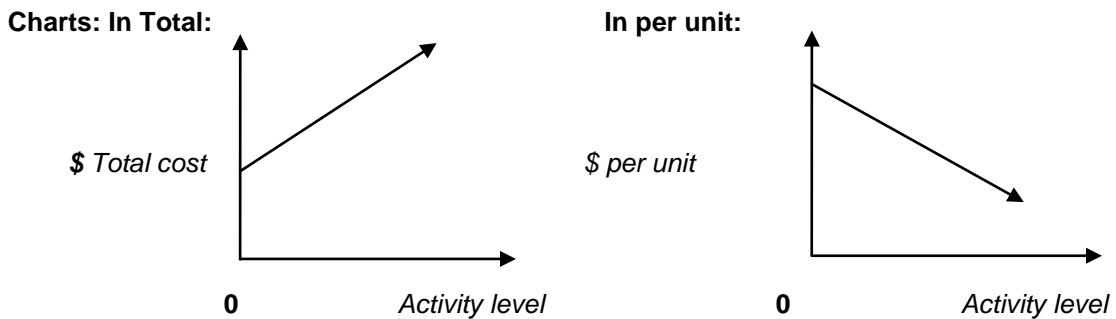
- **Fixed Costs:** "A cost that remains fix in total with the change in activity level (with a specific range) but changes in per unit is called fixed cost". Fixed cost does not depend on the activity level, it relates with the passage of time. **Examples:** Rent, Salaries, Straight line depreciation, etc.

Charts: In Total:**In per unit:**

- **Stepped Fixed Cost:** "A cost that fix for a certain level of activity, will increase and will then remain fix again until another level of production is called stepped fixed cost". **Examples:** Store rent, Supervisor's salaries, Tyre replacement, Oil change cost, etc.



- **Mixed Cost/ Semi-Variable/Semi-Fixed Cost:** “A cost which has both elements fixed and variable is called semi-variable cost”. **Examples:** bills, guaranteed wage, cost of running car, etc.



HIGH-LOW METHOD

This a method used to determine fixed and variable elements of mixed cost. It relies on the assumption that mixed costs are linear.

APPLYING HIGH LOW METHOD

This method consists of selecting the periods of highest and lowest activity levels and comparing the changes in costs that result from two levels. Application of the method requires the following steps:

1. Identify two different levels of activities: the highest and the lowest level of activities and the corresponding costs.
2. Find the variable cost per unit by

$$\frac{\text{Total costs at highest activity level} - \text{Total costs at lowest activity level}}{\text{Total units at highest activity level} - \text{Total units at lowest activity level}}$$
3. Compare the variable cost with the total costs at either the lowest activity level or highest activity level to compute the total fixed cost.

$$\boxed{\text{Total costs at highest activity level} - (\text{Total units at highest level} \times \text{Variable cost per unit})}$$

OR

$$\boxed{\text{Total costs at lowest activity level} - (\text{Total units at lowest level} \times \text{Variable cost per unit})}$$

4. Form the equation

Total Cost = Total Fixed Cost + Total Variable cost

Total Cost = Total Fixed Cost + (Variable cost per unit × Number of Units)

$$Y = a + bx$$

Where, Y is the dependent variable i.e. the total cost for the period at activity level of X

x is the independent variable, i.e. the activity level

a is the constant, i.e. the total fixed cost for the period

b is also a constant, i.e. the variable cost per unit of activity

- **High low method with stepped fixed cost:** Sometimes fixed costs are only fixed within certain level of activity and increase in steps as activity increases. High-Low method can still be used to estimate fixed and variable costs by making an adjustment, **keeping fixed cost equal at both levels.**
- **High low method with the change in variable cost per unit:** Sometimes there may be changes in the variable cost per unit. High-Low method can still be used to determine the fixed and variable elements of semi-variable cost by making an adjustment, **keeping variable cost per constant at both levels.** The variable cost per unit may change because: Availability of discounts, Inflation, etc.

ADVANTAGES AND DISADVANTAGES OF HIGH LOW METHOD

Advantages of high – low method:

- It is easy to use and understand
- It needs just two activity levels (highest and lowest)

Disadvantages of high – low method:

- It considers two extreme points which may be representative of normal conditions
- Based on two points so formula is not very accurate.
- Based on historical data.

Material

Materials can be divided into the following categories:

Direct Material:

The material, which can be directly and easily associated / related with a particular unit of product / service and it, is economically feasible to trace it in the product. It becomes a major part of finished goods.

Examples: wood for a table, cloth for a shirt, papers for a book, etc.

Indirect Material:

Materials that are cannot be directly traceable or identifiable. It will not become a major part of product.

Examples: cleaning materials, lubricants, nails, glue, buttons, etc.

Inventory has three types:

Raw material: is the good purchased to be incorporating into products for sale.

Work in progress: Represents an intermediate stage of material between the manufacturer purchasing the raw material for further processing and the finished product.

Finished goods: is a product ready for sale or dispatch.

The Storage of Raw Materials

The objective of storekeeping:

- Speedy issue and receipt of materials
- Full identification of all materials at all times
- Correct location of all materials at all times
- Protection of materials from damage and deterioration
- Provision of secure stores to avoid pilferage, theft and fire
- Efficient use of storage space
- Maintenance of correct stock levels
- Keeping correct and up to date records of receipts, issues and stock levels

The store department is responsible for:

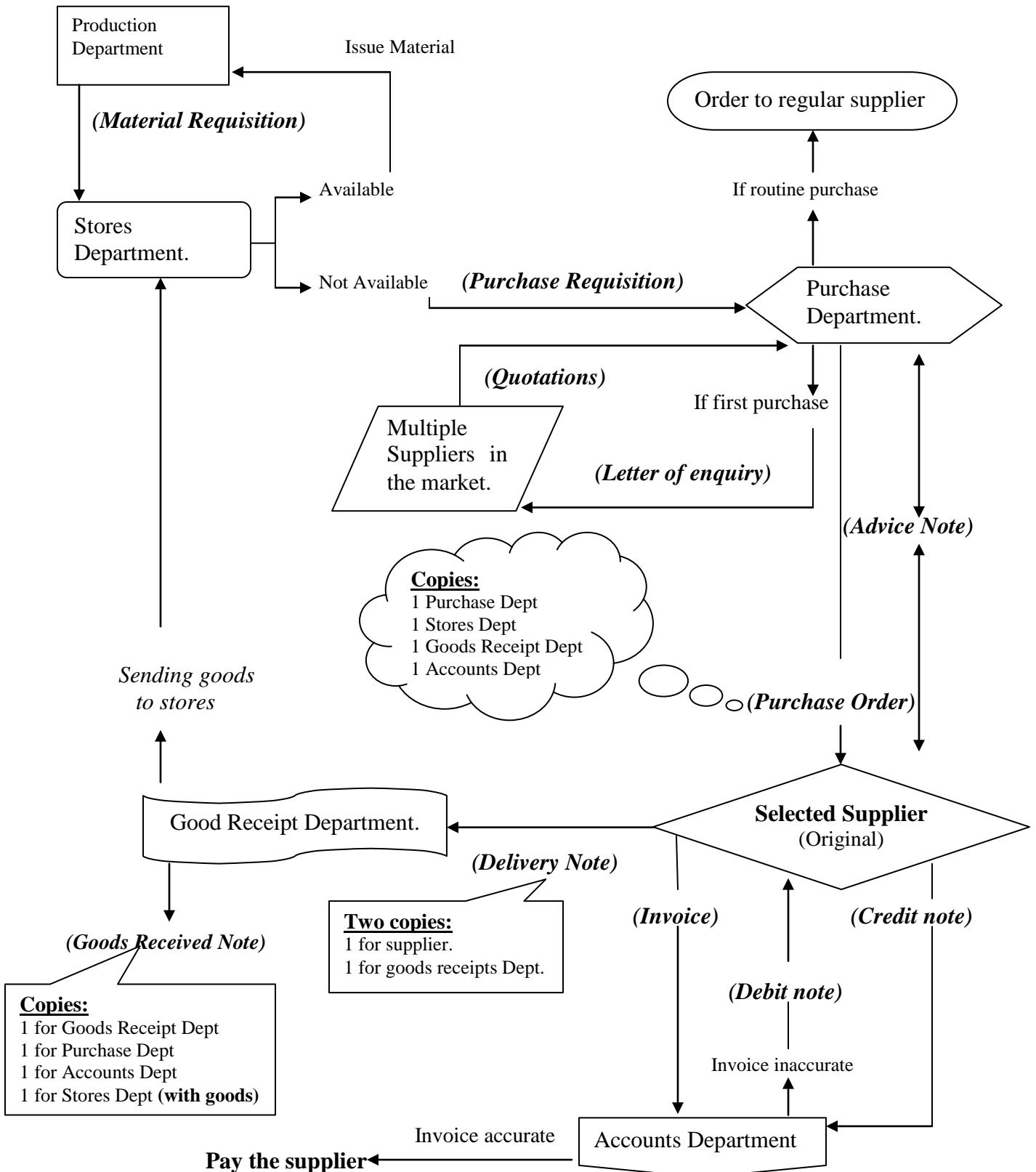
- Receipt of goods;
- Storage of materials;
- Issue of materials;
- Recording receipts and issues.

The Purchase of Raw Materials

Materials are purchased by companies for production and sales purpose. Purchase of material may be controlled by

- Purchasing only necessary items
- Orders to supplier after considering price & delivery issues;
- Goods received agreed with goods ordered in quantity and quality;
- Price paid is the price agreed when order was placed.

Purchase Cycle:



DOCUMENTS FOR BUYING MATERIALS

The documents involved in buying and selling are prime source of cost and revenue information. The following documents used in purchase of materials.

1. Purchase requisition

- Prepared and send by the storekeeper to purchase department for buying the goods when inventory level falls down to the Reorder level.
- Authorized by the supervisor of the stores or the departmental head who is responsible for department's budget.

2. Letter of Enquiry

- To determine the 'appropriate' supplier, the purchase department sends out a letter of enquiry (in case of new supplier) to various suppliers to find out about the price, delivery time, delivery charges, discounts, terms of payment etc.
- The suppliers will respond to the letter of enquiry with
 - **A catalogue and price list** (for standard goods),
 - **A quotation** (for non-standard goods) or
 - **An Estimate of cost** (for services such as building work and repair);

3. Purchase Order

- A purchase order is prepared by purchase department and send to the selected or existing supplier.
- It specifies the quantity, quality and the price of the goods that are to be bought.
- It is authorized by head of purchase department

Four Copies of the purchase order are sent to the following:

- (a) **The Purchase department** (To keep records)
- (b) **The accounts department** (so that when the goods are arrived and invoice has received. The invoice can be matched with the purchase order for price confirmation)
- (c) **The stores section** (for updating the stock records)
- (d) **The goods received section** (so that they can expect to get the goods by the date mentioned on the purchase order)

The original purchase order is send to the supplier.

4. Advice Note

- Advice note is an agreement which takes place as a result of trade with new supplier or change in terms and conditions of the trade with the supplier to avoid future disruptions.
- Confirmation of purchase order is also done with the sign of this agreement for the supplier.

5. Delivery Note

- Supplier sends delivery note to the customer with the goods.
- The delivery note has **two copies. Both are signed by buyer**.
- One copy is **retained by buyer** for documentation and the other copy is taken **back to the supplier** by the driver to confirm the supplier that the goods have been delivered to the right buyer.

Important: If the supplier does not use his own transport, the **consignment note** will provide the same evidence as the delivery note.

6. Goods Received Note (GRN) (internal document)

- When the goods have been received at the goods received section, a good received note is

- prepared and sent to the other departments so that they know that the goods have arrived.
- **Four Copies** of the good received note are sent to the following departments:
 - (a) **The accounts department** (to check against the invoice and purchase order for quantity confirmation)
 - (b) **The stores section** (for updating stock records)
 - (c) **The purchase department** (to confirm that the goods have arrived)
 - (d) **The goods received section** (will keep a copy in its records)

7. Invoice

- The supplier's sales department will send the invoice to the buyer's accounts department detailing the amount that the company has to pay to the supplier.
- The buying company should **check the invoice** carefully to check the following:
 - That the supplier has only charged for the goods which has been received (**check Good received note for quantity**).
 - That the price and terms are as agreed (**look at the purchase order to check price**).
 - That the calculations on the invoice are correct (**including VAT**)
- If the invoice is correct, an entry is passed in the purchase ledger. The purchase is then recorded in the accounts and the invoice is paid.

8. Credit Note

If the invoice sent by the supplier has any errors, a debit note is send to supplier by the accounts department, and then the supplier will send a credit note (which in effect reverses the invoice).

- A credit note may be issued for the whole of the invoice instead of for the incorrect amount only so this way both the supplier and the company can remove the incorrect invoice from their books and replace it with the correct invoice.
- Accounts department of buyer authorises it to make payment against it.

Important: Two types of discounts may be offered by the suppliers:

- (a) Trade discount: usually given for larger orders. ***Is shown as a deduction in the invoice***
- (b) Cash discount/Settlement discount: usually given for prompt/immediate payment within a specified period of time. ***It is NOT shown as a deduction on the invoice.***
 - If VAT is payable, discounts are deducted from the cost of the goods and THEN VAT is calculated and added to the invoice. (i.e. the amount net of VAT is coded)

OTHER DOCUMENTS USED IN AN ORGANIZATION

1. **Store or material requisition:** A material requisition will be completed when materials are needed from stores by the production department. An officer from production will sign to authorise it, and stores will issue the materials when the requisition is given to them. It is then used as a source document for:
 - (a) Updating the bin card in stores;
 - (b) Updating the stores ledger account in the costing department; and
 - (c) Charging the job, overhead or department that is using the materials.
2. **Goods or material return note:** A materials return note will accompany any unused material back to stores. In effect this document is reverse of a material requisition and therefore it must contain all the information that is present on material requisition and will be used as the source document to update the same records. This time though the material will be a receipt into stock and a deduction from the job originally charged with the material issued.

- 3. Materials transfers and returns:** A material transfer note is usually raised when material issued to one department is transferred to another department directly. This note shows the name of both, transferor and transferee departments. This process enables stock ledger accountant to appropriately allocate the cost between two departments.

DOCUMENTS FOR RECORDING MATERIAL

An important item purchased by manufacturing business is materials. These are kept in warehouses or in stores. Two types of stock records that are used:

1. Bin Card

- It is maintained by stores department (can be manual or computerised).
- It records the quantity of material and its description (name, stock code, stock unit, bin number, references of the documents used in stock issues, receives and returns).
- Balance of the quantity of stock on hand after each stock movement.
- BIN CARDS DO NOT HAVE THE AMOUNT/COST OF STOCK.

2. Stock Ledger Account

- It is maintained by accounts department (can be manual or computerized) and this would enable the amount of free stock to be monitored.
- Stock ledger accounts carry all the information that is in bin cards such as goods received note, material requisition, material return note details etc but **they also have the value/cost of stock units**. This means that total cost of each issue, receipt and that of the balance amount is shown in the store ledger accounts.

BIN cards are kept in the store but the store ledger accounts are kept in the costing/accounts department or a separate stores office where a cost bookkeeping clerk maintains them.

Important: Bin cards and store ledger accounts are kept by separate departments so comparing them to check if the quantity of stock shown by each match can be a good control to ensure that the records are correct.

Computerized inventory control system:

Now days many inventory control systems are computerised.

Features of computerised inventory control systems:

- a) **Data must be inputted into the system:** For example details relating to receiving goods may be entered directly to the computer and after that goods received note will be printed & signed as evidence of the transaction. Some systems may be devices such as bar code reader.
- b) **Inventory master file is maintained:** This file contains details of every type of inventory and frequently updated as defined by the company. It also contains details of inventory movement (receipt, issue or return) over a period but this will depend on the type of system used.

Two types of systems are generally used for recording inventory movement:

1. Batch systems:

Transactions relating to a certain defined period are grouped separately and then master file is updated only.

2. On line systems:

Each transaction may be input to the master file directly. In this system inventory records are continuously updated which will help in monitoring & controlling inventory. (The system may

generate purchase orders automatically once the quantity in stock has fallen to reorder level)

- c) **System will generate outputs:** Outputs can be generated in any form depending upon users
 - 1) **Hard copy** (like GRN)
 - 2) **Visual display unit** (like current inventory level or details about a particular transaction can be just viewed on screens).
 - 3) **Printed reports**

STOCKTAKING

- A stock taking is the counting and recording of the physical quantities of each item of stock at regular interval (monthly or annually) and the checking the balance against the stock record.
- If all receipts and issues of stocks are correctly recorded, then total quantity counted should agree with the balance in the bin card and stock ledger account.

There are two methods of stocktaking:

Periodic Stocktaking: All stocks are counted and updated on specific date periodically, usually at the end of the accounting period.

Perpetual and Continuous Stocktaking: All stocks are counted and updated after each transaction.

Valuable items are checked more frequently.

STOCK DISCREPANCY

The reasons for stock discrepancy (the difference between the physical and recorded quantity of stock) should be investigated.

Reasons for differences	Action taken
1. error in recording or calculating	correct the bin card
2. omission of goods received or issues	correct the bin card
3. stock store in wrong position	move back to correct place
4. goods may be stolen	review security system and goods written off as an expense

FREE STOCK

Free stock means what is really available for future use. When a material requisition from the production department is received at the store, it is important to ensure that only that stock is issued which is 'free' (that has not been already scheduled to be used in production or allocated to a job).

Free stock = Stock in hand + Stock on order (with supplier) – Reserved/scheduled stock.

ORDERING STOCKS

Some organizations place orders according to their plans of future production or sales.

For Retail Businesses

Order quantity = Sales requirements + Closing stock– Opening stock

For Manufacturing Businesses

Order quantity = Production requirements + Closing stock – Opening stock

Here Production units = Sales units + Closing stock – Opening stock

STOCK VALUATION METHODS

Pricing of Materials Issued: Materials are purchased in large quantities at different prices and issued to production in smaller lots. It is necessary to price the material requisitions so that the cost centres (and cost units) can be charged in a fair and consistent manner.

METHODS OF PRICING OF RAW MATERIALS:

1. FIFO (First in first out)
2. LIFO (Last in first out)
3. Weighted average (AVCO)
4. Periodic weighted average pricing method

1. First in First Out (FIFO) Method

- The earliest price of materials is used for each issue
- If prices are rising, issued price will be lower, vice versa
- Closing stock is valued at most recent prices

Advantages

- This method is adopted by most of the organisations as this method assumes the oldest receipts are issued first
- Issued prices are based on the prices actually paid for the stock
- Closing stock values are based on the most latest prices
- It is an acceptable method for companies act 1985, IAS 2, and for taxation purposes

Disadvantages

- It uses the older prices and this can affect the costing of worked done
- In time of rising prices FIFO value stock at out of date prices which lower the cost of sales figure thus increases the profit figure which is not prudent

2. Last In First Out (LIFO) Method

- The most recent price of materials is used for each issue
- If prices are rising, issued price will be higher, vice versa
- Closing stock is valued at the earliest prices

Advantages

- The value of closing stock is based on prices actually paid for the stock.
- Issues are valued at the most recent prices so it incorporates the prudence concept.

Disadvantages

- *It is less realistic than FIFO since it assumes that the most recent purchases will be issued before the older stock*
- *LIFO is unacceptable for the purpose of taxation and IAS 2*

3. Weighted Average Price Method

- Average price is calculated by dividing total cost by the total units.
- Average price is calculated before every issue.
- Issue price will be between FIFO & LIFO methods for example average price
- Closing stock valued at weighted average price

Advantages

- Since prices are averages, it recognises that issues from stock have equal value to the business and variation in these values are minimised
- The value of closing stock will be fairly close to latest price paid for purchases
- AVCO is an acceptable method for purpose IAS 2 and companies act 1985

Disadvantages

- Time consuming.
- It involves complex calculations
- The prices charged to the issues of stock will not agree to the price paid to purchase the stock

Example:

Bicycle Ltd receive 10 bicycles during January and issue 6 bicycle, details of which are as follows:

1 January receive 5 bicycles @ \$50 each

5 January issue 2 bicycles

10 January issues 1 bicycles

15 January receive 5 bicycle @ \$70 each

25 January issue 3 bikes

The value of 4 bicycles held as inventory at the end of January may be calculated as follows:

All issues of inventory will be assumed to carry the average cost of all purchases up to the date of the issue. Average cost will be calculated by dividing total units of inventory by the total cost till that date.

Date	Receipts			Issues			Balance		
	Units	\$/Units	\$ Total	Units	\$/Units	\$ Total	Units	\$/Units	\$ Total
1 Jan	5	50	250				5	50	250
5 Jan				2	50	100	3	50	150
10 Jan				1	50	50	2	50	100
15 Jan	5	70	350				5	70	350
	<i>Average Cost of Inventory</i>						7	64.286	450
25 Jan				3	64.286	192.858	4	64.286	257.144

As can be seen from above, AVCO method allocates cost on the average cost of purchases during the period. Average cost of inventory changes every time a purchase is made at a different price. Therefore, the average cost of inventory changed from \$50 to \$64.286 after the purchase on 15 Jan.

4. Periodic Weighted Average Pricing Method

$$\frac{\text{Cost of all receipts in the period} + \text{Cost of opening stock}}{\text{no of units received in the period} + \text{no of units of opening stock}} = \text{Periodic Average price per unit}$$

Comparison of FIFO, LIFO AND AVCO

- The values for AVCO lie between those for LIFO and FIFO. This should always occur because AVCO is an averaging method.
- Both LIFO and FIFO require records to be kept of each batch of purchases so that the appropriate price may be attached to each issue.
- Price fluctuations are smoothed out with the AVCO method which makes the data easier to use for decision-making, although the rounding of the unit value might cause some difficulties.
- Many management accountants would argue that LIFO provides more relevant information for decision-making because it uses the most up-to-date price.
- However LIFO may sometimes confuse managers, since the pricing method represents the opposite to what is happening in reality, that is, the items in store will probably be physically issued on a FIFO basis.
- The prices of receipts are rising during the month. Therefore the FIFO method, which prices issues at the older, lower prices, results in the highest value of closing inventory and the highest profit figure. The AVCO method produces results that lie between those for FIFO and LIFO.

STOCK CONTROL LEVELS

There are **three stock control levels** maintained for every proper stock control system. The main purpose is to ensure only the right quantity of stock is held, not over or under stocking.

- **Reorder Level:** It is also called replenishment order level. When stock reaches this level, it indicates that ordering of stock is necessary. At this level, even if usage is at maximum level and the lead-time is the longest, there will still be no stock-out situation.

$$\text{Reorder level} = \text{Maximum Usage} \times \text{Maximum lead time}$$

Lead time: Lead time is the time between placing the order and receiving the goods.

- **Maximum Level:** This identifies the maximum quantity of stock to keep. It avoids cost of over-stocking.

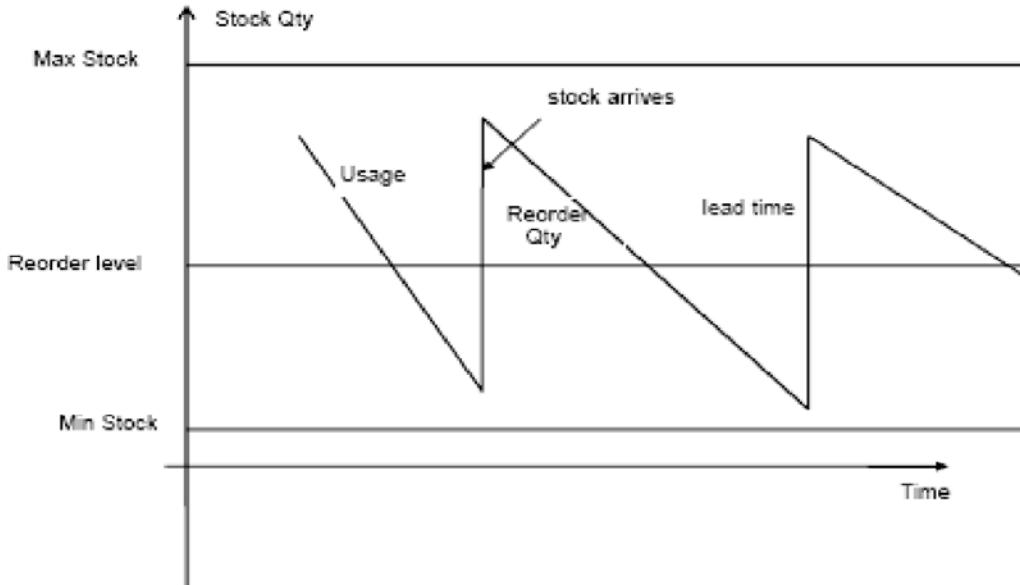
$$\text{Maximum level} = \text{Reorder level} + \text{Reorder quantity} - (\text{Minimum usage} \times \text{Minimum lead time})$$

Reorder quantity: Reorder quantity is the number of units of stock ordered each time when re-order level is reached. If it is set so as to minimize the total costs associated with holding and ordering stock, then it is known as EOQ.

- **Minimum Level:** This is the lowest quantity of stock that should be kept. This level warns the danger of stock-out. When stock reaches this level, emergency action will have to be taken to avoid stock-out.

$$\text{Minimum level} = \text{Reorder level} - (\text{Average usage} \times \text{Average lead time})$$

Note: Buffer Stock/Safety Stock will also be calculated using Minimum Level Formula.



It is also important to understand the concept of average stock for stock control purpose:

- **Average Stock:** Average stock is the average between the minimum stock level and the highest possible stock level.

$$\text{Average stock} = \text{Safety stock} + \frac{1}{2} \text{reorder quantity}$$

Safety stocks (or buffer stocks) are level of units maintained in case there is unexpected demand.

STOCK COSTS

Stock costs include purchase costs, holding costs, ordering costs and stock-out costs.

- **Stock-out cost:** If stock is kept too low, there is a risk of stock-out, for example production stoppage, loss of customer goodwill, loss of sales, labour idle time and extra cost for urgent re-orders.
- **Purchase cost:** The cost of buying the material. This is the largest cost faced by an organization and once purchased, stock has to be carefully controlled and checked. It can be reduced through availability of bulk purchase discounts.
- **Holding cost:** The costs incurred in keeping and storing stock, for example interest charges, insurances, electricity and water, storekeeper's wages and risk of obsolescence, pilferage and deterioration. A company has to make a balance between keeping the stock for production and having an amount of working capital tied up in stock. It can be reduced through ordering less quantity in an order. Reasons of holding stock are:
 - To ensure sufficient quantity is available to meet future demand.
 - To meet future shortage of required material.
 - To avail bulk purchase discounts.
 - To avoid blockage in production process.
 - To avoid stock-out costs.
- **Ordering cost:** The costs involved in ordering, receiving and paying for stock for example administrative costs for contacting supplier to place an order, transport costs, filing paper works, receiving goods, checking quantities and paying invoices. It can be reduced through ordering more quantity per order.

The cost should be considered when determining optimum stock level consists of holding costs and ordering costs. To maintain stock at optimum level and to minimise cost, the total costs of holding and ordering stock a company can

- Order in large quantity by placing a few orders
- Order in small quantity and placing many orders
- The aim of stock control is to minimize stock costs.

ECONOMIC ORDER QUANTITY (EOQ)

The Economic Order Quantity (EOQ) is the optimized order size/ quantity that will result in minimum total annual cost. In other words, it is the most economic stock replenishment order size which minimizes stock costs.

At EOQ: Total annual holding cost = Total annual ordering cost

Assumptions/Limitations of EOQ model

- Demand is constant throughout the year.
- Lead time is constant or zero (for example suppliers are reliable)
- Purchase price per unit is constant (for example no bulk discounts)
- Holding cost per unit will be constant per annum.
- Ordering cost per order will be constant
- No safety stock
- Average stock concept
- Ignore any uncertainty.

EOQ formula is

$$\text{EOQ} = \sqrt{\frac{2 \times C_o \times D}{C_h}}$$

Where,

C_o: cost of placing one order

D: expected annual sale (demand)

C_h: cost of holding one item of stock for one year

Total annual costs = Total annual purchase cost + Total annual ordering cost +Total annual holding cost

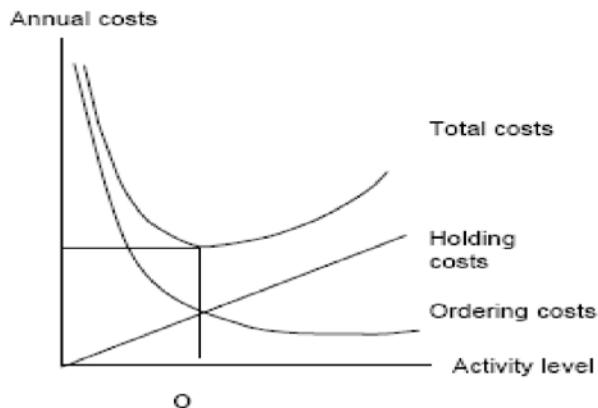
No. of orders = D/EOQ

Frequency of orders = EOQ/D x 365 (if required in days)

Annual ordering cost = No. of orders x C_o

Annual holding cost = (EOQ/2 + Safety stock) x C_h

Annual Purchase cost = D x Purchase Price

EOQ GRAPH

The total costs are at a minimum for an order quantity at point Q, which is EOQ.

It is also a point where the holding cost curve intersects with the ordering cost curve.

BULK PURCHASE / LARGE ORDER DISCOUNTS

Frequently, discount will be offered for ordering in large quantities. When bulk discounts are available we have two options; take advantage of discount by ordering a larger quantity or ignore the discount offer and go for economic order quantity. We take decision based on mathematical calculation.

We choose the option under which the sum of three costs; total purchase cost, total inventory holding cost and total inventory ordering cost, is minimised. The total cost under two options is compared at following level:

- Pre-discount EOQ level.
- Minimum order size to earn discount

If total cost is minimised at pre-EOQ level then discount offer should be ignored outright and vice versa.

It may be solved by the following procedures:

1. Calculate EOQ as usual, ignoring discounts.
2. If this is below the quantity which must be ordered to obtain discounts, calculate total annual stock costs at EOQ.
3. Recalculate the total annual stock costs using the order size required to just obtain the discount.
4. Compare the cost of steps 2 and 3 with the saving from the discount and select the minimum cost alternative.
5. Repeat for all discount levels to determine the best ordering quantity.

The Ways in Which Discounts Might Affect the Order Size and the Total Costs

- **Discounts** are likely to **lower the total purchase cost** and it will likely to **increase order size** in order to obtain discount in bulk purchases
- The **total ordering cost** will be **reduced** as the **increase in order size will lower the number of orders**.
- The **total holding cost** will be **increased or decreased**. The increase is due to the **increase of the number of average stocks held annually** but if the **holding cost is a percentage of purchase price**, then the **holding cost will per unit per annum decrease** when the **purchase price decreases**.

ECONOMIC BATCH QUANTITY (EBQ)

Economic Batch Quantity (EBQ), also called Optimal Batch Quantity or Economic Production Quantity, is a measure used to determine the quantity of units that can be produced at minimum average costs in a given batch or production run.

$$EBQ = \sqrt{\frac{2C_oD}{C_h(1-D/R)}}$$

Where:
 Co = cost of setting up a batch
 D = Demand per period
 Ch = holding cost per unit per period
 R = production replacement rate/production rate per period.

ACCOUNTING FOR MATERIAL COSTS

The **opening balance of materials** is a **debit** balance because it is a **current asset** (i.e. it will come on the debit side of the **materials control account**.)

Entries

1. Purchase of material (in an **integrated system** of accounts)

Debit Material control account
 Credit Creditors account

Purchase of materials (in an **interlocking system** of accounts)

Debit Material control account
 Credit Cost ledger control account

2. Direct material issued to production

Debit Work in progress control account
 Credit Material control account

3. Indirect material issued to production

Debit Production overhead control account
 Credit Material control account

4. Direct material returned to stores.

Debit Material control account
 Credit Work in progress control account

5. Indirect material returned to stores.

Debit Material Control account
 Credit Production overhead control account

In view of the above entries, the material control T account would be as follows:

Materials Control Account			
	\$		\$
Opening balance	xxx	Issued to production	
		Direct materials	xxx
Materials bought	xxx	Indirect materials	xxx
Materials returned		Closing Balance	xxx
Direct Material	xxx	(the balancing figure)	
Indirect Material	xxx		

Labour

Labour represents the **human contribution to production** and is an important cost factor requiring constant measurement, control and analysis. It can be classified as:

- **Direct Labour Cost** can be specifically traced to or identified with a particular product/service. They are directly involved in making a product.

Examples: Wages of operative assembling parts into finished products, Teachers, etc

- **Indirect Labour Cost** not charged directly to a product.

Examples: Instructor's salary, supervisor's salary, maintenance worker's salary, etc.

PLANNING AND CONTROLLING PRODUCTIVITY

Production levels can be raised by

- Working overtime
- Hiring extra staff
- Sub-contracting some work to an outside firm
- Managing the work force so as to achieve more output

Productivity if improved, the company will enable to produce its products in less hours therefore it will reduce labour cost.

Production levels can be reduced by

- Cancelling overtime
- Laying off staff

RECORDING LABOUR COST

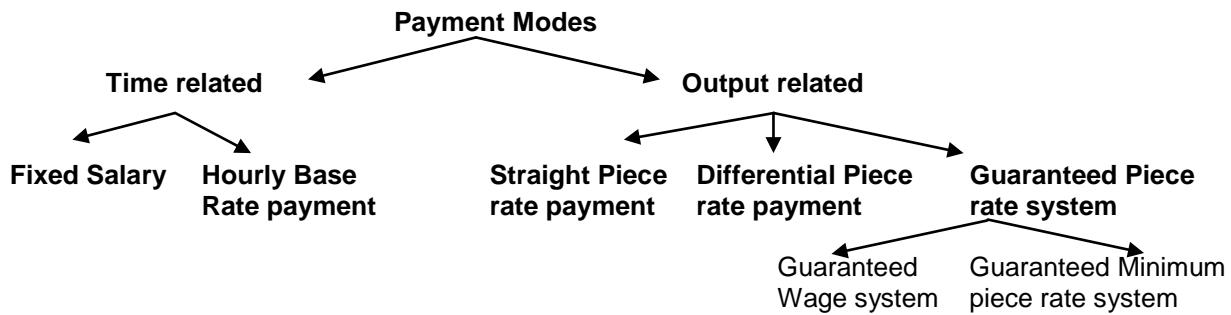
Several departments are involved in the collection, recording and costing of labour. These include:

- Personnel;
- Production planning;
- Timekeeping: responsible for recording the attendance time and the time spent in the factory and spent on particular job by each employee;
- Payroll: Labour costs paid to employees according to records;
- Cost accounting.

Records showing how each employee's pay has been calculated are known as **pay-slips**.

- **Personnel Department:** The personnel department is headed by a professional personnel officer trained in managing people, labour laws, company personnel policy and industry conditions. The professional personnel should have an understanding of the needs and problems of employees. The department is responsible for:
 - Engagement, transfer and discharge of employees
 - Classification and method of remuneration
- **Production Planning Department:** The production planning department is responsible for
 - Scheduling work
 - Issuing job orders to production department
 - Chasing up jobs when they run late

LABOUR REMUNERATION METHODS



✓ Time Related

This is the most commonly used remuneration method. Under this system employees' pay is based on hours, days, weeks or months.

- **Fixed Salary:** A fixed salary, which employee receives after a particular intervals, (usually weekly, monthly). It does not depend on output produced.
- **Hourly Based Payments / Day Rate System:** Employees are paid on the basis of actual number of hours they have worked and there is a rate fixed for each hour worked.
It can be calculated as:

$$\text{Hourly pay} = \text{Number of actual hours worked} \times \text{standard rate per hour}$$

Impacts of using a time based pay system

- Advantages include a simple pay system, both for employee and employer and employees are only paid for the time they work. It focuses on quality of product rather than quantity.

Disadvantages:

- Pay system is time based rather than output or performance based.
- There is no motivational impact in this pay system
- Employees may try to remain present in order to become entitled to the wages rather than focusing on performance/output

✓ Output Related (Piecework)

Under this system employees are paid based on output. Employees are paid only for good units produced.

- **Straight Piecework:** Employees are paid according to the number of units of a product that they produce in a period. A fixed amount is defined as pay for every unit an employee produces. So that more they produce the more they can earn.

$$\text{Basic pay} = \text{Number of good units produced} \times \text{standard rate per unit}$$

- **Differential Piecework:** Differential piecework system is where a higher amount per unit is paid the more the employee produces. Only the additional units qualify for the higher rate. Such a differential system is too common nowadays. This system is designed to improve productivity and employee morale but may have adverse effects on employee health and social life.
- **Guaranteed minimum Piecework:** Guaranteed piecework system is where the employee is paid a guaranteed amount of minimum pay in case there is not enough work available for each employee. This help companies in retaining their workers.

- **Guaranteed wage system:** Where worker has a guaranteed wage with an additional pay per unit or per contract. For example, salesmen pay (salary plus commission).

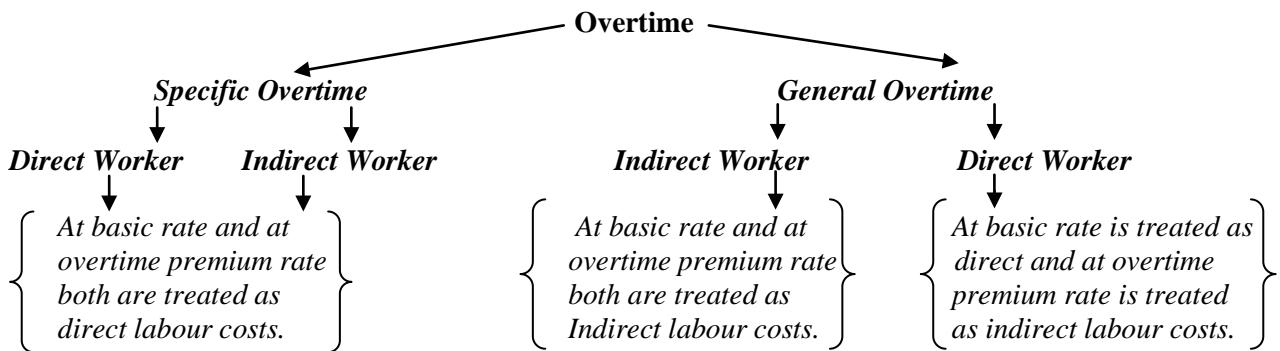
OVERTIME AND OVERTIME PREMIUM

Overtime usually arise from working more than normal working hours, including weekends and national holidays.

Overtime premium The additional / extra amount paid to the employee over the normal rate because he / she worked for more than the normal period of time. Overtime payment is always more than normal hourly rate. There is **two parts** of overtime payment; overtime **basic pay and overtime premium**.

Types of Overtime

- **General Overtime:** Extra hours worked due to general reasons like machine breakdown, production scheduling problem etc.
- **Specific Overtime:** Overtime is done due to customer's special request to complete his job earlier.



✓ Idle Time / Down Time

- Time that is paid for but in which no work was done (so it is **non-productive time**)
- It is always treated as an **indirect labour cost** (both for direct and indirect workers)
- There is no idle time in overtime but general overtime may arise due to idle time.
- Idle time hours are deducted from normal basic hours

Reasons of idle time

- Production disruption
- Machine breakdown
- Shortage of material
- Inefficient scheduling
- Poor labour supervision
- Payments for tea break
- Payments for rest periods
- Sudden fall in demand of a product
- Strike at supplier's business

An idle time ratio is a useful ratio for the control of idle time:

$$\text{Idle time ratio} = \frac{\text{Idle hours}}{\text{Total hours paid}} \times 100$$

Total hours paid = Productive hours + Non-productive hours

Total hours worked = only Productive hours

❖ Question solving pattern:

	\$ D. Lab	\$ Ind. Lab
Direct Workers:		
Basic wage $[(\text{basic hours} - \text{idle time hour}) \times \text{Basic rate}]$	X	
Idle time $(\text{idle time hours} \times \text{basic rate})$		X
Overtime:		
Specific:		
At basic rate $(\text{specific overtime hours} \times \text{basic rate})$	X	
At overtime premium rate $(\text{Specific overtime hours} \times \text{overtime premium rate})$	X	
General:		
At basic rate $(\text{general overtime hours} \times \text{basic rate})$	X	
At overtime premium rate $(\text{general overtime hours} \times \text{overtime premium rate})$		X
Indirect Workers:		
Basic wage $[(\text{basic hours} - \text{idle time hour}) \times \text{Basic rate}]$	X	
Idle time $(\text{idle time hours} \times \text{basic rate})$		X
Overtime:		
Specific:		
At basic rate $(\text{specific overtime hours} \times \text{basic rate})$	X	
At overtime premium rate $(\text{Specific overtime hours} \times \text{overtime premium rate})$	X	
General:		
At basic rate $(\text{general overtime hours} \times \text{basic rate})$	X	
At overtime premium rate $(\text{general overtime hours} \times \text{overtime premium rate})$	X	
	<hr/> <hr/> XX	<hr/> <hr/> XX

GROSS PAY AND NET PAY

Gross Wage / Pay: The amount which includes all kind of bonuses and incentives. As per records, the amount charged as labour cost is the gross pay.

Net Wage / Pay: The amount which is actually paid to the worker after making deductions to the gross pay. These deductions are then transferred to relevant bodies (like, HMRC) by the company on behalf of the employee.

Net pay is calculated as;

Gross Pay	\$ XX
Less:	
Income TAX (PAYE)	(X)
Employees NIC (National Insurance Contribution)	(X)
Employees' pension fund contribution	(X)
Net Pay / Wage	XX

Labour Cost to an Employer:

	\$
Gross Pay	XX
Add:	
Employers NIC (National Insurance Contribution)	X
Employers' pension fund contribution	X
Labour Cost to an Employer	XX

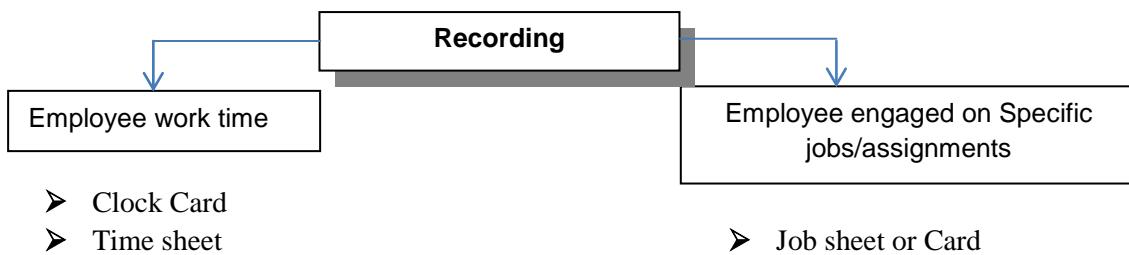
RECORDING OF LABOUR COST (DOCUMENTATION AND PROCEDURE)

- **Employee personnel records (human resource department)**

Employee Record Card

- Contains the basic information concerning an employee
- Is raised when the employee is engaged and shows a history of progress through the firm, for example date of joining firm, rate of pay, promotion, training, departments in which experience has been gained, records of sickness, absenteeism, etc.
- When the employee leaves, the card is completed with the closing date and if possible, the reason for leaving.
- Is the source document for the rate of pay which is used in the compilation of other labour records

- **Employee record of attendance sheet.**



- **Clock Cards:** Workers who are paid on an hourly basis record the time for which they have worked, on a clock card. It shows the time at which they arrived and the time at which they left the organisation. Modern time recording systems may not use physical cards they have computerised system.
- **Time Sheets:** Time sheets are used to record the time spent on the production by each individual employee. A time sheet is filled by the employee as a record of how their time is being spent. The total time on the timesheet should correspond with time shown on the attendance record. A time sheet can be filled daily or weekly.

TIME SHEET						
NAME: _____			CLOCK NO: _____			
DEPARTMENT: _____						
WEEK COMMENCING						
Date	Job	Start	Finish	Hours	Overtime Hrs.	\$
				TOTAL		
TOTAL OVERTIME PAYMENT _____						
FOREMAN'S SIGNATURE _____						

- Job Sheets:** If an employee is working on different jobs relating to different departments, they will need to keep a record of the time they have spent on each job. A job card is prepared for each job or batch. An employee records the time spent on the job on the job card.

JOB SHEET					
NAME: _____			CLOCK NO: _____		
DEPARTMENT: _____					
WEEK COMMENCING					
Product	Units	Code	Price	Bonus	Total
GROSS WAGES					
TOTAL HOURS					
Foreman's Signature _____			Date _____		

- Piecework ticket / operation card:**

The wages of piecework workers and the labour cost of work done by them are determined from piecework ticket. It records:

- Total quantity produced
- Rejected units
- Good units

Payments are made only for good units

PERFORMANCE MEASUREMENT OF LABOUR USING STANDARD HOUR

It is not possible to measure output in terms of units produced for a department making several different products. This problem can be overcome by ascertaining the standard hours produced, for example the amount of time, working under efficient conditions, it should take to make each product. For example the allowed time for producing a product X is 5 hours.

- Activity ratio / production volume ratio:** This ratio measures how the overall production compares to planned levels. It compares the number of standard hours equivalent to the actual work produced and budgeted hours.

$$\frac{\text{Standard hours for actual output}}{\text{Budgeted hours}} \times 100$$

- **Capacity ratio:** This ratio measures the extent of worker's capacity by their working hour has been achieved in a period with the planned labour hours utilization.

$$\frac{\text{Actual hours worked} \times 100}{\text{Budgeted hours}}$$

- **Efficiency ratio:** This ratio measures the efficiency of the labour force by comparing equivalent standard hours for product produced and actual hours worked. The benchmark of efficiency is 100%.

$$\frac{\text{Standard hours for actual output}}{\text{Actual hours worked}} \times 100$$

Relationship between the three ratios:

$$\text{Activity ratio} = \text{Efficiency ratio} \times \text{capacity ratio}$$

$$\text{Standard hours for actual output} = \text{Standard hours per unit} \times \text{Actual output.}$$

$$\text{Standards hours per Unit} = \text{Budgeted hours} \div \text{Budgeted units produced}$$

BONUS SCHEME

The basic principle of a bonus payment is that the employee is rewarded for any additional income. It may be due to the employee's efficiency on production which helps savings in the cost of production for the organization. The bonus payable will depend on the method of payment of the employee and the policy of the organization.

Characteristics of bonus schemes are as follows:

- Employees are paid more for their additional effort
- Bonus level is set at a productivity level that is achievable but above normal effort level. The purpose being to attract all employees rather than limiting it to a few number of employees.
- Increase morale of employees.
- The objective of such scheme is to persuade employees to go for an extra effort to earn a satisfactory return.

At the same time it should be ensured that employees are working in the right direction, i.e. no substandard production to achieve a bonus.

Factors to consider in the successful implementation of a bonus/incentive scheme:

- Reward offered should be closely linked to the effort expected by employees
- Bonus scheme details should be agreed with all employees
- Terms and conditions of bonus scheme should be easy to understand by employees
- The bonus should be paid to employees as soon as they deserve that
- All the employees concerned should be made aware of the bonus scheme implementation
- There must be some allowance for conditions outside the control of employees which affect their effort like material shortage, substandard material, poor working environment, machine breakdowns and so on.
- Its objectives should be clearly defined.
- It should be attainable by employees.
- Bonus conditions are easy to understand.
- It should be fair for both employees and employer.
- Only those employees who make extra efforts should be rewarded.

- 1. High-day Rate System:** It is a system under which employees are paid a high hourly wage rate in expectation that they will work more efficiently than similar employees on lower rate in other companies.

Advantages of high-day rate scheme:

- Calculation is simple
- Easy to understand
- Guarantee to employees for increased rate of wage.

Disadvantages of high-day rate scheme:

- Employees cannot earn more than fixed rate per hour for their extra efforts.
- More supervision is required.
- More efforts are required by employees as a result employees may prefer to work at lower day rate.

- 2. Individual bonus:** Such schemes are designed to suit individual employee. Each individual employee can qualify for a bonus over and above his basic pay by achieving a standard set for him. Standard level is set for each employee separately according to his job nature and position in the hierarchy of the organization. So bonus for each employee is a different amount from any other employee

Main Features of an Individual Bonus Scheme:

- Employee can earn bonus by showing efficiency above given targets.
- The bonus is awarded for a unique performance standard for each employee
- Each individual employee is provided with the resources to use his potential to achieve that performance level to become entitled to bonus
- Employee concerned gets involved in such a scheme to make implementation productive.

Following factors ensure success of such a bonus scheme:

- Working conditions should be appropriate
- Performance levels set for bonus should be realistic otherwise employees would get frustrated very soon resulting in failure of scheme
- Standard set for work should be capable of being measured in time so that standard time can be set for the tasks

Bonuses should be reviewed periodically so as to keep the scheme attractive for employees otherwise once the employee has achieved that standard of performance employees would start perceiving bonuses as part of their basic pay.

- 3. Group bonus:** Where in an organisation work is largely team oriented, individual bonus schemes are not appropriate. In such an environment group bonus schemes are more appropriate. A group bonus scheme is a reward plan that rewards the whole team if desired performance level is achieved. Effort of each and every member is an essential feature of such a bonus scheme.

The main features of group bonus scheme include:

- One of the main objectives is to create a teamwork environment in the organization. Result of the combined effort of team members is greater than the sum of individual team members; called synergy effect.
- In designing the bonus scheme it is always considered that extra effort from each team member

is required to achieve the desired performance level.

- To make the bonus scheme work, the performance standards are set in consultation with team members

Advantages of group bonus schemes:

- Such a scheme is much easier to administer as compared to individual bonus schemes as no separate record of individual employees' performance and reward is maintained
- A common goal increases the teamwork culture in an organization
- Efficiency level is found to increase for such a scheme
- By working in a team members get to share skills of each other

Disadvantages of group bonus scheme:

- When performance standard is set for a whole group, the group members try to set desired performance level at a lower level than an optimum level. It is natural that employees have reservations about their team fellow member's performance.
- In case of failure to achieve the desired performance level, team members blame each other. Such an event is disastrous for team work culture in the organization.
- Once failed to achieve the desired performance level at group level, the group or team members prefer individual bonus scheme over group bonus scheme.

4. **Flat rate bonus (fixed amount bonus):** A fixed amount of money is paid to each employee as a bonus. This is based on performance. For example \$200 pay as a bonus to each employee.
5. **Percentage of salary paid as bonus:** A fixed percentage is defined as a bonus. Percentage is applied on the basic pay of employees. For example 10% of salaries paid as bonus
6. **Profit sharing scheme:** A profit sharing scheme is a scheme where the part of a company's profit is paid to employees as a reward for loyalty and contribution to the company's success. The size of the bonus depends on their position and length of employment in the company. The reward may be in any form, i.e. cash, shares or a combination of both. Most common forms of such a scheme are as follows:

The advantages of profit-sharing schemes:

- Profit maximization of the company become the objective of all employees
- As the workers are directly linked with the share of profit and then their morale is kept high. They do not need strict supervision. Disciplined workers only can keep the standard of administration high.
- The workers, who leave the organization during the course of year, lose their share of profit hence the scheme is a positive incentive to the workers to stick to their jobs. Thus, it ensures low labour turnover
- The company only pays when profits are available and company can afford it

Disadvantages of profit sharing scheme:

- The profit results are not merely from the availability of capital or efforts of employees. It depends on several other factors such as efficiency of management, market conditions, on several other factors beyond the control of the employees.
- A share of profit is paid to the employees only at the end of a specified period. In other words, reward comes long after the effort has been made. This time lag reduces the eagerness of employees to get something for their efforts.

- At the time of profit distribution, employers may object to the profit sharing scheme. They argue that profit is the reward of the risk which the employer runs. Further if there is a loss why should the employees not bear the share of it?
- In years of recession employees would lose their interest in such a scheme at all.
- Labour turnover might be high just after the profit sharing.

- 7. Incentive schemes involving shares:** Nowadays this bonus scheme is very common. In this scheme companies use their shares or right to acquire them as a form of incentive. A share option scheme is a scheme which gives its members the right to buy their company's shares in future at a defined price. An employee share ownership plan is a scheme which acquires shares on behalf of a number of employees and it must distribute these shares within a certain number of years of acquisition.

The advantage of share schemes:

- Employee will feel interest in company as a stakeholder

Disadvantage of share schemes:

- Benefits are not certain because market price cannot be determined realistically in advance.
- Benefits are not immediate.

- 8. Productivity related bonus (time saving bonus):** If employees made more products in basic allowed hours than the bonus is paid for hours saved

$$\text{Saved hours} = \text{Time allowed} - \text{Time taken}$$

Bonus is calculated according to formulas in given question.

LABOUR TURNOVER

Labour turnover is a measure of the proportion of leavers who require replacement to the average number of people employed. One of the main objectives of a personnel department is to minimize labour turnover.

$$\frac{\text{Number of leavers who require replacements} \times 100}{\text{Average number of employees in a period}}$$

The reasons of labour turnover

The controllable reasons of labour turnover are as follows:

- Inadequate wage levels causing employees to switch
- Poor morale and low motivation within the workforce
- Making employees to work under uncomfortable environment
- Too much workload on an employee
- Recruiting employees which are not suitable for particular job
- Lack of career progression opportunities in the organization
- Poor working relationships between employees and manager
- Unrealistic expectations from employee

Unavoidable reasons of labour turnover:

- Illness
- Accident
- Family problems
- Social issues
- Retirement

- Death

Cost of labour turnover:

Labour turnover costs are very large and management should try to keep labour turnover as low as possible to minimize these costs. Labour turnover costs are divided into two categories:

1. **Replacement costs:** Recruitment and replacement of staff will involve advertising, interviewing and selection which can be time consuming

- Additional cost of training new employees
- Loss of efficiency due to new recruits learning the job
- Adverse effect on morale of existing work force which can lead to de-motivated employees
- Loss of profit due to delay in new labour becoming available
- Increased wastage among new staff due to lack of expertise
- Lower productivity level as new staff need time to get pace

Therefore, labour turnover should be closely monitored and reduced if possible.

2. **Preventive costs**

- Improving working condition
- Keeping wages of labour up with market rate
- Provision of a pension
- Provision of welfare services
- Cost of medical facilities offered to employee and his family
- Cost of other benefits offered like interest free or low interest loans, training programs, sports facilities and vacations etc
- Bonuses or profit sharing schemes

ACCOUNTING FOR LABOUR COST:

Integrated system (Gross Wages)

Debit	Wages control account
Credit	Cash/ bank/ payables

Interlocking system (Gross Wages)

Debit	Wages control account
Credit	cost ledger control account

Charging Direct Wages to production department

Debit	Work in progress account
Credit	Wages control account

Charging Indirect Wages to production department

Debit	Production overhead account
Credit	Wages control account

Charging Indirect Wages to non-production department

Debit	Non-production overhead control account
Credit	Wages control account

Wages control a/c			
\$		\$	
Bank	xxx	WIP(direct labour)	xxx
		Production overhead:	
		Indirect labour	xxx
		Overtime premium	xxx
		Idle time	xxx
		Shift allowance	xxx
		Sick pay	xxx
XXX		XXX	

Overheads

REVENUE EXPENDITURE AND CAPITAL EXPENDITURE

- **Revenue expenditure** is expense incurred during the course of business or expenses incurred to maintain existing fixed assets. It is charged to the profit and loss account as an expense.
- **Capital expenditure** is expense incurred in the acquisition of fixed assets. It is not charged to the profit and loss account as an expense. The expenditure is capitalised as a fixed asset and a depreciation amount is charged to the profit and loss account to write off the capital expenditure over a period of time.
- **Indirect expenses** are expenses which cannot be traced directly to a product, service or department. For example rent, rates, insurance, depreciation, electricity, water, maintenance of plant and machinery. They are also classified as overheads which consist of the total of all indirect cost (indirect material + indirect labour + indirect expenses).

PRODUCTION AND NON PRODUCTION OVERHEADS

- **Production / Manufacturing overheads** are indirect costs that are related to the production of the products of the business. They make up part of the production cost.
- **Non-production / Non-manufacturing overheads** are expenses that are not directly or indirectly related to the production. They are classified as Selling overheads, Distribution overheads, Administration overheads and Finance overheads.

TREATMENT OF OVERHEADS

Overhead costs are cost incurred that cannot be charged directly into cost units. These costs must, however, be charged into the cost units to avoid underestimation of product costs which may end up with under-setting the product selling price. Overheads are treated as product cost or period cost.

- **Product Cost:** The cost of making a product is known as product cost. It includes direct material, direct labour, direct expenses and production overheads.
- **Period Cost:** The cost which is related to a period not to production is known as period cost. It includes selling and distribution, research, finance and administration.

Accounting Treatment of Product and Period Cost

Product cost is taken into profit and loss account only to the extent of number of units sold and cost of unsold units is taken into the balance sheet as a closing stock. Whereas period cost in total is charged to profit and loss account. Product cost is used for stock valuation purpose but period cost is least concern with stock valuation.

APPROACHES TO RECORD THE COST

Costs are recorded and accumulated in cost accounting systems using one of two main approaches:

- Marginal costing
- Absorption costing

ABSORPTION COSTING

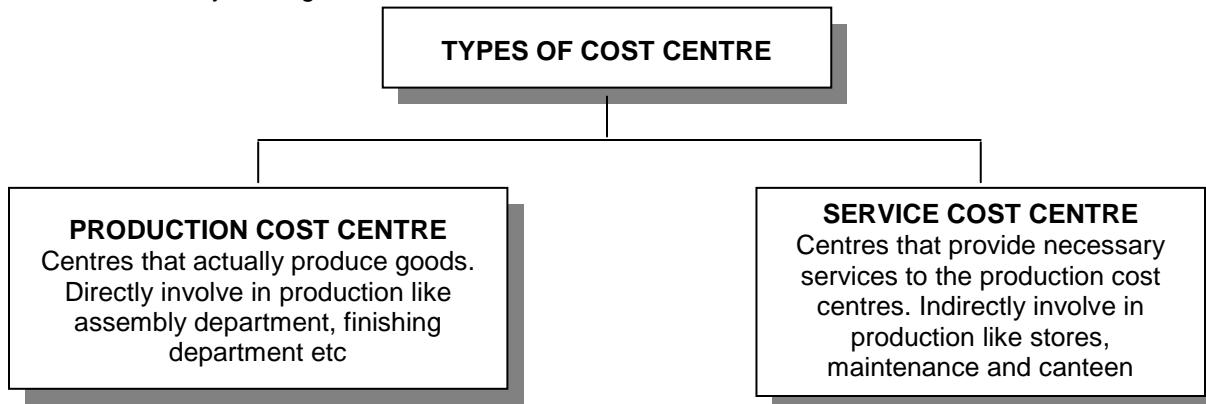
The objective of absorption costing is to include an appropriate share of the organisation's total production overhead in the total cost of a product. Factory overhead cost will be added to each unit of product manufactured and sold.

- The process is to share out all overheads amongst the cost centres and then to share their overheads amongst the products made in the cost centre. Some cost centres provide necessary services to the **production cost centres**. These cost centres are known as **service cost centres**, which includes

- stores, maintenance and canteen.
- The overheads incurred by the service cost centres must then be shared amongst the production cost centres until all the overheads are within the production cost centre. Then finally the total overhead can be shared amongst the units which are made in each of the production cost centres.

Cost Centre

The department or sub-part of a division, to which costs can be identified. Cost centre can further be divided into two major categories.



Under **Absorption costing system** there are **four steps** of charging overhead costs to cost centres and cost units.

1. Allocation.
 2. Apportionment.
 3. Re-apportionment.
 4. Absorption
1. **Allocation** is the charging or distributing of cost directly to the cost centres or cost units. Costs that relate to a single cost centre are allocated to that cost centre. Normally indirect materials and indirect labour costs are allocated.
2. **Apportionment** is where an overhead is common, combined or joint to more than one cost centre and therefore it needs to be shared out amongst the relevant cost centres based on benefit received by each cost centre.

Formula of overheads apportionment:

$$\text{Overhead apportionment} = \frac{\text{Department base}}{\text{Total base}} \times \text{Production overheads}$$

Cost	Basis of apportionment
Rent and rates	Floor area / space occupied
Light and heat	Floor area / space occupied
Power	Kilowatt hour / capacity of machines
Employee related costs	Number of employees / wages cost
Depreciation of plant & machinery	Value of machinery
Insurance of plant & machinery	Value of machinery
Canteen cost	Number of employees

3. Reapportionment

Service departments are cost centres, which exist to provide services to other departments. The canteen is a common example, having allocated and apportioned the costs to the production and service departments, the totals of service cost centres, the latter need to be reapportioned to the production cost centres.

Basis of Reapportionment

<i>Service cost centres:</i>	<i>Bases of reapportionment</i>
Stores	Number of material requisitions
Maintenance	Number of maintenance hours or number of maintenance calls
Canteen	Number of employees

Two methods are available for reapportionment:

- **Direct method** is used when service centers do not exchange services with each other, means they only provide services to production centers.
- **Indirect method** is used when service centers exchange services with each other. Means service centers provide services to production centers and to each others as well.
Indirect method further sub divided into 2 methods:
 - Step Down method** (one-way method)
One service department provides services to other service departments but others do not. Service department which provides service to other service center is reapportioned first. This is the only method in which sequence of re-apportionment matters.
 - Reciprocal method** (two-way method)
Service departments provide services to each other. It may be solved **algebraically by simultaneous equation** or through **repeated distribution**.

4. **Absorption rate** is a method of including a fair proportion of the total overheads costs as part of the cost of each cost unit. The amount of overhead that is to be treated as a cost of each cost unit (or product) is calculated using overhead absorption rate:

$$\text{Overhead Absorption Rate} = \frac{\text{Budgeted Production Overhead}}{\text{Budgeted Activity Level}}$$

The total of the overheads in each production department must now be **absorbed** into the units of production on the following basis:

Activity level	Absorption rate
Direct labour hours	\$ x per direct labour hour
Machine hours	\$ y per machine hour
Units of production	\$ z per unit (for standard units only)
Direct wages cost	% of direct wages cost
Direct materials cost	% of direct materials cost
Prime cost	% of prime cost
Full production cost	% of full production cost

BLANKET RATE AND DEPARTMENTAL RATE

Blanket rate refers to a situation where single OAR is used for the whole factory or organisation. It is appropriate,

- Fewer departments
- Fewer products
- Similar processes and activities.

Departmental rate is also known as separate absorption rate. It uses a separate OAR for each department or cost centre. It is appropriate,

- Multiple departments
- Wide range of products
- Different processes and activities.

Comparison between blanket rate and departmental rate

- If blanket overhead absorption rate is used for the whole factory then some products will receive a higher overhead proportion and some will be under charged. Using a separate absorption rate is more appropriate where product spent different amount of time in each department.
- The use of blanket rate saves time and thus cost, but less accurate than departmental rates.
- Therefore a careful selection of which type of rate to use is essential, taking into account the cost-benefit analysis.

OVER/ UNDER ABSORPTION OF OVERHEADS

Predetermined absorption rate or Overhead absorption rate (OAR) is based on budgeted overheads and budgeted activity levels. The absorbed overheads will differ from actual overheads incurred.

Absorbed overheads = Absorption rate x actual activity level

Absorbed overheads are compared with actual overheads incurred in a period; the difference is either under absorption or over absorption.

Absorbed OH < Actual OH = UNDER absorption (add to Cost of goods sold or deduct from profit)

Absorbed OH > Actual OH = OVER absorption (deduct from Cost of goods sold or add in profit)

- *If actual overheads incurred are not given then an assumption can be taken that Budgeted overheads = Actual overheads*

Under or over absorption of overheads will occur if:

- Actual overheads are different from the budgeted overheads
- Actual activity level different from the budgeted activity level
- Or both situations arise

THE REASONS FOR USING ABSORPTION COSTING

- **Stock valuation:** Stocks in hand are valued for the closing stock figure in the balance sheet and the cost of sales figure in the profit and loss account. Absorption costing is recommended in financial accounting by the statement of standard accounting practice on stocks and long term contracts.
- **Pricing decision:** Many companies fix the selling price of a product by calculating the full cost of production and then add a margin for profit. This is known as “full cost plus pricing”.
- **Profitability:** When a company sells more than one product, overhead costs must be shared on a fair basis to each product to judge the profitability of each product.
- Absorption costing is recommended by IAS 2

NON-MANUFACTURING OVERHEADS

Non-manufacturing overheads may be allocated by choosing a basis for overhead absorption rate which fairly reflects the non-production overheads. For external reporting purposes non-manufacturing costs are required to be treated as period cost but for internal reporting purposes it may be included into product cost.

Basis for apportionment of non-manufacturing overheads

There are two options available for apportioning non-manufacturing costs to cost units:

- **Method-1:** Choose a basis for apportioning non-manufacturing overheads which fairly reflects non-manufacturing overhead such as direct labour hour, machine hour etc.
- **Method-2:** Allocate non-manufacturing overheads to products on the basis of products ability to bear such cost. For example manufacturing cost may be used to apportion non-manufacturing cost to product.

$$\text{Overhead absorption rate} = \frac{\text{Estimated non-manufacturing cost}}{\text{Estimated manufacturing cost}}$$

Other possible bases for allocating overhead costs are as follows:

Overhead	Possible absorption bases
Administration	Production cost
Selling overhead	Sales value
Distribution overhead	Sales value

Absorption and Marginal Costing

PROFIT REPORTING AND STOCK VALUATION

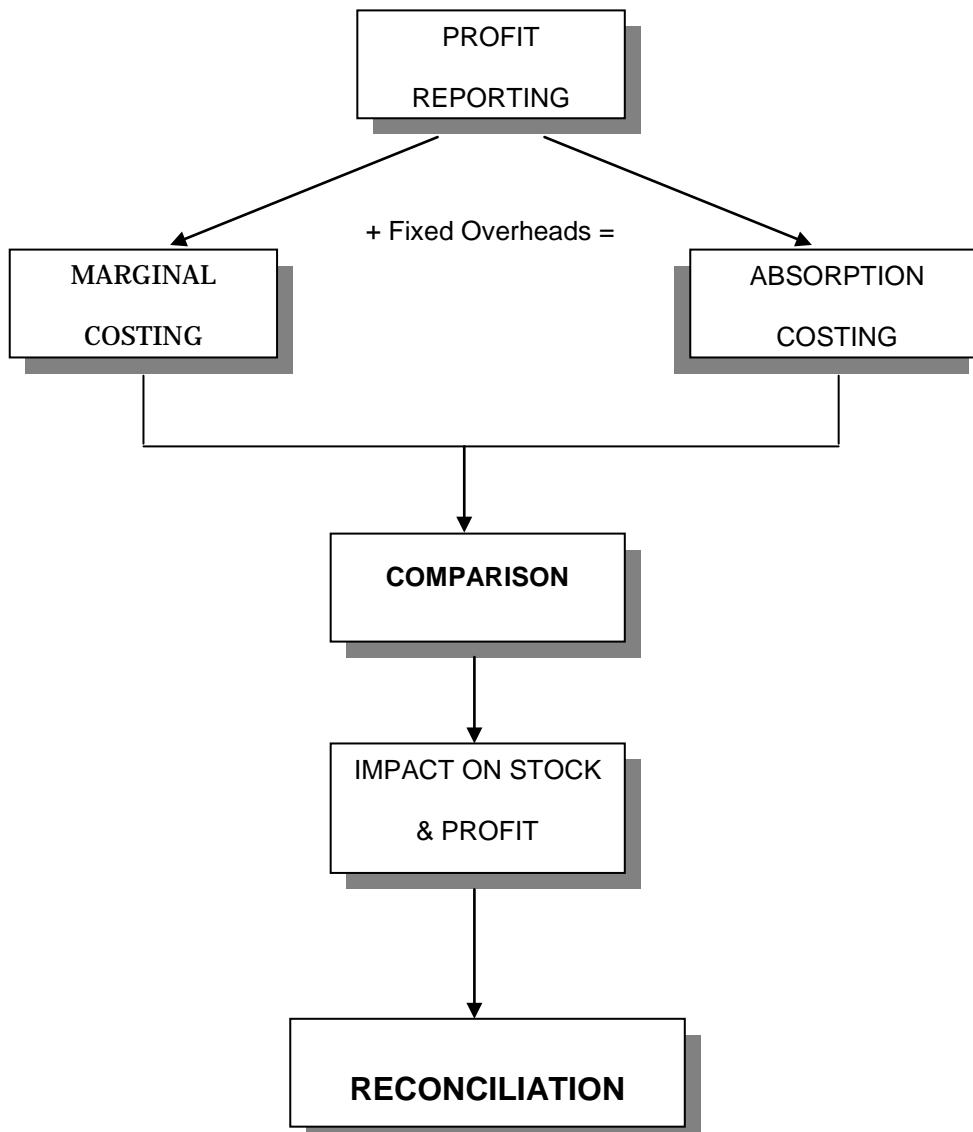
There are two profit reporting techniques

- Marginal costing
- Absorption costing

These two profit reporting techniques are based on concept of product and period cost.

PROFIT REPORTING

Overview



PRODUCT AND PERIOD COST

- **Product Cost:** The cost of making a product is known as product cost. It includes direct material, direct labour, direct expenses and production overheads.
- **Period Cost:** The cost which is related to a period and not to production is known as period cost. It includes selling and distribution, research, finance and administration.

Accounting Treatment of Product and Period Cost

Product cost is taken into profit and loss account only to the extent of number of units sold and cost of unsold units is taken into the balance sheet as a closing stock. Whereas period cost in total is charged to profit and loss account. Product cost is used for stock valuation purpose but period cost is least concern with stock valuation.

MARGINAL COST

The cost of a unit of a product or service which would be avoided if that unit were not produced or provided. Normally variable cost is considered as marginal costing.

Definition of Marginal Costing

It is the accounting system in which variable production costs are charged to cost units and fixed costs of the period are written off in full against the aggregate contribution.

Product Cost under Marginal Costing

The marginal production cost per unit of an item usually consists of the following:

- Direct material
- Direct labour
- Direct expenses
- Variable production overheads

It is also known as variable cost of production.

Contribution

Contribution is the difference between sales and variable cost. Contribution is more useful for decision making. **Contribution = Total Sales Revenue – Total Variable Cost**

$$\text{Contribution} = \text{Total Fixed Cost} + \text{Total Profit}$$

Format- Profit under Marginal Costing:

	\$	\$
Sales (sales units x selling price)		XX
Variable Cost of Sales:		
Opening Stock (opening stock units x V.CPU)	X	
Production (production units x V.CPU)	XX	
Closing Stock (closing stock x V.CPU)	(X)	
	<hr/>	<hr/>
		(X)
		XX
Gross Contribution		
Variable non-manufacturing OH:		
Variable selling OH	(X)	
Variable distribution OH	<hr/>	<hr/>
		(X)

Contribution	XX
Fixed production OH (actual)	(X)
Fixed non-manufacturing OH:	
Fixed selling OH	(X)
Fixed distribution OH	(X)
Fixed administration OH	<u>(X)</u>
	<u>(X)</u>
Net Profit	XX

ABSORPTION COSTING

In absorption costing fixed manufacturing overheads are absorbed into cost units.

Definition of Absorption Costing

The accounting system in which variable and fixed production cost are charged to cost units and fixed non production costs and variable non production cost of the period are written off in full against the aggregate gross profit.

Product cost under absorption costing

The absorption production cost per unit of an item usually consists of the following:

- Direct Material
- Direct Labour
- Direct Expenses
- Variable Production Overheads
- Fixed Production Overheads

It is also known as full production cost.

Format- Profit under Absorption Costing

	\$	\$
Sales (sales units x selling price)	XX	
Cost of Sales:		
Opening Stock (opening stock units x CPU)	X	
Production (production units x CPU)	XX	
Closing Stock (closing stock x CPU)	<u>(X)</u>	
Cost of sales	<u>(XX)</u>	
Unadjusted gross profit	XX	
(Under) / Over Absorbed	(X) / X	
Adjusted gross profit	X	
Variable non-manufacturing OH:		
Variable selling OH	(X)	
Variable distribution OH	<u>(X)</u>	
Fixed non-manufacturing OH:		
Fixed selling OH	(X)	
Fixed distribution OH	(X)	
Fixed administration OH	<u>(X)</u>	
	<u>(X)</u>	
Net Profit	XX	

Closing Stock Equation: Closing Stock units = Opening stock units + Production units – Sales Units

Important Notes

- Profit differences are temporary, they are settled in the future.
- Profit differences do not arise due to **Under / (Over)** absorption
- Stock values are always greater using Absorption Costing (due to high cost per unit)
- Net stock values difference is equal to the profit difference.
- Profit differences arise due to the treatment of fixed production overheads in opening and closing stock units.

CASES:

1. Opening stock units < Closing stock units ; High profit under Absorption costing
2. Opening stock units > Closing stock units ; High profit under Marginal costing
3. Opening stock units = Closing stock units ; Same profit under Both

MARGINAL COSTING AND ABSORPTION COSTING – A COMPARISON

Summary of absorption costing and marginal costing:

	Absorption costing	Marginal costing
Cost per unit	Includes fixed and variable production cost; So it may arise under/over absorption of production overhead.	Includes only variable production cost; fixed cost is not absorbed but written off to P&L, so there is no under/over absorption.
Stock	Valued at full production cost	Valued at variable production cost
Profit <i>If stock level change, the 2 methods produce different operating profits.</i>	Profit is higher if the stock levels are rising	Profit is higher If the stock levels are falling

Reconciliation of profits between absorption and marginal costing.

The difference in profits reported under the two systems is due to the different stock valuation methods used. If one of the marginal and absorption profit is given, we can find the other one by using the following format.

$$\begin{aligned} \text{Profit under marginal costing} &= \text{xxx} \\ \text{Increase / (decrease) in stock} \times \text{OAR} &= \underline{\text{xxx / (xxx)}} \\ \text{Profit under absorption costing} &= \underline{\text{xxx}}. \end{aligned}$$

ARGUMENTS IN FAVOUR OF ABSORPTION COSTING

- Fixed production costs are incurred in order to make output, it is therefore fair to charge all outputs with a share of these costs.
- Closing stock values, by including a share of fixed production overhead, will be valued on the principle of IAS 2, as required by financial accounting purpose.
- Including fixed cost in the value of closing stock allows the fixed cost to be charged only in the period of which revenue is earned, thus following the cost - revenue matching concept.

ARGUMENTS IN FAVOUR OF MARGINAL COSTING

- It is simple to operate as we do not have to determine fixed overhead absorption rate.
- Writing off fixed cost immediately in the period it is incurred follows the prudence concept of accounting.
- Fixed cost are irrelevant cost for decision making, thus highlighting contribution in profit statement provides better information for decision making purposes.
- Profit will not be distorted through fluctuation in stock level and production level as the contribution calculated is based on sales volume.

ACCOUNTING ENTRIES OF OVERHEADS

1. Debit Work in progress account
Credit Production overheads account
(With the amount of overheads absorbed)
2. Over absorption of overheads
Debit Production overheads account
Credit Over absorbed account
(With the balancing figure of production overheads account)
3. Under absorption of overheads
Debit Under absorbed account
Credit Production overheads account
(With the balancing figure of production overheads account)
4. Closing entry of work in progress account
Debit Finished goods account
Credit Work in progress account
(With the balancing figure of work in progress account)
5. Closing entry of under absorbed account
Debit Profit and loss account
Credit Under absorbed account
(With the balancing figure of under absorbed account)
6. Closing entry of over absorbed account
Debit Over absorbed account
Credit Profit and loss account
(With the balancing figure of over absorbed account)

Other Costing Techniques

✓ ACTIVITY BASED COSTING

Activity-based costing (ABC) is an alternative approach to the traditional method of absorption costing. The traditional method of overhead absorption effectively absorbs overheads on a production volume basis and may be misleading for costs where the behaviour is not directly related to production volume.

ABC approach is to link overhead costs to the products or services that cause them by absorbing overhead costs on the basis of activities that 'drive' costs (**cost drivers**) rather than on the basis of production volume.

Cost pool: A cost pool is an activity that consumes resources and for which overhead costs are identified and allocated. For each cost pool, there should be a cost driver. A group of costs having the same cost driver

Cost drivers: Any factor which causes a change in the cost of an activity. A cost driver is a unit of activity that consumes resources. An alternative definition of a cost driver is a factor influencing the level of cost.

Examples of cost driver and cost pool

Cost pool	Cost driver
Purchasing department costs	number of purchase orders made
Maintenance costs	number of machine breakdowns
Production control costs	number of production runs
Quality control costs	number of inspections carried out
Ordering costs	number of purchase orders
Dispatch costs	number of customer orders
Material handling cost	number of production runs

Reasons behind the development of ABC

- Traditional method of absorption costing was developed in a time when most organizations produce only a **narrow range of products** (which produced in similar operations and consumed similar proportions of overheads) and **overheads costs were only a small part of total cost**.
- ABC was first developed in the US where, in the 1950's – 60's, attempts were made to establish more accurate allocation and absorption of selling and distribution overheads, based on value adding activities which consume resources and the cost drivers which generate cost.
- There had been a general agreement that traditional method of dealing with overheads had weaknesses.
- Business processes are now **more complicated and automated** which includes a **more diverse product range** requiring wide support functions. Service providers have become a more significant feature in many economies. With this shift, **overheads have become an increasingly larger proportion of total cost**, with wide ranging activities and drivers generating such costs. With this change competition has come increased and the need to develop models which enable management to determine **more accurate product cost**.
- Activity based costing could provide much more meaningful information about product costs and profits when:
 - Indirect costs are high relative to direct costs
 - Products or services are complex
 - Products or services are tailored to customer specifications

- Some products are sold in large numbers and others in small numbers.
- Different products result in different levels of activities and resource consumption.

In terms of information resulting from an activity-based system, the outcomes may be therefore:

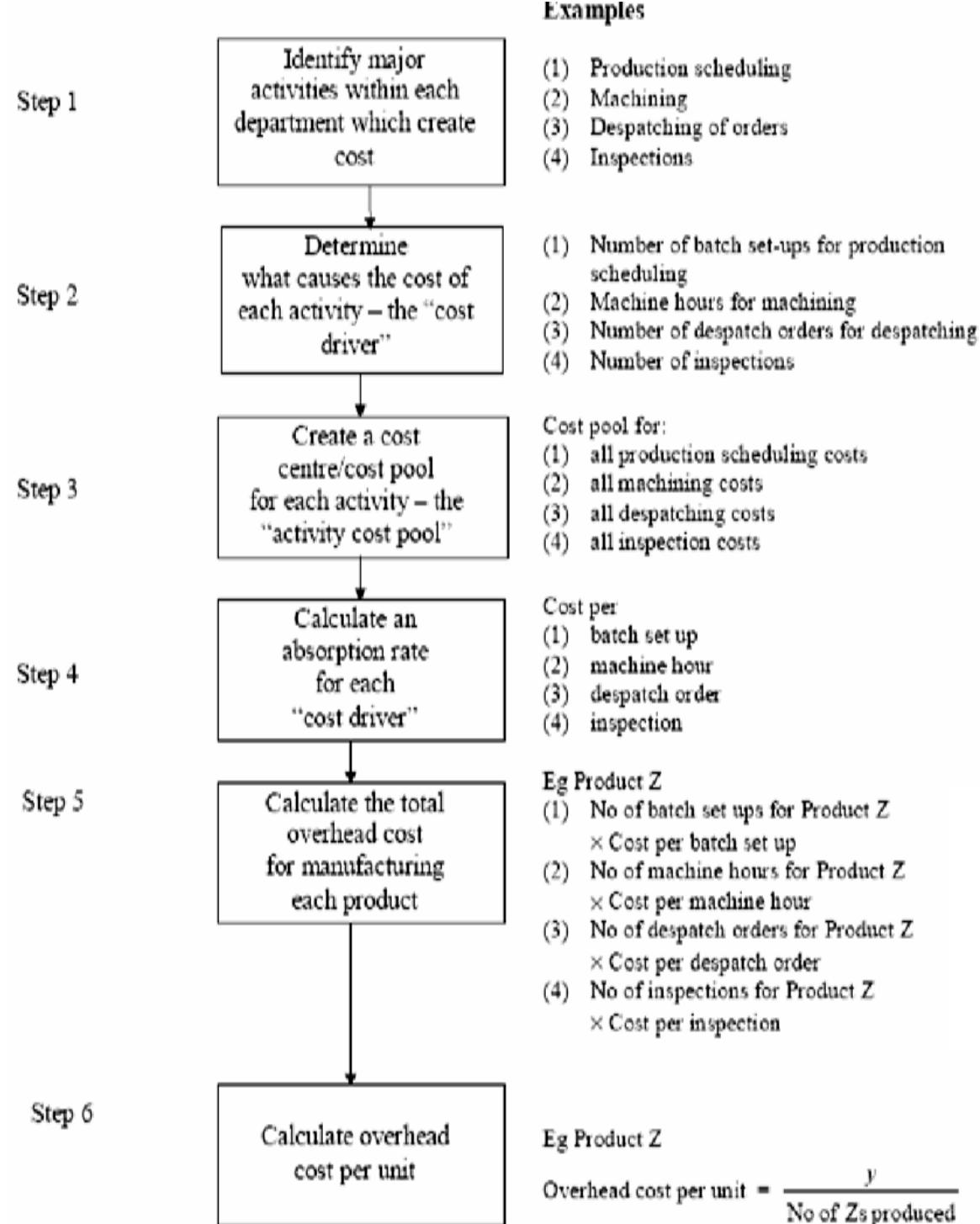
- **Improved control over overhead expenditure:** The identification of costs by activity, and the linking of the costs of each activity directly with products via cost drivers, provides more and better information (compared with traditional methods).
- **Increased accuracy and improved insight into the makeup, of product costs:** This should lead to more informed product decisions. Many overheads may be viewed as long-run variable costs, rather than as fixed costs, influenced by a number of factors at different levels of business activity.
- **Pricing can be based on more realistic cost data:** The traditional method of absorption of overheads into unit costs on a volume basis may be misleading, with the result that product costs can, potentially, be materially under/overstated.

More realistic product costs as a result of the use of ABC may enable sales staff to:

- Target customers that appeared unprofitable using absorption costing but may be profitable under ABC
- Stop targeting customers or market segments that are now shown to offer low or negative sales margins.
- Front line sales staff will be able to negotiate prices with greater confidence
- ABC can be used to review the profitability of products and services with a view to focusing the efforts of sales staff upon those products and services which offer the highest sales margins.

ABC vs. Traditional Absorption Costing:

- **Allocation of overheads:** Absorption costing allocates overheads to production departments where ABC assigns overheads to each major activity (cost pool) . under ABC reapportionment of service department costs is avoided.
- **Absorption of overheads:** The major difference between the two methods is the way in which overheads are absorbed into products. Traditional method usually use two absorption bases (labour hours or machine hours) whereas ABC uses many cost drivers as absorption bases (number of orders, number of dispatches)
- **Cost drivers and absorption rates:** ABC focus attention on what causes cost to increase, the cost drivers. Whereas in traditional system no rule is available for selecting a base.

Steps involved in ABC

ADVANTAGES AND DISADVANTAGES OF ABC

Advantages:

- Allotment of overhead is **fairer** and therefore product costs are **more accurate**.
- There is a **better understanding** of what causes cost.
- The company can **concentrate on** producing the most **profitable items**.
- **Control** of overheads is easier, as responsibility for incoming costs must be given.
- **Performance appraisal** is more meaningful.
- Cost driver rates can be monitored and used to **identify areas of weakness** or inefficiency.
- **Budget setting** and **sensitivity** analysis are more accurate.
- **Activity based budgeting** (ABB) can be used.
- More **accurate use of resources** in making a product.
- By focusing **attention on cost drivers** it will help managers understand and manage overhead cost.
- An understanding of cost driver rates can help in **budgeting overhead expenditure**.
- ABC concerns itself with all overhead costs, and as a consequence it has proved very **useful in service industries**.
- ABC is concerned with **all overhead costs** (production related and non-production)

Disadvantages:

- ABC may be based on **historic information** but could be used for future strategic decisions.
- **Selection of cost drivers** may not be easy.
- Additional **time and cost** of setting up and administering the system.
- **Cost measurement** may not be easy.
- Assessing the **degree of completion of work** in progress with respect to each cost driver is difficult.
- Variance analysis is **complicated**.
- Implementation of ABC is often **problematic**.
- Many **judgmental decisions** still required in the construction of an ABC system.

✓ TOTAL QUALITY MANAGEMENT

Total Quality Management (**TQM**) is the process of applying a **zero defect** philosophy to the management of all resources and relationships within an organization as a means of developing and sustaining a culture of **continuous improvement** which focuses on meeting customer expectations.

Quality means

- How well a product is made or service is performed
- How well it fulfills its purpose
- How it measures up against its rivals

Importance of quality: In modern business environment, there are some changes in customers' behaviour

- Now customer emphasis on quality rather than quantity.
- Customer prefers timely deliveries
- It prefers reliable product with best quality

Quality management becomes total when it applies on process of TQM:

Step 1: Establish standards of quality for a product or service

Step 2: Determine procedures or methods through which required standards of quality can meet

Step 3: Monitor actual quality achieved and compare it with required standards

Step 4: Take control actions if the required standards are not met.

Principles of TQM

1. **Get it right, first time:** Cost of preventing mistake is always less than cost of correcting. So the basic aim is to get things right first time. Cost of mistakes/ delay/ misunderstanding:
 - Waste of time
 - Waste of efforts
 - Loss of goodwill
 - Loss of future sales
 - Loss of money
 - Material wastage
2. **Continuous improvements:** Second principle of TQM is continuous improvement in quality. It means get it more right next time
3. **Customer focused:** The product should meet all the requirements of the customer.

Quality costs

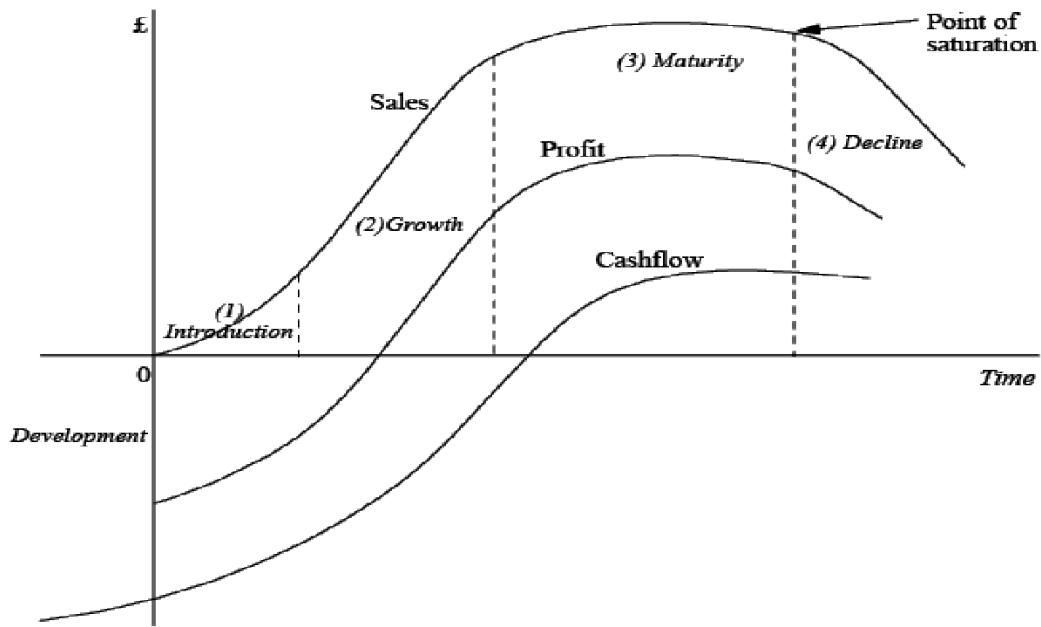
1. **Internal failure costs:** These costs arise from inadequate quality where the problem is discovered before the transfer of ownership from supplier to buyers.
 - Rework costs
 - Down time or idle time due to quality problem
 - Disposal of defective products
 - Re-inspection cost
 - Cost of reviewing product after failure
2. **External failure costs:** The cost arising from poor quality discovered after the transfer of ownership from suppliers to buyers.
 - Warranty claims
 - Cost of lost sales
 - Cost of customer service section
 - Complaint, investigation and processing costs
3. **Appraisal costs:** It is a cost incurred in initial ascertaining the product to quality requirement
 - Inspection and tests
 - Product quality audits
 - Process control monitoring
 - Test equipment expense
4. **Prevention costs:** Cost of any action taken to prevent or reduce defects of failures
 - Customer surveys
 - research of customer needs
 - quality education and training programs
 - supplier reviews
 - investment in improved production equipment

✓ LIFE CYCLE COSTING

It tracks and accumulates costs and revenues attributable to each product over the entire product life cycle. A product life cycle can be divided into four phases:

1. Introduction
2. Growth
3. Maturity

4. Decline



1. Introduction

- Product introduced in market
- Heavy capital expenses on product development
- Potential customers will be unaware
- Very low demand
- Start earning some revenue
- More spending on advertisement
- Try to gain market share

2. Growth

- Gaining market
- Create demand
- Increase in sales revenue
- Start gaining profit
- Initial costs of investment are gradually recovered

3. Maturity

- Stable demand
- Continue to be profitable
- To sustain demand modification or improvement is required

4. Decline

- Saturation point
- Fall in demand
- May become loss maker
- At this time organization stops selling the product

Not all products follow this cycle, but it remains useful tool when considering decisions such as pricing.

Life cycle costing versus traditional absorption costing:

- Traditional costing system is based on financial accounting year and it divides product lifecycle into a series of 12 month period. It assesses profitability of a product on a periodic basis whereas life cycle costing tracks and accumulates actual costs and revenue to each product over the entire product life.
- Traditional costing system does not relate research costs to the products that caused them. Instead they write off these costs on annual basis against the revenue generated by existing products. Through which the existing products seems to be less profitable than they actually are. Whereas in life cycle costing research cost is charged to the product which actually causes it.
- Traditional costing system charge non-production cost as period cost but life cycle costing charge non-production to which it relates.

Advantages of Life Cycle Costing

- Full understanding of individual product profitability
- More accurate feedback information
- Cost reduction and revenue expansion opportunities more apparent
- Increased visibility of non-production costs

✓ TARGET COSTING

Target costing involves setting a cost by subtracting a desired profit margin from a competitive market price. To compete in current competitive market, organisation must continually redesign the process so profit life cycles have become much shorter. Now days many costs are committed at planning and designing stage of a product. Target costing have great impact on design stage to reduce cost.

Steps involved in implementing target costing system

- Step 1:** Determine a product specification for which sales volume is estimated.
- Step 2:** Set a selling price at which market share can be achieved
- Step 3:** Estimate the organisation's required profit
- Step 4:** Calculate target cost = target selling price – target profit
- Step 5:** Determine estimated cost of that product based on defined specifications
- Step 6:** Calculate cost gap = estimated cost – target cost
- Step 7:** Make efforts to close the gap. Try to close the gap at planning stage rather than controlling cost after arising gap.

When a product is manufactured, its target cost may be very low as compared to currently attainable cost. Management have to reduce costs through:

- Reducing number of components
- Proper training
- Use new technology
- Remove any non-value adding activity
- Using different materials
- Use low paid staff

These techniques are known as value engineering.

Even if the product can be produced within target cost, target costing can be applied to throughout the entire life cycle. Once target cost is achieved, it gradually reduces and reduction is incorporated into budget process (continuous cost saving).

Target costing versus traditional absorption costing

- Traditional method develop a product , determine production cost, set a selling price with a resulting profit or loss whereas target cost determines the selling price from the market, deduct the desired profit margin and this results in the target cost which must be achieved.

Job and Batch Costing

- **Specific order costing** method is used when the work consists of separately identifiable jobs, batches or contracts. Work only commences after an order is received.
- **Continuous operation costing** method is used when there is a continuous flow of identical units. Process costing is a typical form of continuous production process.

✓ JOB COSTING

A job is a cost unit which consists of a single order or contract. It consists of a single order undertaken to customers' special requirements and is usually for a short duration.

It relates to a costing system where each unit of batch of output is unique. This creates the need for the cost of each unit to be calculated separately.

JOB COSTING PROCEDURES

The normal procedure in jobbing organizations involves:

- An initial enquiry is received from a customer.
- Details are confirmed and agreed with the customer as to the precise dimensions, quality of materials, quality of finished goods, required delivery date, etc.
- A cost estimate is prepared based on the requirement of the customer.
- A profit markup or margin will be added to the total estimated cost in order to calculate a quotation (selling price) for the job.
- If the estimate is accepted the job can be scheduled. All the material, labour or equipment required will be arranged.
- After the completion of the job, actual cost of the job will compare with the estimated selling price for the calculation of actual profit.

Job Sheet/Job Card

Cost of each job is recorded on a job sheet or job card. It is separately prepared for each job because each job is different from another job.

A typical job cost card is as follows:

	\$
Direct material	X
Direct labour	X
Direct expense	<u>X</u>
Prime cost	X
Production overheads (absorbed)	<u>X</u>
Production cost	X
Non- manufacturing overheads	<u>X</u>
Total cost	X
mark up/margin	<u>X</u>
Selling price	X

COLLECTION OF JOB COST INFORMATION

Direct material Cost:

- Estimated material cost will be calculated by valuing the material included in the quotation and cost of material purchased specifically for the job shall also be estimated.
- Actual material cost is taken from the material requisitions and by applying values to issues or from the invoices of material specifically purchased.

Direct Labour Cost:

- Estimated labour time requirement will be determined from similar jobs from the past. Labour rate will need to be considered for any increase or overtime.
- Actual labour hours are recorded over time sheets or on job cards. Actual labour cost is calculated using information about the hours (from the job card) and labour rate (predefined rate)

Direct Expenses:

- Estimated expenses shall be determined from the suppliers.
- Details of actual expenses will be determined from the invoices.

Production Overheads:

- Estimated production overheads will be calculated from overhead absorption rate is operation based on an estimated activity level (like budgeted labour hours).
- Actual production overheads are charged to the job using absorption rate and actual results (like actual labour hours). This means absorbed overheads are charged to jobs.

Non-Manufacturing Overheads:

- Non-Manufacturing overheads are charged to a job as a percentage of some cost such as Prime Cost, Production Cost etc.

Profit:

- Usual method of setting a selling price is cost plus pricing method. This method adds a profit to total cost to arrive at a selling price. The final price to be charged will be affected by what competitors charge and by what a customer is willing to pay.

TREATMENT OF RECTIFICATION WORK

Rectification cost is the cost incurred in rectifying sub-standard outputs.

Rectification is necessary where defects are discovered during the job or after completion of the job which requires additional work to be done. Sub-standard output returned to that department where the fault arises.

Rectification cost can be treated in two ways:

- If rectification work is not a frequent occurrence and can be identified with a specific job, then rectification costs should be charged as a direct cost to the job concerned.
- If rectification work is regarded as a normal part of the work, then rectification cost should be treated as production overheads and absorbed into the cost of all jobs for the period using overhead absorption rate.

USES OF JOB COSTING INFORMATION

- In making a decision as to the lowest price at which a job should be undertaken.
- In the estimation of a price for quotation to the customer.
- In the valuation of the partly completed job for balance sheet purpose.
- In the comparison of actual with budgeted data to facilitate operational control and for future cost or price estimation.

Work In Progress:

At the period end, the value of work in progress is simply the sum of cost incurred on incomplete jobs (charged as closing work in progress).

✓ BATCH COSTING

Batch costing is very much similar to that of job costing. A batch of identical products is treated as an individual job. A batch is a cost unit where a quantity of identical items is manufactured. It consists of a separate, readily identifiable group of product units which maintains their separate identity throughout the production process.

Batch costing is essentially a variation of job costing. Instead of a single job, a number of product units are manufactured as a batch. Batches may be made specifically to customer requirements or produced for holding in stock prior to sale. The procedures for costing batches are very similar to job costing. Once the batch is completed, the cost per unit can be calculated.

$$\text{Cost per unit} = \frac{\text{Total batch cost}}{\text{In a batch} \quad \text{Number of units}}$$

Uses of batch costing

Batch costing is appropriate in following circumstances:

- Where similar number of items are made for each order.
- Where a business produces a single item to meet customer's specifications but where the product being made contains components that are also used in other products. Such components will be made in batches.

Service Costing

Service costing is a costing method concerned with establishing the cost, not for items of production, but the cost of services provided. It is also called operation or function costing.

Service organisations do not make or sell tangible goods. Profit seeking service organisations include accountancy firms, law firms, transport companies, hair salons, banks and hotels. Non-profit organisations include hospitals, schools and libraries.

THE USE OF SERVICE COSTING

Service costing is used in:

- **External Services:** provided by a company in a service industry, for example car hiring services, transport services, courier services, etc.
- **Internal Services:** carried out by internal departments of a company, for example the costs of the vans or lorries used in distribution departments, the costs in computer departments or costs for staff canteens.

FEATURES OF SERVICE COSTING

1. **Intangibility:** Output is 'intangible' rather than a tangible product.
2. **Perishability:** Services are not 'storable' and cannot be bought in bulk.
3. **Simultaneity:** Service is performed and consumed simultaneously.
4. **Heterogeneity:** Nature and output is never standardized as human input is a major element of a service
5. **Cost nature:** In a service industry sector a higher proportion of costs incurred are indirect as compared to direct
6. **Composite cost units:** More than one cost units like cost per patient/night, cost per passenger/mile.

SERVICE COSTING COMPARED WITH PRODUCT COSTING

- Labour element in service costing is more prominent than material used
- There is no standardized process for recording of material, labour and other expenses. These all vary subject to nature of service
- Not all services are revenue generating; customer service centres, distribution facility, libraries etc are main examples. So purpose of service costing may not, necessarily, be establishing a profit or loss attributable to that service but rather to provide the management with costs associated and efficiency and effectiveness of service being provided.

THE UNIT COST MEASUREMENT

One particular problem with service costing is the difficulty in defining a realistic cost unit that represents a suitable measure of the service provided. Frequently, a **composite cost unit** may be deemed more appropriate. Hotels, for example, may use the 'occupied bed-night' as an appropriate unit for cost ascertainment and control.

Other typical cost units that can be used include:

Services	Cost unit
Transport company	Passenger/kilometer ton/mile or kilometer
Education	Student/subject
Hospital	Patient/night
Canteen	meals served

Cost per service unit = Total service costs for the period
Number of services provided in the period

Occupancy of service = Number of services provided in the period x 100
Number of services available in the period

Service Cost Analysis:

- Planned cost should be compared with actual costs.
- A cost per unit of service should be calculated and it should be used as part of control function.
- Prices should be calculated for services being sold to third parties, similar procedure to job costing.
- Cost should be analysed into fixed, variable and semi-variable to assist in planning, control and decision making.

PROCESS COSTING

Process costing is a costing method which is applicable in industries producing homogeneous products in large quantities. The purpose of process costing is a typical one for example stock valuation. It is also called continuous order costing.

FEATURES OF PROCESS COSTING

- Homogeneous production (Large Quantities) identical products.
- Production is continuous (2 or 3 or more processes) like oil refining, paper making and chemical manufacturing.

Some important terms and concepts related to process costing are as follows:

- If finished products are produced by more than one process, then **output of first** process becomes the **input of the next** process.
- There might be some **incomplete products** at the end of the period; they are called **work in progress** units.
- **Work in progress** might **not be complete** with respect to all the cost so **equivalent units** should be calculated.
- **Conversion cost** = Direct labour cost + Direct expenses + Production overheads.
- During production process, some units might get lost, and if the **loss is not more than the expected** loss then it is called as **NORMAL Loss** (ignored in the calculation).
- If the **loss is more than the expected** loss, then it is called as **ABNORMAL Loss** of the process. It should be treated in the calculation.
- If the **output units are greater than the expected** output, then the extra units produced are called as **ABNORMAL GAIN**. Abnormal Gain must be treated in calculation.
- In some industries, there might be a chance of joint and By-products. **By-products should be treated as NORMAL LOSS.**
- **Loses** might have a **certain resale value**, that value is called the “**Scrap Value**”.
- **Losses** might have to dispose of at some cost to company, that cost is called “**Disposal value**”.

STEPS TO SOLVE QUESTION

1. Prepare a process account.
2. Calculate equivalent units.
3. Calculate the cost of an equivalent unit.
4. Find the cost of finished goods.
5. If there is work in progress at the end, calculate the cost of work in progress / abnormal loss / abnormal gain.

Concept of Equivalent Units: *Equivalent unit refers to a notional quantity of completed units substituted for an actual quantity of incomplete physical units in progress.*

A process is continuous in nature and at the end of a period there may be some units, which have been started but have not been completed. These partially completed units are known as **work-in progress**. The existence of work-in-progress gives a problem in computing the average cost per unit as production units will be at different degree of completions, therefore we cannot simply take total cost divided by total output.

It becomes more complicated if the degree of completions varies for various cost elements. For example, materials may be added at the start of the process, and are thus fully complete, whereas labour and

manufacturing overheads (conversion cost) may be added uniformly throughout the process. Hence, the ending work in progress may consist of materials that are 100% complete and conversion cost that is only partially complete.

For this problem, we need to calculate equivalent units.

Please note:

- The equivalent unit for one normal loss output is 0 as the company can predict for the normal loss when determining the cost per normal output unit.
- The equivalent unit for one abnormal gain or loss output is 1 since the company cannot predict it when calculating the cost per normal output unit.

LOSSES DURING THE PROCESS

- **Normal Loss:** *Normal Loss is an expected loss of the process* and its units are ignored while calculating equivalent units. If normal loss has a scrap value, the value of this loss is set off against the cost of production usually material.
- **Abnormal Loss:** *Abnormal Loss arises when actual loss is more than expected loss.* Abnormal Loss is the amount by which actual output from a process less than the expected output. Cost of one unit of abnormal loss is same as one unit of output. The cost of abnormal loss is charged to profit and loss account in the period in which it occurs.
If abnormal loss has a scrap value, the amount of scrap value will be set off against the amount to be written off to profit and loss account and not in the process account. In process account abnormal loss units are valued at average cost per unit.
- **Abnormal Gain:** *Abnormal Gain is the amount by which actual output from a process exceeds the expected output.* It is the amount by which actual loss is less than the expected loss. So, **Abnormal Gain is exactly opposite to Abnormal Loss.** Cost of one unit of abnormal gain is same as one unit of output. Abnormal Gain is recorded in Process account and in Abnormal Gain account. The Abnormal Gain is then taken to profit and loss account as an item of income.

Losses with disposal cost

Sometimes loss units have a disposal cost rather than some scrap value; for example, additional cost is incurred in disposing them off. To deal with such a situation remember the following points (opposite to scrap value):

- Debit the disposal cost of normal loss units to process costs. The resulting amount would be used to value good output and abnormal loss/gain
- Normal loss appears in process cost with nil value
- Disposal cost of abnormal loss units is included in abnormal loss account and therefore is transferred to income statement

Example 1: During a 2-week period, period 1, costs of input to a process were \$30,000. Input was 2,000 units, output was 1,700 units and a normal loss is 10%, with a scrap value of \$1.5 per unit. During the next period, period 2, costs of input were again \$30,000. Input was again 2,000 units, normal loss is 10%, with scrap value of \$1.5 per unit but output was 1,900 units. There were no units of opening or closing inventory.

Required: Prepare process account.

Solution:**Period 1:****Process Account**

	units	\$		units	\$
<i>Input</i>	2,000	30,000	<i>Finished goods</i>	1,700	28,050
			<i>Normal loss</i>	200	300
			<i>Abnormal loss</i>	100	1,650
Total	2,000	30,000	Total	2,000	30,000

Equivalent units: $1,700 + 100 = 1,800$ units**Cost per unit:** $\frac{30,000 - 300}{1,800} = \16.5 per unit

1,800

Cost of output: $1,700 \times 16.5 = \$28,050$ **Cost of abnormal loss:** $100 \times 16.5 = \$1,650$ **Period 2:****Process Account**

	units	\$		units	\$
<i>Input</i>	2,000	30,000	<i>Finished goods</i>	1,900	31,350
			<i>Normal loss</i>	200	300
<i>Abnormal gain</i>	100	1,650			
Total	2,100	31,650	Total	2,100	31,650

Equivalent units: $1,900 - 100 = 1,800$ units**Cost per unit:** $\frac{30,000 - 300}{1,800} = \16.5 per unit

1,800

Cost of output: $1,900 \times 16.5 = \$31,350$ **Cost of abnormal gain:** $100 \times 16.5 = \$1,650$ **VALUING WORK IN PROGRESS**

- **Closing work in progress:** Where there are units partially completed at the end of the period, it has to be recorded in the books. To deal with this situation equivalent units are calculated. A value is then placed to closing work in progress.

Following assumptions are made when calculating equivalent units:

- Material is completely added at the start of the process and therefore a unit is assumed to be 100% complete with respect to material unless stated otherwise.
- Labour and overheads are assumed to be incurred evenly over the production process. So when a unit is referred to be 50% complete with respect to labour and overhead that means that unit is half complete with respect to labour and overheads although it might be 100% complete for material.

- **Opening work in progress:** Units left partially completed at the end of the period are treated as *Opening WIP* for the next period. International Accounting Standard (IAS) 2 Inventories allows two methods for inventory valuation:

- First in first out (FIFO)
- Weighted average method

Which method to use for valuation of opening inventory?

FIFO inventory valuation technique is normally used and should be used in examination unless specifically stated otherwise.

Remember the following rule:

- If degree of completion of each cost element is not provided in the question but just the value of each cost element, use weighted average method.
- If, on the other hand, degree of completion is provided for each cost element but not the value of each cost element, use FIFO method.

Example 2: BR Ltd makes a product requiring several successive processes. Details of the first process are as follows:

Opening WIP 400 units

Degree of completion:

Material (valued at \$19,880)	100%
Conversion (valued at \$3,775)	25%
Units transferred to process 2	1700 units
Closing WIP	300 units

Degree of completion:

Materials	100%
Conversion	50%

Costs incurred in the period :

Material	\$100,000
Conversion	\$86,000

There were no process losses.

Required: Prepare the process account for august using:

- Weighted average method.
- FIFO method.

Solution:**a) Weighted Average Method****Process Account**

	units	\$		units	\$
<i>Opening WIP</i>	400	23,655	<i>Finished goods</i>	1,700	184,394
<i>Material</i>	1,600	100,000	<i>Closing WIP</i>	300	25,261
<i>Conversion</i>		86,000			
Total	2,000	209,655	Total	2,000	209,655

Equivalent units:

Material: $1,700 + (300 \times 100\%) = 2,000 \text{ units}$

Conversion: $1,700 + (300 \times 50\%) = 1,850 \text{ units}$

Cost per unit:

Materials: $(\$19,880 + \$100,000) / 2,000 \text{ units} = \59.94 per unit

Conversion: $(\$3,775 + \$86,000) / 1,850 \text{ units} = \48.527 per unit

Total cost per unit: $\$59.94 + \$48.527 = \$108.467 \text{ per unit}$

Cost of Finished Goods: $1,700 \times \$108.467 = \$184,394$

Cost of Closing WIP:

Materials: $(300 \times 100\%) \times \$59.94 = \$17,982$

Conversion: $(300 \times 50\%) \times \$48.527 = \$7,279$
 $\underline{\$25,261}$

b) **FIFO (First in first out)**

Process Account

	units	\$		units	\$
Opening WIP	400	23,655	Finished goods	1,700	183,534
Material	1,600	100,000	Closing WIP	300	26121
Conversion		86,000			
Total	2,000	209,655	Total	2,000	209,655

Equivalent units: (Opening WIP x remaining percentage of completion) + Units input n transferred to output in the period + (closing WIP x percentage of completion).

Material: $(400 \times 0\%) + 1,300 + (300 \times 100\%) = 1,600 \text{ units}$

Conversion: $(400 \times 75\%) + 1,300 + (300 \times 50\%) = 1,750 \text{ units}$

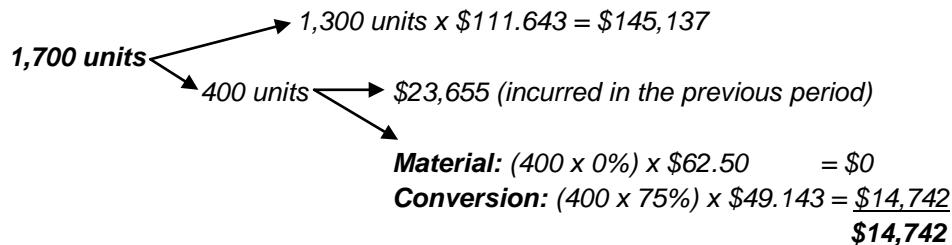
Cost per unit:

Materials: $\$100,000 / 1,600 \text{ units} = \62.50 per unit

Conversion: $\$86,000 / 1,750 \text{ units} = \49.143 per unit

Total cost per unit: $\$62.50 + \$49.143 = \$111.643 \text{ per unit}$

Cost of Finished Goods:



Total cost of finished goods: $\$145,137 + \$23,655 + \$14,742 = \$183,534$

Cost of Closing WIP:

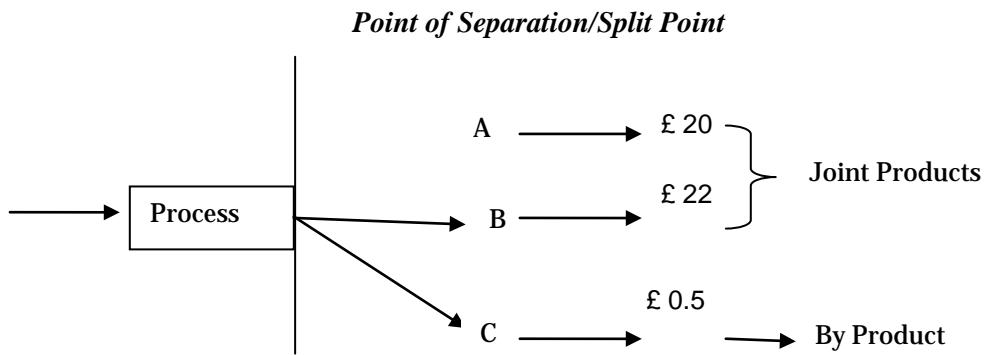
Materials: $(300 \times 100\%) \times \$62.50 = \$18,750$

Conversion: $(300 \times 50\%) \times \$49.143 = \$7,371$
 $\underline{\$26,121}$

JOINT AND BY PRODUCTS

Joint Products: Joint Products are produced from the same process but which have significant sales value at point of separation.

By Products: By Products on the other hand are the output of the same process but they have a very small sales value as compared with the value of main products.



APPORTIONMENT OF JOINT COST INTO JOINT PRODUCTS

Process account will be as normal. The joint cost of the joint products is distributed according to these methods:

1. Physical measurement/volume at point of separation
2. Sales value at point of separation
3. Net realizable value at point of separation

ACCOUNTING TREATMENT FOR BY-PRODUCTS

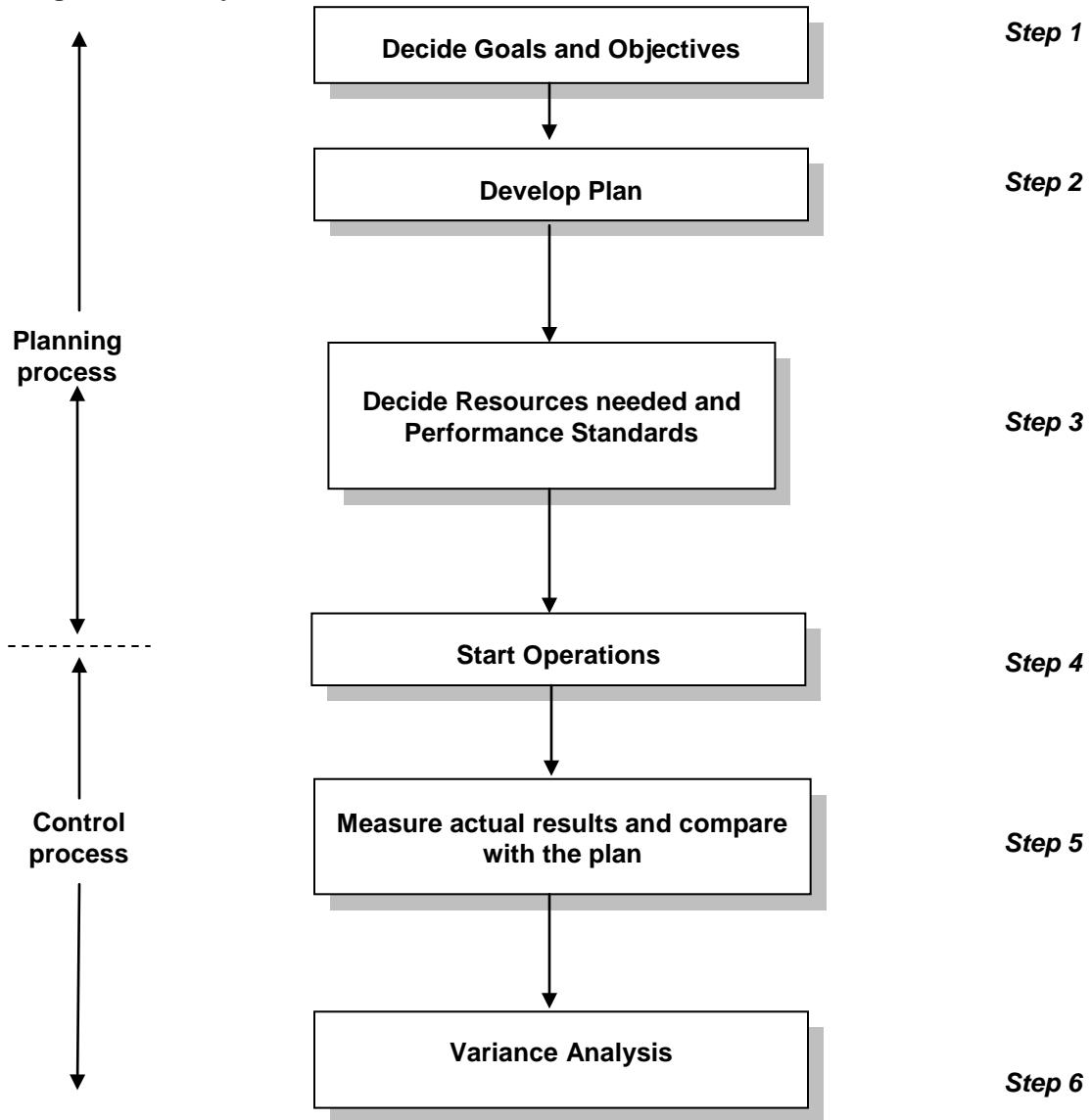
In process costing, By Products are treated as normal losses and the sales value of By Product is treated as scrap value of normal loss.

1. Income from by product added to sales of main product
2. Income from by product treated as a separate source of income
3. Sales income of by product deducted from the cost of production
4. Net realisable value of by product deducted from the cost of production

	Joint product	By product
Nature	It's a main product	Supplementary product
Realizable value	High sales value	Low sales value
Accounting	All the joint products are separately accounted for	A by-product is not separately costed.

Budgeting

Planning & Control Cycle



Most organizations have long term goals which can be divided into objectives and action plan.

Objective: Measurable steps towards achieving the goals.

Action plan: Detailed steps for achieving the objectives. Action plans are often expressed in money terms and usually called budget.

Budget: An organization's plan for a forthcoming period, expressed in monetary terms.

Forecasts and budgets are not the same thing. Forecast is a prediction of what is likely to happen. A budget is a target, not a prediction, which has to be achieved. Any difference between the planned results and the actual results are called variances.

THE MAIN PURPOSE OF BUDGETING

Budget generally refers to a list of all planned expenses and revenues. The purpose of budgeting is to:

- Provide a forecast of revenues and expenditures i.e. construct a model of how our business might perform financially speaking if certain strategies, events and plans are carried out.
- Enable the actual financial operation of the business to be measured against the forecast.

Department managers in a business are responsible for making decisions on daily basis that affect the profitability of the business. In order to make effective decisions and coordinate the decisions and actions of the various departments, a business needs to have a plan for its operations. Planning the financial operations of a business is called budgeting. A budget is a written financial plan of a business for a specific period of time, expressed in currency and units. Each area of a business's operations typically has a separate budget. For example, a business might have a marketing budget, a production budget, a sales budget, a purchase budget, a research and development budget, and a cash budget.

The main aims of preparing budgets include:

- To ensure the fulfillment of organization's objectives.
- A framework for responsibility accounting.
- Planning for the future.
- Best utilization of resources.
- Cost controlling.
- To ensure proper co-ordination.
- To motivate employees.
- Performance appraisals.
- Defining authorities.

Budgets are therefore set in consultation with all the stakeholders in order to ensure that budget setting objectives are achieved.

THE BUDGET SETTING PROCESS

Before budget setting process is commenced, long-term goals of the organization must be considered. Budget is always set taking account of organizational goals. Budgets are steps towards the achievement of long term goals of the organization and hence budgets ensure the progress towards the ultimate goal of the organization.

Administration of Budget:

1. **Budget manual:** It is a collection of instructions governing the responsibilities of persons. It is usually prepared by management accountant.

It includes:

- Object of budgets
- Organisation structure
- Guide line regarding making budgets
- Formats and layouts of budgets
- Interdependence of budgets
- Budget Deadlines

2. **Budget period:** Budget period is a time period to which budget relates.
3. **Responsibilities of preparing budgets:** Managers responsible for preparing budgets ideally be the managers who are responsible for carrying out the budget.
4. **Budget committee:** Budget committee is usually responsible for coordination and administration of budgets. Members of budget committee are:
 - Managing directors as chairman
 - Accountant as budget officer (for assistance)
 - Representatives from each department (sales, production, marketing).

Functions of budget committee:

- Coordination for budget preparation
- Issue timetables for functional budgets
- Assign responsibilities of budget preparation
- Provide information which is required for budget
- Communicate final budget to appropriate managers
- Variance calculation and investigation
- Continuous assessment of budgetary process.

Budget Preparation

1. Communicate budget details and guidelines to responsible person.
2. Determine **Principal Budget Factor**.
 - *Principal budget factor is the factor that limits an organization's activity for a given period.*
 - It is often the starting point in budget preparation.
 - It is also known as **key budget factor** or **limiting budget factor**.
 - Usually it is **Sales demand** or any **Limiting Factor**.
 - All the other budgets are dependent upon it.
3. Prepare budget of principal budget factor.
4. Prepare functional budgets dependent upon Principal budget. *Functional budgets include:*
 - Production cost budget
 - Resources budget
 - Machine utilization
 - Material usage budget
 - Purchasing budget
 - Labour budget
 - Overhead budget
 - Marketing cost budget
 - Personnel budget
 - Research and development budget
5. Prepare **Master Budget**.

It includes:

 - *Cash budget:* This shows anticipated sources and uses of cash for the forthcoming budget period. Short run deficits and surpluses are identified to enable the appropriate action to be taken.

- *Budgeted income statement*
 - *Budgeted balance sheet*
6. Negotiate budgets with seniors for approval.
 7. Coordination of budgets because some budgets are out of balances with others and need modifications.
 8. Final acceptance of budgets.
 9. Budget reviews.

FUNCTIONAL BUDGETS

- **Sales Budget:** Sales figure is subject to market demand so it is mostly principal budget factor and hence sales budget is prepared before any other budget.
 $= \text{expected sales demand (units)} \times \text{selling price per unit}$
- **Production Budget:** Production budget is prepared based on sales budget. But if production capacity is principal budgeting factor then production budget factor is prepared first. To find out whether production is principal budget factor consider the following:
 - Availability of materials
 - Availability of labour
 - Machine capacity $= \text{Budgeted sales units} + \text{Closing stock} - \text{Opening stock}$
- **Material Budget:** Material budget are of two types:
 - **Material usage budget:**
 $= \text{Budgeted number of units for production} \times \text{material quantity required per unit}$
 - **Material purchase budget:** it equals to
 $= \text{Material usage budget} + \text{Closing inventory of material} - \text{Opening inventory of material}$
- **Labour budget:** Labour budget is calculated simply by multiplying number of hours required for production to labour rate per hour.
 - $\text{Budgeted labour hours} = \text{budgeted production units} \times \text{standard hours per unit}$
 - $\text{Budgeted labour cost} = \text{Budgeted labour hours} \times \text{standard hourly rate}$

Labour budget based on standard hour

Productivity is often described in terms of standard hour. A standard hour describes the amount of work that is achievable at standard efficiency level. This concept is particularly useful when dissimilar units are being produced in a factory and management is interested to determine the production level of each product.

If there is a shortfall of labour hours, management can take a number of steps to address the problem:

- Recruit more workers
- Offer better overtime rates
- Offer incentives for labour force for achieving production targets
- Address the causes of scrap output

- Reduce closing inventory requirement
- **Production overheads budget:** Unlike non-production overheads budget for production overheads can be set quite comfortably as production overheads are directly related to production.
- **Non-production overheads:** As non-production overheads are not related to production but rather fixed in nature like administration overheads and research overheads. Fixed costs can be predicted in advance but the costs that incur subject to management decisions are harder to predict at the start of the period.

MASTER BUDGET

The master budget is the budget into which all subsidiary budgets are consolidated. The master budget normally comprises:

- Budgeted income statement
- Budgeted balance sheet
- Budgeted cash flow statement (cash budget).

The master budgets will be drawn up after all the functional budgets have been approved.

- **Budgeted income statement:** The budgeted income statement is prepared by summarising the functional budgets.
- **Budgeted balance sheet:** The budgeted balance sheet will show the likely financial position at the end of the budget period.
- **Cash budget:** 'A cash budget is a detailed budget of cash inflows and outflows incorporating both revenue and capital items.'
 - Consider only cash items
 - Ignore non-cash items like depreciation, provisions etc
 - Take cash flows at the time of receipt and payment not at transaction time

The cash budget shows the cash position as a result of all plans made during the budgetary process and gives management the opportunity to take appropriate control action. Cash budget is an important part of the budgeting process and an important working capital management tool. These, produced on a monthly basis, will allow a firm to identify when cash surpluses or deficits are likely to arise so that suitable steps (investing or borrowing) can be planned.

Appropriate control actions for cash:

Short term surplus: Pay payables early to obtain discount or make short term investments

Short term deficit: Increase payables, reduce receivables, and arrange an overdraft

Long term surplus: Expand, diversify, replace /update fix assets

Long term deficit: Issue share capital, consider shutdown /divestment opportunities

The production of this budget in practices and in exam questions will follow a similar pattern:

- Forecast sales
- Identify debtor payment patterns
- Calculate cash receipts
- Produce functional budgets to determine production, materials usage, materials purchases, labor requirements, and other costs.
- Calculate cash payments
- Find net cash flow
- Calculate surplus /deficit and closing cash balances

FIXED AND FLEXIBLE BUDGETS

- **Fixed budget:** A budget which remains unchanged regardless of activity level is called fixed budget.
 - A fixed budget is prepared based on an estimated production plan at the start of a period.
 - It does not give like with like comparison.
 - Commonly used in service industries where most costs are fixed.
 - It does not give fair performance evaluation.
 - Fixed budget is normally prepared for planning purpose.

- **Flexible or flex Budgets:** A budget that flexes the budgeted level of costs and revenues according to the level of activity actually achieved.
 - Budget is initially prepared at the anticipated level of activity.
 - The budgeted production level and the actual production level may not be the same.
 - Budgets may need to be adjusted to reflect the actual production level
 - The new budget, flexed to the actual production level is called the flexed budget.
 - The budget prepared on different activity levels is called flexible budget.
 - For variance reporting, actual costs are compared with the flexed budget for the same volume of production and sales.
 - Variance can be either **favourable** or **adverse**. Appropriate control action is then taken to control variances.
 - It gives like with like comparison.
 - It determines cost behaviour patterns.
 - It gives realistic performance evaluation.

Variance Reporting: It is the reporting of differences between budgeted and actual performance

$$\text{Variance} = \text{Actual} - \text{Budget (flex budget)}$$

Variances are:

Favourable if the business has more money as a result

Unfavourable (Adverse) if the business has less money as a result

Favourable variances are NOT always good for the organisation. For example if the essential staff is not hired the labour variance will be favourable but this may also mean that the production targets will not be met.

BEHAVIOURAL ASPECTS OF BUDGETING

It is very easy for the budgetary process to cause dysfunctional activity. For example, if junior management believe that a budget imposed upon them is not attainable, their aim may well be to ensure that the budget is not achieved, thereby proving themselves to be correct. This needs to be avoided, and therefore an understanding of the behavioural aspects is necessary.

Managers may be involved in setting budget targets or these may be imposed by senior management without consultation.

- **Top-down approach / Imposed style of budgeting:** It is a budget, which is set without allowing the ultimate budget holders to have the opportunity to participate in the budgeting process. It is also called 'imposed' budget, or non-participative.

Features

- Senior management prepare budgets
- Imposed on junior management
- Quicker than bottom up approach
- Time saving

The time when imposed budgets are effective

- New organization
- Small businesses
- In period of economic hardship
- When operational personnel have lack of budgeting skills
- When different organization's unit require precise coordination

Advantages

- Strategic plans are incorporated in budgets
- Increased coordination between plans and long-term objectives of the division
- Involvement of senior management in operational decisions
- Decreased input from inexperienced employees
- Time saving

Disadvantages

- low employees morale (hard for people to be motivated to achieve targets set by someone else)
- acceptance of organizational goals & objectives could be limited
- operational managers are likely to have a better understanding of day by day operations
- unachievable budgets (may be for local operations)
- The feeling of team spirit may disappear.
- Lower-level management initiative may be stifled.

➤ **Bottom-up approach / Participative style of budgeting:** Bottom-up budgeting system of budgeting in which budget holders have the opportunity to participate in setting their own budgets.

Features

- Junior management prepare budgets
- Senior management review to ensure consistent with organization objectives
- Risk of budget bias/slacks

Advantages

- Increased morale and motivation
- Should contain better information, especially in a fast-moving or diverse business
- Increases managers' understanding and commitment
- Better communication
- Senior managers can concentrate on strategy.
- In general they are more realistic.
- Individual managers' aspiration levels are more likely to be taken into account.

Disadvantages

- Senior managers may resent loss of control
- Bad decisions from inexperienced managers
- Budgets may not be in line with corporate objectives
- Budget preparation is slower and disputes can arise

- They may cause managers to introduce budgetary slack and budget bias.
- An earlier start to the budgeting process could be required.
- They can support 'empire building' by subordinates.
- Figures may be subject to bias if junior managers either try to impress or set easily achievable targets
- Certain environments may preclude participation, e.g. sales manager may be faced with long-term contracts already agreed.

Whilst bottom-up is generally seen as preferable, there are situations where top-down is applicable.

➤ **Negotiated style of budgeting:** A budget in which budget allowances are set largely on the basis of negotiations between budget holders and those to whom they report.

At the two extremes, budgets can be dictated from above or simply emerge from below but, in practice, different levels of management often agree budgets by a process of negotiation. In the imposed budget approach, operational managers will try to negotiate with senior managers the budget targets which they consider to be unreasonable or unrealistic. Likewise senior management usually reviews and revises budgets presented to them under a participative approach through a process of negotiation with lower level managers.

Final budgets are therefore most likely to lie between what top management would really like and what junior managers believe is feasible. The budgeting process is hence a **bargaining process** and it is this bargaining which is of vital importance, **determining whether the budget is an effective management tool or simply a clerical device.**

Budgetary slacks (also called budget padding): Budgetary slack is the difference between the minimum necessary costs and the costs built into the budget or actually incurred.

- In the process of budgeting, managers might deliberately overestimate cost and underestimate sales, so that they will not be blamed in the future for overspending and poor results.
- Manager of profit centre might underestimate budgeted sales and/or overstate budgeted expenditure (budgetary slack).

Reasons

- Reward systems may be linked to performance compared with budget. This encourages the manager to build slack into the budget to maximize personal gain.
- To reduce work related stress by having easier targets.
- "Gaming" – some individuals enjoy trying to beat the system.

BEHAVIOURAL IMPLICATIONS OF BUDGETING

"Used correctly a budgetary control system can **motivate** but it can also produce undesirable **negative reactions.**" The purpose of a budgetary control system is to assist management in planning and controlling the resources of their organization by providing appropriate control information. The information will only be valuable, however, if it is interpreted correctly and used purposefully by managers and employees.

Their attitude to control information will colour their views on what they should do with it and a number of behavioral problems can arise.

- The managers who set the budget or standards are often not the managers who are then made responsible for achieving budget targets.
- The goals of the organization as a whole, as expressed in a budget, may not coincide with the

personal aspirations of individual managers.

- **Control is applied at different stages by different people.** A supervisor might get weekly control reports, and act on them; his superior might get monthly control reports, and decide to take different control action. Different managers can get in each other's way and resent the interference from others.

Motivation:

Motivation is what makes people behave in the way that they do. It comes from individual attitudes, or group attitudes. Individuals will be motivated by personal desires and interests. It is therefore vital that the goals of management and the employees harmonise with the goals of the organization as a whole. This is known as **goal congruence**.

The management accountant should therefore try to ensure that employees have positive attitudes towards **setting budgets, implementing budgets**. (that is, putting the organization's plans into practice) and feedback of results (**control information**). If this desirable state of affairs does not exist the organization is at risk of under-performing as a result of dysfunctional decision-making.

- **Goal congruence** is the state which leads individuals or groups to take actions that are in their self-interest and also in the best interest of the organization.
- **Dysfunctional decision making** occurs when goal congruence does not exist or is impaired. Managers and others take decisions that promote their self-interest at the expense of the interest of the organization.

Poor attitudes when setting budgets

If managers are involved in preparing a budget, poor attitudes or hostile behaviour towards the budgetary control system can begin at the **planning stage**.

- Managers may complain that they are too busy to spend much time on budgeting.
- They may build 'slack' into their expenditure estimates.
- They may argue that formalizing a budget plan on paper is too restricting and that managers should be allowed flexibility in the decisions they take.
- They may set budgets for their budget centre and not coordinate their own plans with those of other budget centres.
- They may base future plans on past results, instead of using the opportunity for formalized planning to look at alternative options and new ideas.

Poor attitudes when putting plans into action

Poor attitudes also arise when a budget is implemented.

- Managers might put in only just enough effort to achieve budget targets, without trying to beat targets.
- A formal budget might encourage rigidity and discourage flexibility.
- Short-term planning in a budget can draw attention away from the longer-term consequences of decisions.
- There might be minimal cooperation and communication between managers.
- Managers will often try to make sure that they spend up to their full budget allowance, and do not overspend, so that they will not be accused of having asked for too much spending allowance in the first place.

Poor attitudes and the use of control information

The attitude of managers towards the accounting control information they receive might reduce the information's effectiveness.

- Management accounting control reports could well be seen as having a relatively **low priority** in the list of management tasks. Managers might take the view that they have more pressing jobs on hand than looking at routine control reports.
- Managers might **resent control information**; they may see it as **part of a system of trying to find fault with their work**. This resentment is likely to be particularly strong when budgets or standards are imposed on managers without allowing them to participate in the budget-setting process.
- If budgets are seen as **pressure devices** to push managers into doing better, control reports will be resented.
- Managers **may not understand the information** in the control reports, because they are unfamiliar with accounting terminology or principles.
- Managers might have a **false sense of what their objectives should be**. A production manager might consider it more important to maintain quality standards regardless of cost. He would then dismiss adverse expenditure variances as inevitable and unavoidable.
- **If there are flaws in the system of recording actual costs**, managers will dismiss control information as unreliable.
- **Control information** might be **received weeks after the end of the period** to which it relates, in which case managers might regard it as out-of-date and no longer useful.
- Managers might be **held responsible for variances outside their control**.

It is therefore obvious that accountants and senior management should try to implement systems that are acceptable to budget holders and which produce positive effects.

Pay as a motivator

Many researchers agree that pay can be an important motivator, when there is a formal link between higher pay (and other rewards, such as promotion) and achieving budget targets. Individuals are likely to work harder to achieve budget if they know that they will be rewarded for their successful efforts. There are, however, problems with using pay as an incentive.

- A serious problem that can arise is that formal reward and performance evaluation systems can encourage dysfunctional behaviour. Many investigations have noted the tendency of managers to pad their budgets either in anticipation of cuts by superiors or to make the subsequent variances more favourable. And there are numerous examples of managers making decisions in response to performance indices, even though the decisions are contrary to the wider purposes of the organization.
- The targets must be challenging, but fair, otherwise individuals will become dissatisfied. Pay can be a demotivator as well as a motivator!

Investment Appraisal

Capital expenditure:

- Expenditure incurred in acquisition of non-current assets.
- It is not charged to income statement although a depreciation charge will usually be made to write off the capital expenditure gradually overtime.
- Capital expenditure appears in statement of financial position.

Revenue expenditure:

- Expenditure incurred for the purpose of trade off the business or to maintain the existing earning capacity of non-current assets.
- It is charged to income statement.

Capital income:

- Income from the sale of non-current assets.

Revenue income:

- Income from the sale of trading assets. It also includes interest and dividend received from investment held by the business.

Capital expenditure budget:

- Capital expenditure budget is a long term plan and is considered very important for the business.
- Major expenses are required for it so most projects are considered individually and are fully appraised.
- Suitable finance must be arranged for capital expenditure.
- Capital expenditure should have a positive value for the business.

Investment appraisal: Investment appraisal techniques are required to determine:

- whether a new project should be accepted
- which of two (or more) projects to accept
- whether to lease or buy a new asset
- How to raise finance for the purchase of an asset

Relevant and irrelevant costs: The cost which is useful for decision making is known as relevant cost. Relevant costing is used in long term decision making and investment decisions. The relevant costs are:

- Only cash items
- Future cash flows
- Incremental cash flows

Following are the examples of some important relevant and irrelevant costs

- **Past or Sunk Cost or Historical cost:** Costs that have been incurred to date are past costs or sunk costs, irrecoverable costs. These are **irrelevant** for decision making because we cannot change the past.
- **Committed cost:** Costs that are already committed to be incurred regardless of the decision made. Committed costs are **irrelevant** to decision. Mostly fixed costs are committed cost.
- **Apportioned cost:** All costs or charges being allocated but without the responsible manager's control or not actual cost are **irrelevant** for decision making. For example absorbed overheads, fixed overheads.

- **Notional cost:** A notional cost or imputed cost is a hypothetical accounting cost to reflect the use of a benefit for which no actual cash expense is incurred. For example Notional rent, notional interest, depreciation, provisions. These are non-cash items and **irrelevant** for decision making.
- **Incremental Cost:** Costs which are additional due to only one specific decision are incremental cost and they are **relevant**.
- **Controllable Cost:** Costs that can be controlled because of one particular decision are controllable costs and they are **relevant** for decision making.
- **Uncontrollable Cost:** Costs which cannot be controlled because of a specific decision are uncontrollable cost and they are **irrelevant** for decision making.
- **Avoidable Cost:** Costs that can be avoided because of one specific decision are avoidable costs and they are **relevant**.
- **Unavoidable Cost:** Costs that cannot be avoided because of one specific decision are unavoidable costs and they are **irrelevant** for decision making.
- **Fixed cost:** Fixed costs are generally **irrelevant** to decision making because they do not change but the **incremental fixed costs** are always **relevant**.
- **Variable cost:** Variable costs are normally **relevant** for decision making.
- **Opportunity Cost:** Opportunity cost is the benefit which has been given up, by choosing one option instead of another. Opportunity costs only apply to the use of scarce resources. Where resources are not scarce, no sacrifice exists from using these resources.
- **Differential/ incremental cost:** Differential cost is the difference in total costs between alternatives. Incremental costs are similar in principle to the economist's concept of marginal cost.

Relevant cost of using machines

Use of machinery will incur some incremental costs:

- Repair cost
- Hire charges
- Fall in resale value

Note: depreciation is irrelevant cost

Cost Behaviour

- Variable costs are usually relevant costs.
- Fixed costs which do not change when the activity level changes irrelevant cost. Fixed cost may only be fixed in the short term.
- Incremental fixed cost is relevant cost.
 - ❖ Additional fixed cost are incurred in a decision to increase an extra activity or
 - ❖ Fixed cost will decrease if the scale of an operation is reduced.

INVESTMENT APPRAISAL METHODS

There are mainly two methods to appraise any prospective investment.

1. Non-discounted cash flow methods (traditional methods)

- Accounting rate of return
- Simple payback period

2. Discounted cash flow methods (DCF methods)

- Discounted payback period
- Net present value
- Internal rate of return

Various surveys have shown that the traditional methods are still more common than the discounted cash flow methods, the theoretically inferior internal rate of return is more commonly used.

1. NON-DISCOUNTED CASH FLOW METHODS (TRADITIONAL METHODS)

➤ Accounting rate of return or Return on capital employed (ARR or ROCE)

This method of appraising the viability of a project over its several years life is similar to the method of assessing the financial performance of a business over a single year.

It is sometimes called an accounting rate of return.

$$\text{Return on capital employed} = \frac{\text{Average accounting profit per annum}}{\text{Capital Employed}} \times 100$$

The profit used is usually after depreciation but before interest and tax

$$\text{Average accounting profit} = \frac{\text{Total profit of all years}}{\text{Number of years}}$$

$$\text{Average investment} = \frac{\text{Initial investment} + \text{scrap value}}{2}$$

Decision rules

If accounting rate of return > Target=>	Accept the project
If accounting rate of return < Target=>	Reject the project

Advantages of Accounting rate of return

- Quick to calculate
- Simple to use and understand
- Familiar concept for managers
- Commonly used by external analysts

Disadvantages of Accounting rate of return

- Accounting profits might not be objectives of the organization
- Different methods of calculation are possible
- It ignores the time value of money
- It considers accounting profits rather than cash flows

➤ Simple payback period

This is the time taken to recover the initial cash flows from the cash inflows of the project. Payback period is the amount of time that is expected to take for the cash inflows from a capital investment project to equal the cash outflows. It is particularly useful if there are liquidity problems or if distant forecasts are very uncertain.

$$\text{Simple payback period} = \text{Initial investment} \div \text{annual cash inflows (in case of annuity)}$$

Decision rules

If Simple payback period < Target	=>	Accept the project
If Simple payback period > Target	=>	Reject the project

Advantages of simple payback period

- It is easy to calculate and understand.
- It is widely used in practice as a first screening method.

- Its use will tend to minimize the effects of risk and help liquidity, because greater weight is given to earlier cash flows which can probably be predicted more accurately than distant cash flows.
- It is based on cash flows rather than profits.

Disadvantages of simple payback period

- Total profitability is ignored.
- The time value of money is ignored.
- It ignores any cash flows that occur after the project has paid for itself. A project that takes time to get off the ground but earns substantial profits once established might be rejected if the payback method is used, whereas a smaller project, paying back more quickly, may be accepted.

INTEREST

Money earned or paid for the use of money is called interest. Interest cost is always on outstanding balance. The two types of interest are.

- **Simple interest:** Interest calculated on principal amount is Simple interest

$$\text{Simple Interest} = \text{Principal amount} \times r \times n$$
- **Compound interest:** Compound interest is calculated on principle amount as well as any previous outstanding interest.

$$\text{Compound Interest} = \text{Principal amount} (1 + r)^n$$

Where,

r = Interest rate

n = Number of years

FUTURE VALUE

Future value is defined as the value or sum of money at a future date at a particular interest rate. Future value is calculated by multiplying present value with a compound factor

$$F.V = P.V (1 + r)^n$$

Where, P.V = Present value

F.V = Future value

r = interest rate / discount rate

n = number of time periods

The method of converting present value into future value is called as compounding.

PRESENT VALUE

Present value is the value which refers to the value of money at today which is to be received in future. The present value of a future sum tells us what a future sum is worth today.

$$P.V = F.V (1 + r)^{-n}$$

Where, P.V = Present value

F.V = Future value

r = interest rate / discount rate

n = number of time periods

The method of converting future value into present value is called as discounting.

TIME VALUE OF MONEY CONCEPT

There is a time preference for receiving the same sum or money sooner rather than later. Conversely, there is a time preference for paying the same sum of money later rather than sooner.

Reasons for Time Preference for Money

There are three very important reasons why money has a time preference.

- **Consumption Preference** – money received now can be spent on consumption
- **Risk preference** – risk disappears once money is received.
- **Investment preference** – money received can be invested in the business, or invested externally.

2. DISCOUNTED CASH FLOW METHODS (DCF METHODS)

Principles behind DCF methods

- It recognize the “time value of money” (having the use of money has a cost for example interest)
- People would prefer to receive money sooner rather than later
- Investors don’t attach equal values to equal sums of money receivable at different times
- In investment appraisal calculations, reduce (discount) later cash flows
- The discounting process is sometimes thought of as compound interest in reverse

➤ Discounted payback period

Discounted payback period is same as simple payback period with the difference that cash flows are discounted cash flows. *Simple payback period is always shorter than discounted payback period.*

➤ Net present value (NPV)

Net present value is the net of present values of cash flows.

Net present value = Present value of cash inflows – Present value of cash outflows.

Decision rules

If Net present value = Positive accept the project

If Net present value = Negative reject the project

Advantages of Net present value

- Shareholder wealth is maximized.
- It considers time value of money.
- It takes into account the time value of money.
- It is based on cash flows which are less subjective than profit.
- Shareholders will get benefits if a project with a positive net present value is accepted.
- It considers cash flows after payback period

Disadvantages of Net present value

- It can be difficult to identify an appropriate discount rate.
- For simplicity, cash flows are sometimes all assumed to occur at year ends: this assumption may be unrealistic.
- Some managers are unfamiliar with the concept of net present value.

➤ Internal rate of return

Internal rate of return is the point where the present value of cash inflows is exactly equal to the present value of cash outflows. It refers to the discount rate where net present value is zero. It is calculated as

$$\text{IRR} = A + \frac{NPV_A}{NPV_A - NPV_B} \times (B - A)$$

Where:	A = Lower discount rate
	B = Higher discount rate
	$NPV_A = NPV_A$ at A
	$NPV_B = NPV_B$ at B

IRR is more accurate if:

A = Lower discount rate at which NPV is positive &

B = Higher discount rate at which NPV is negative

But these two should be closest

Decision rules

If internal rate of return > cost of capital => Accept the project (*in this NPV would be positive*)

If internal rate of return < cost of capital => Reject the project (*in this NPV would be negative*)

If internal rate of return = cost of capital => Project is gearing no return

Advantages of Internal rate of return

- It takes into account the time value of money, unlike other approaches such as simple payback period.
- Results are expressed as a simple percentage, and are more easily understood than some other methods.
- It indicates how sensitive calculations are to changes in interest rates.

Disadvantages of Internal rate of return

- Projects with unconventional cash flows can produce negative or multiple internal rates of return.
- Internal rate of return may be confused with accounting rate of return or return on capital employed (ROCE), since both give answers in percentage terms.
- It may give conflicting recommendations with mutually exclusive projects, because the result is given in the relative terms (percentages), and not in absolute terms (\$) as with net present value.
- Some managers are unfamiliar with the internal rate of return method.
- It cannot accommodate the changing interest rates.
- It assumes that funds can be re-invested at a rate equivalent to the internal rate of return, which may be too high.

✓ ANNUITY

Whenever a project is expected to earn equal amount of cash flows in equal interval of time for a defined time period, then the cash flows are said to be an Annuity. Constant cash inflows or outflows for a defined time period is called annuity.

Present value of annuity = annuity x annuity factor

$$\text{Annuity Factor} = \frac{1 - (1 + r)^{-n}}{r}$$

✓ PERPETUITIES

Perpetuity is, in which equal cash flows are generated for unlimited time period. When a project has expected to earn equal amount of cash flows in equal interval of time but for unlimited time period is called perpetuity. If the perpetuity situation arises, the present value of perpetuity will be calculated as:

$$\text{Present value of perpetuity} = \frac{\text{constant yearly cash flow}}{\text{Discount rate}}$$

✓ **NOMINAL RATE AND EFFECTIVE RATE**

Nominal rate is the interest rate which is quoted by the financial institutions and effective rate is the actual rate of interest earned that a company charge. *Nominal rate is used when interest is compounded only once in a period. Effective rate is used when interest is compounded more than once in a period.* Interest may be compounded daily, weekly, monthly or quarterly. Effective rate is greater than nominal rate when compounding is done for less than one year. Effective rate is equals to the nominal rate if compounding is done at the end of year. Effective rate is calculated as:

$$\text{Effective Rate} = [(1 + r)^n - 1] \times 100$$

Where

r = nominal rate of interest per compounding

n = number of times compounding is done in a period.

Effective rate is also called Annual Percentage Rate (APR) or compound annual rate (CAR).

TABLES**Present Value Table**Present value of 1 i.e. $(1 + r)^{-n}$

Where r = discount rate
 n = number of periods until payment

Periods (n)	Discount rate (r)									
	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
1	0.990	0.980	0.971	0.962	0.952	0.943	0.935	0.926	0.917	0.909
2	0.980	0.961	0.943	0.925	0.907	0.890	0.873	0.857	0.842	0.826
3	0.971	0.942	0.915	0.889	0.861	0.840	0.816	0.794	0.772	0.751
4	0.961	0.924	0.888	0.855	0.823	0.792	0.763	0.735	0.708	0.683
5	0.951	0.906	0.863	0.822	0.784	0.747	0.713	0.681	0.650	0.621
6	0.942	0.888	0.837	0.790	0.746	0.705	0.666	0.630	0.596	0.564
7	0.933	0.871	0.813	0.760	0.711	0.665	0.623	0.583	0.547	0.513
8	0.923	0.853	0.789	0.731	0.677	0.627	0.582	0.540	0.502	0.467
9	0.911	0.837	0.766	0.703	0.645	0.592	0.544	0.500	0.460	0.424
10	0.905	0.820	0.744	0.676	0.614	0.558	0.508	0.463	0.422	0.386
11	0.896	0.804	0.722	0.650	0.585	0.527	0.475	0.429	0.388	0.355
12	0.887	0.788	0.701	0.625	0.557	0.497	0.444	0.397	0.356	0.319
13	0.879	0.773	0.681	0.601	0.530	0.469	0.415	0.368	0.326	0.290
14	0.870	0.758	0.661	0.577	0.505	0.442	0.388	0.340	0.299	0.263
15	0.861	0.743	0.642	0.555	0.481	0.417	0.362	0.315	0.275	0.239
(n)	11%	12%	13%	14%	15%	16%	17%	18%	19%	20%
1	0.901	0.893	0.885	0.877	0.870	0.862	0.855	0.847	0.840	0.833
2	0.812	0.797	0.783	0.769	0.756	0.743	0.731	0.718	0.706	0.694
3	0.731	0.712	0.693	0.675	0.658	0.641	0.624	0.609	0.593	0.579
4	0.659	0.636	0.613	0.592	0.572	0.552	0.534	0.516	0.499	0.482
5	0.593	0.567	0.543	0.519	0.497	0.476	0.456	0.437	0.419	0.402
6	0.535	0.507	0.480	0.456	0.432	0.410	0.390	0.370	0.352	0.335
7	0.482	0.452	0.425	0.400	0.376	0.354	0.333	0.314	0.296	0.279
8	0.434	0.404	0.376	0.351	0.327	0.305	0.285	0.266	0.249	0.233
9	0.391	0.361	0.333	0.308	0.284	0.263	0.243	0.225	0.209	0.194
10	0.352	0.322	0.295	0.270	0.247	0.227	0.208	0.191	0.176	0.162
11	0.317	0.287	0.261	0.237	0.215	0.195	0.178	0.162	0.148	0.135
12	0.286	0.257	0.231	0.208	0.187	0.168	0.152	0.137	0.124	0.112
13	0.258	0.229	0.204	0.182	0.163	0.145	0.130	0.116	0.104	0.093
14	0.232	0.205	0.181	0.160	0.141	0.125	0.111	0.099	0.088	0.078
15	0.209	0.183	0.160	0.140	0.123	0.108	0.095	0.084	0.074	0.065

Annuity Table

Present value of an annuity of 1 i.e. $\frac{1 - (1 + r)^{-n}}{r}$

Where r = discount rate
 n = number of periods

Periods (n)	Discount rate (r)									
	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
1	0.990	0.980	0.971	0.962	0.952	0.943	0.935	0.926	0.917	0.909
2	1.970	1.942	1.913	1.886	1.859	1.833	1.808	1.783	1.759	1.736
3	2.911	2.884	2.829	2.775	2.723	2.673	2.624	2.577	2.531	2.487
4	3.902	3.808	3.717	3.630	3.546	3.465	3.387	3.312	3.240	3.170
5	4.853	4.713	4.580	4.452	4.329	4.212	4.100	3.993	3.890	3.791
6	5.795	5.601	5.417	5.212	5.076	4.917	4.767	4.623	4.486	4.355
7	6.728	6.472	6.230	6.002	5.786	5.582	5.389	5.206	5.033	4.868
8	7.652	7.325	7.020	6.733	6.463	6.210	5.971	5.747	5.535	5.335
9	8.566	8.162	7.786	7.435	7.108	6.802	6.515	6.247	5.995	5.759
10	9.471	8.983	8.530	8.111	7.722	7.360	7.024	6.710	6.418	6.145
11	10.37	9.787	9.253	8.760	8.306	7.887	7.499	7.139	6.805	6.495
12	11.26	10.58	9.951	9.385	8.863	8.381	7.943	7.536	7.161	6.814
13	12.13	11.35	10.63	9.986	9.394	8.853	8.358	7.904	7.487	7.103
14	13.00	12.11	11.30	10.56	9.899	9.295	8.745	8.214	7.786	7.367
15	13.87	12.85	11.91	11.12	10.38	9.712	9.108	8.559	8.061	7.606
(n)	11%	12%	13%	14%	15%	16%	17%	18%	19%	20%
1	0.901	0.893	0.885	0.877	0.870	0.862	0.855	0.847	0.840	0.833
2	1.713	1.690	1.668	1.647	1.626	1.605	1.585	1.566	1.547	1.528
3	2.411	2.402	2.361	2.322	2.283	2.246	2.210	2.174	2.140	2.106
4	3.102	3.037	2.974	2.914	2.855	2.798	2.743	2.690	2.639	2.589
5	3.696	3.605	3.517	3.433	3.352	3.274	3.199	3.127	3.058	2.991
6	4.231	4.111	3.998	3.889	3.784	3.685	3.589	3.498	3.410	3.326
7	4.712	4.564	4.423	4.288	4.160	4.039	3.922	3.812	3.706	3.605
8	5.146	4.968	4.799	4.639	4.487	4.344	4.207	4.078	3.954	3.837
9	5.537	5.328	5.132	4.946	4.772	4.607	4.451	4.303	4.163	4.031
10	5.889	5.650	5.426	5.216	5.019	4.833	4.659	4.494	4.339	4.192
11	6.207	5.938	5.687	5.453	5.234	5.029	4.836	4.656	4.486	4.327
12	6.492	6.194	5.918	5.660	5.421	5.197	4.988	4.793	4.611	4.439
13	6.750	6.424	6.122	5.842	5.583	5.342	5.118	4.910	4.715	4.533
14	6.982	6.628	6.302	6.002	5.724	5.468	5.229	5.008	4.802	4.611
15	7.191	6.811	6.462	6.142	5.847	5.575	5.324	5.092	4.876	4.675

Standard Costing

Standard cost: *The planned unit cost of a product, component or service.*

Standard costing: *A system of accounting based on predetermined costs and revenue per unit, which are compared to actual performance to provide useful feedback information to management.*

The predetermined cost is known as standard cost and the difference between standard and actual cost is called variance. The process through which differences are analysed is known as variance analysis. Although standard costing can be used in manufacturing as well as service industries, its greatest benefits are realised where mass production and repetitive work is undertaken.

Performance Standards

Performance standards are used to set efficiency targets. There are four types of standards:

1. Ideal Standards

- These standards are based on perfect or ideal situations i.e. no wastage, no idle time, no inefficiencies.
- These standards are likely to be de-motivating because reported variance is always adverse.
- Employees will often feel that standards are unattainable so they will not feel the need to work hard.

2. Attainable Standards

- These standards are based on efficient situations to make them attainable.
- Some allowances are made for wastage or inefficiencies.
- They are realistic however challenging targets for employees.
- These standards are motivating for employees.

3. Current Standards

- These are based on the current situation.
- Prepared for short term (just for current situations)
- When the current situation ends, standards are restated.
- These standards do not attempt to improve current level of efficiency.

4. Basic Standards

- These standards are kept unaltered over long periods of time.
- These standards are likely to be outdated.
- They are the least useful for variance analysis.

USES OF STANDARD COSTING

- Stock valuation. For internal or external use.
- As a basis for pricing decisions i.e. cost plus pricing.
- For budget preparation/business planning.
- For budgetary control, reporting deviations from plan (reporting by exception)
- Use in variance analysis
- For performance measurement.
- Motivating staff by using standards as targets.

STANDARD COST CARD

Standard cost card under Absorption costing

Product XYZ		\$ per unit	\$ per unit
Selling price			100
Production cost:			
Material	(2 kgs @ \$20/kg)	40	
Labour	(1.5 hrs @ \$2/hr)	3	
Variable overheads	(1.5 hrs @ \$6/hr)	9	
Fixed overheads	(1 .5hrs @ \$10/hr)	15	
Standard cost			(67)
Standard profit per unit			33

Standard cost card under Marginal costing

Product XYZ		\$ per unit	\$ per unit
Selling price			100
Production cost:			
Materials	(2 kgs @ \$20/kg)	40	
Labour	(1.5 hrs @ \$2/hr)	3	
Variable overheads	(1.5 hrs @ \$6/hr)	9	
Standard variable cost			(52)
Standard contribution per unit			48

STANDARD-SETTING: Standards are set for each element of cost in the production of a unit of output. It involves estimating the quantity of the resource used and its associated costs. In addition a standard selling price is set.

➤ Direct materials

- Materials standard is like: **5 kgs/unit x \$10/kg = \$50/unit**
- Quantity standards are recorded, for example, as a bill of materials.
- Standard prices are obtained from the purchasing department which researches alternative suppliers and selects those which can provide:
 - Required quantity
 - Sound quality
 - Most competitive price

➤ Direct labour

- Labour standard is like: **3 hrs/unit x \$8/hr = \$24/unit**
- Time measurements determine standard hours for the average worker to complete a job.
- Wage rates are determined by company policy/negotiations between management and unions.

➤ Variable overheads

- Variable overheads standard is like: **3 hrs/unit x \$5/hr = \$15/unit**
- Variable overheads rate is often based upon labour hours or machine hours.
- A standard variable overhead rate per unit of activity is calculated.
- If there is no observable direct relationship between resources and output, past data is used to predict.

- The activity measure that exerts the greatest influence on costs is investigated— usually direct labour hours.

➤ **Fixed overheads**

- Fixed overheads standard is like: $3 \text{ hrs/unit} \times \$2/\text{hr} = \$6/\text{unit}$
- This standard is developing by using fixed overhead absorption rate.
- Because fixed costs are largely independent of changes in activity, they are constant over wide ranges in the short term.
- Therefore, for control purposes, a fixed overhead rate per unit of activity is inappropriate.
- For inventory valuation purposes IAS 2 requires standard fixed overhead rates.

➤ **Selling price and margin**

- Sales standard is like: $\$30/\text{unit} \times 100 \text{ units sold}$
- Anticipated market demand
- Competitive production and competitor's action
- Manufacturing costs
- Inflation estimates

ADVANTAGES & DISADVANTAGES OF STANDARDS

Advantages

- Annual examination of costs and revenues.
- Provides a yardstick to judge performance.
- Helps management by exception.
- Helps bookkeeping.

Disadvantages

- Waste important resources like time and costs.
- Standard developed may be outdated.
- De-motivating effect if system is poor.

BUDGET AND STANDARD COMPARISON

Budgets and standards are very similar and interrelated, but there are important differences between them.

Budget

- Gives planned and aggregate costs for a function of cost centre*
- Can be prepared for all functions, even when output cannot be measured*
- Mostly expressed in money terms*

Standards

- Shows the planned unit resources usage for a single task, for example the standard labour hours for a single units of production*
- Limited to situation where representative action are performed and output can be measured*
- Need not be expressed in money terms. For example a standard rate of output does not need a financial value put on it*

Variance: A variance is 'the difference between a planned, budgeted or standard cost and the actual cost incurred'. The same comparisons may be made for revenues.

Variance analysis: The process by which the total difference between standard and actual results is analyzed is known as variance analysis.

Finally three figures arise

- Original budget (standard costs/revenues at expected activity level)
It is calculated as **standard cost/revenue per unit x budgeted units**
- Flexed budget (standard costs/revenues at actual activity level)
It is calculated as **standard cost/revenue per unit x actual units**
- Actual results
It is calculated as **actual cost/revenue per unit x actual units**

➤ **Direct Material Cost Variance:** Direct material total variance refers to the total difference between what the output quantity should have cost and what it did cost.

- Direct material total variance** can be computed as:

<i>Actual output x standard cost per unit</i>	<i>XX</i>
<i>Actual output at actual cost</i>	<u><i>(XX)</i></u>
<i>Direct material total variance</i>	<u><i>XX</i></u>

The direct material total variance is made up of:

- Direct material price variance; and
- Direct material usage variance

- Direct material price variance** represents the difference between the standard cost and actual cost for the material purchased or used.

<i>Standard cost of actual quantity</i>	<i>XX</i>
<i>Actual cost of actual quantity</i>	<u><i>(XX)</i></u>
<i>Material price variance</i>	<u><i>XX</i></u>

- Direct material usage variance** is the difference between the standard quantity of materials that should have been used for the number of units actually produced, and the actual quantity of materials used, valued at the standard cost per unit of material.

$$= (\text{actual quantity used} - \text{standard quantity that should have been used}) \times \text{standard cost per unit}$$

Cases of Material: If material purchase quantity and used quantity is different then

Material price variance calculated by using



➤ **Direct Labour Cost Variance:** Direct labour cost variance is the difference between the standard cost for actual production and the actual cost in production. Direct labour total variance can be subdivided into labour rate variance and labour efficiency variance.

- Direct labour total variance** can be computed as:

<i>Actual output x standard cost per unit</i>	<i>XX</i>
<i>Actual output at actual cost</i>	<u><i>(XX)</i></u>
<i>Direct labour total variance</i>	<u><i>XX</i></u>

- **Direct labour rate variance** is the difference between the standard cost and the actual cost paid for the actual number of hours worked.

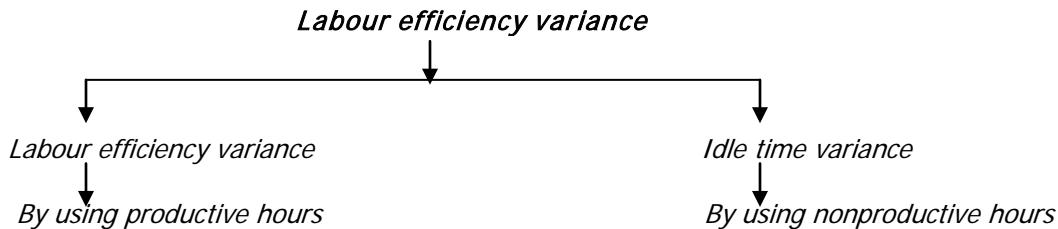
<i>Actual hours at standard rate</i>	XX
<i>Actual hours at actual rate</i>	<u>(XX)</u>
<i>Labour rate variance</i>	<u>XX</u>

- **Direct labour efficiency variance** is the difference between the standard labour hour that should have been worked for the actual number of units produced and the actual number of hours worked when the labour hours are valued at the standard rate.

= (actual hours taken for job – standard hours for job) x standard rate per hour
Idle time is not considered in calculation of this variance.

- **Idle Time Variance:** Company may operate a costing system in which any idle time is recorded. Idle time may be caused by machine breakdowns or not having worked to give to employees, perhaps because of limited resources or a shortage of orders from customers. When idle time occurs, the labour force is still paid wages for time at work, but no actual work is done. Time paid for without any work being done is non-productive and therefore inefficient. In variance analysis, idle time is an adverse efficiency variance.

In case of idle time:



- **Variable Production Overhead Variance:** Variable production overhead variance is divided into variable production overhead expenditure variance and variable production efficiency variance.

- **Variable overheads total variance** can be computed as:

<i>Actual output x standard cost per unit</i>	XX
<i>Actual output at actual cost</i>	<u>(XX)</u>
<i>Variable overheads total variance</i>	<u>XX</u>

- **Variable overhead expenditure variance** is the difference between amount of variable production overhead that should have been incurred in actual hours worked and the amount of variable production overhead actually incurred.

<i>Actual hours at standard rate</i>	XX
<i>Actual hours at actual rate</i>	<u>(XX)</u>
<i>Variable overheads expenditure variance</i>	<u>XX</u>

- **Variable overhead efficiency variance** is very much similar to labour efficiency variance. It is the difference between the standard labour hour that should have been worked for the actual number of units produced and the actual number of hours worked when the labour hours are valued at the standard variable production overhead rate.

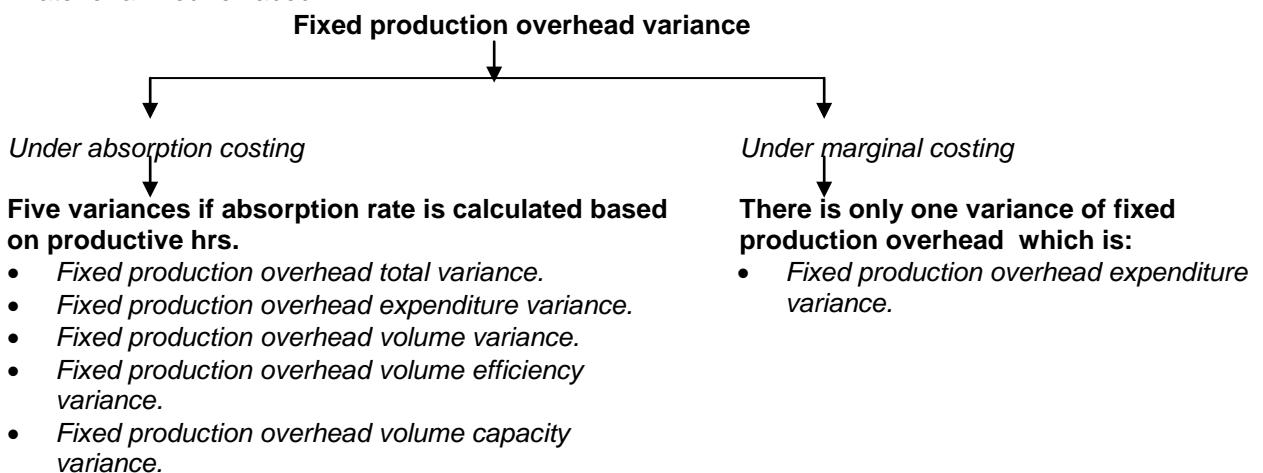
= (actual hours taken for job – standard hours for job) x standard variable OAR per hour

➤ **Fixed Production Overhead Variances:** Fixed production overhead variance is the difference between the incurred cost of fixed production overhead and the amount of overhead actually absorbed. The amount of overhead absorbed is calculated by using the overhead rate which, at the time of absorption, is based on budgeted figures. In absorption costing system under or over absorption of overheads is almost inevitable. Recall the overhead absorption rate:

$$\text{Overhead absorption rate} = \frac{\text{Budgeted fixed overheads}}{\text{Budgeted activity level}}$$

Both, numerator and denominator are budgeted or planned. If either of two changes, it will result in over or under absorption of overheads. Fixed production overhead variance is divided and analyzed into:

- Expenditure variance
 - Volume variance
 - Volume efficiency variance
 - Volume capacity variance
 - **Fixed overheads total variance** can be computed as: It is same as under/over absorption of overheads.
- | | |
|---|------------------|
| <i>Actual output x standard cost per unit</i> | <i>XX</i> |
| <i>Actual output at actual cost</i> | <i>(XX)</i> |
| <i>Fixed overheads total variance</i> | <i><u>XX</u></i> |
- **Fixed overhead expenditure variance:** Fixed production overhead expenditure variance is simply the difference between the actual fixed production overhead expenditure and the budgeted fixed production overhead expenditure.
 - **Fixed overhead volume variance:** Fixed overhead volume variance arises due to difference between actual and budgeted activity level. To compute the volume variance difference between actual and budgeted activity level is multiplied by budgeted absorption rate per unit.
 - **Fixed overhead volume efficiency variance** is the difference between the actual number of hours worked to produce a set amount of units and the standard hours for actual units. This figure is then multiplied by the overhead rate for an hour of labour.
 - **Fixed overhead volume capacity variance** is the difference between the actual number of hours worked and the budgeted number of hours. This figure is then multiplied by the overhead rate for an hour of labour.



However, if absorption rate is calculated on the basis of production units. There are only three variance:

- *Fixed production overhead total variance.*
- *Fixed production overhead expenditure variance.*
- *Fixed production overhead volume variance.*

➤ **Sales Variances:** Sales variance is the difference between actual sales and budget sales. Sales variance arises from two reasons; either the sale price varies from planned or the volume of sales vary from budgeted. Sales variance can, therefore, be divided in following two main areas:

- Price variance
- Volume variance
- **Sales price variance:** Sales price variance is a measure of effect on profit of a change in sales price. Sales price variance is difference between what the revenue should have been from sale of actual quantity and what the actual revenue was.
- **Sales volume variance:** Sales volume variance measures the effect on profit of change in volume of sales. Volume variance calculates the difference between budgeted quantity and actual quantity sold, valued at standard profit per unit or standard contribution per unit.
- ❖ Standard profit / unit = Standard selling price/unit – standard all cost / unit
- ❖ Standard contribution/unit = standard selling price /unit – standard all variable cost / unit

THE OPERATING STATEMENTS

This summarizes the earlier work and reconciles budgeted with actual profit or cost

Under absorption costing

		<i>Fav</i>	<i>Adv</i>	
		<i>\$000</i>	<i>\$000</i>	<i>\$000</i>
Budgeted profit				xxx
Sales variances				
Price		xxx	(xxx)	
Volume		xxx	(xxx)	xxx/(xxx) XXX
Cost variances				
Materials	Price	xxx	(xxx)	
	Usage	xxx	(xxx)	
Labour	Rate	xxx	(xxx)	
	Idle time		(xxx)	
	Efficiency	xxx	(xxx)	
Variable Overhead	Expenditure	Xxx	(xxx)	
	Efficiency	Xxx	(xxx)	
Fixed Overhead	Expenditure	Xxx	(xxx)	
	Capacity	xxx	(xxx)	
	Efficiency	xxx	(xxx)	
		<u>Xxx</u>	<u>(xxx)</u>	xxx/(xxx) XXX
Actual profit				XXX

* All stocks must be valued at **standard cost** in determining actual profit.

Operating statement under marginal costing

There are three differences between this and the total absorption approach just seen:

- The **fixed overheads** variance will be only the **expenditure variance**. There can be no volume variances, as there is no attempt to absorb fixed overheads into production.
- The sales volume variance needs to be recalculated in terms of standard contribution, rather than standard profit.
- Stock should be valued at standard marginal cost, rather than standard total absorption cost.

Under marginal costing

	<i>Fav</i>	<i>Adv</i>	
	\$'000	\$'000	\$'000
Budgeted contribution			xxx
Sales variances			
Price	xxx	(xxx)	
Volume	xxx	(xxx)	
	<hr/>	<hr/>	
	xxx	(xxx)	xxx/(xxx)
			XXX
Cost variances			
Materials	Price	xxx	(xxx)
	Usage	xxx	(xxx)
Labour	Rate	xxx	(xxx)
	Idle time		(xxx)
	Efficiency	xxx	(xxx)
Variable Overhead	Rate	xxx	(xxx)
	Efficiency	xxx	(xxx)
	<hr/>	<hr/>	
	xxx	(xxx)	xxx(xxx)
			XXX
Actual contribution			
Fixed overheads			
Budgeted overhead			(xxx)
Expenditure variance	xxx	(xxx)	
	<hr/>	<hr/>	
			xxx(xxx)
Actual profit			XXX

BACKWARD VARIANCES (REVERSE VARIANCES): Examination questions can be set in which the variances are already given and the requirements are to find actual, budget or other data. This implies that students need to have thorough detailed knowledge of how to calculate variances. Essentially the process involved is working backwards with the formula or statement to find missing figures. There is no set approach since questions will not be identical.

INTERRELATIONSHIPS BETWEEN VARIANCE: Individual variances should not be looked in isolation. One variance might be interrelated with another and much of it might have occurred only because the other, interrelated, variance occurred too. This needs to be taken into account when deciding whether to investigate a variance or not. Two variance are interdependent one will usually be adverse and the other one favourable here are some examples.

Interrelated variance	Explanation
Material price and material usage	If cheaper materials are purchased in order to obtain a favourable price variance, materials wastage might be higher and an adverse usage variance may occur. If cheaper material is more difficult to handle, there might be an adverse labour efficiency variance too. If a decision is made to purchase more expensive material, the price variance will be adverse but the usage variance might be favourable as the material is easier to use or of a higher quality.
Labour rate and labour efficiency / material usage	If employees are paid higher rates for experience and skills, (using a highly skilled team to do some work) might lead to an adverse rate variance and a favourable efficiency variance and possibly a favourable material usage variance (experienced staff are less likely to waste material). In contrast , a favourable rate variance might indicate a longer-than-expected proportion of inexperienced workers in the workforce , which could result in an adverse labour efficiency variance , and perhaps poor materials handling and high rates of rejects and hence an adverse materials usage variance.
Selling price and sales volume	The connection between selling price and sales volume is perhaps an obvious one. A reduction in the selling price might stimulate bigger sales demand, so that an adverse selling price variance might be counter balanced by a favourable sales volume variance. Similarly, a price rise would give a favourable price variance, but possibly at the cost of a fall in demand and an adverse sales volume variance.
Variable and fixed production overhead efficiency variances and other variances	Because the variable and fixed production overhead efficiency variances are the same , in hours , as the labour efficiency variance, any interrelationship between other variances and the labour efficiency variance apply equally to the variable and fixed production overhead efficiency variances. So if there is an interrelationship between a favourable labour rate variance and an adverse labour efficiency variance, there will also be interrelationships between the favourable labour rate variance and adverse variable and fixed production overhead efficiency variances.

REASONS OF VARIANCES

Variance	Favourable	Adverse
Material Usage	<ul style="list-style-type: none"> ▪ Material used of higher quality than standard. ▪ More efficient use of material. ▪ Errors in allocating material to jobs. 	<ul style="list-style-type: none"> ▪ Defective material. ▪ Excessive waste or theft. ▪ Stricter quality control. ▪ Errors in allocating material to jobs.
Labour rate	<ul style="list-style-type: none"> ▪ Use of workers at a rate of pay lower than standard. 	<ul style="list-style-type: none"> ▪ Wage rate increases. ▪ Use of high grade labour.
Idle time	<ul style="list-style-type: none"> ▪ The idle time variance is always adverse. 	<ul style="list-style-type: none"> ▪ Machine breakdown. ▪ Illness or injury to worker.

Labour efficiency	<ul style="list-style-type: none"> ▪ Output produced more quickly than expected because of worker motivation, better quality materials etc. ▪ Errors in allocating time to jobs. 	<ul style="list-style-type: none"> ▪ Lost time in excess of standard. ▪ Output lower than standard set because of lack of training, sub-standard materials etc ▪ Errors in allocating time to jobs.
Fixed overhead expenditure	<ul style="list-style-type: none"> ▪ Savings in costs incurred. ▪ More economical use of services. 	<ul style="list-style-type: none"> ▪ Increase in cost of services used ▪ Excessive use of services. ▪ Change in type of services used.
Fixed overhead efficiency	<ul style="list-style-type: none"> ▪ See labour efficiency. 	<ul style="list-style-type: none"> ▪ See labour efficiency.
Fixed overhead capacity	<ul style="list-style-type: none"> ▪ Actual time worked greater than budget (e.g. overtime working). 	<ul style="list-style-type: none"> ▪ Excessive idle time. ▪ Shortage of plant capacity.

SIGNIFICANCE OF VARIANCE: A variance can be considered significant if it will influence management's actions and secedes. Significant variances usually need investigating. If actual results are different from planned and consequently resulted in variances, management need to consider a number of factors in order to decide whether to investigate it or not. Variances are inevitable in routine processes and therefore investigating each and every variance would not be worth-while. Factors that should be considered as to whether to investigate a variance or not include:

- **The size of variance:** If variance is immaterial then it needs not to be investigated. **Controllability:** Some investigations are not controllable by nature. An increase in price of material or shortage of material and skills are major examples as opposed to material usage variance which is controllable by management. In case of uncontrollable variance, plan should be changed for the next period.
- **Cost of investigation:** Cost of investigating a variance must be weighed against the benefits of correcting the cause of a variance.
- **Interdependence of variances:** Sometimes adverse variance in one area is linked with a favorable variance in some other area. For example if sub-standard material is purchased, it would result in favorable material price variance but at the same time would result in adverse material usage variance and adverse labour efficiency variance. So while investigating an adverse variance, all relevant factors should be taken into account.
- **Standard type used;** at the start of this chapter, you studied about different types of standards. If a standard was set which was not suitable to working conditions, adverse variances are inevitable. Standards should be set at 'normal' level and not at an ideal level.

Statistical Techniques

Forecast: A forecast is an estimate of what might happen in the future. Forecast is based on some assumptions about the conditions that are expected to apply.

Budget: A budget is a plan of what the organization is aiming to achieve and what it has set as a target. Budgets are more realistic because management will try to establish some control over the conditions that will apply in the future.

FORECASTING METHODS

- High – low method
- Scatter graph method
- Time series analysis
- Linear regression analysis

➤ **High – Low Method**

- It is simple forecasting technique based on historical data.
- High – low method is already discussed in chapter 2

Advantages:

- It is easy to use and understand
- It needs just two activity levels (highest and lowest)

Disadvantages:

- It considers two extreme points which may be representative of normal conditions
- Based on two points so formula is not very accurate.
- Based on historical data.

➤ **Scatter Graph Method**

This is graphical way of forecasting. Steps involved in forecasting under scattergraph method are:

- Collect data of past volumes of output and the associated cost of producing that output.
- Plot the data on the graph which has cost on vertical axis and volume of output on the horizontal axis.
- Draw the line of best fit through the middle of the plotted points so that the distance of points above the line is the same as the distance of points below the line.

The intersection of the line of best fit on the vertical axis is the fixed cost and slope of the line represents variable costs.

It is a method of visual judgments that is a disadvantage of this method.

➤ **Time Series Analysis**

A time series is a series of figures relating to the changing value of a variable over time. The data often conforms to a certain pattern over time. It is used to forecast sales. Graph of time series called a

HISTOGRAM.

This pattern can be extrapolated into the future and hence forecasts are possible. Time periods may be any measure of time including days, weeks, months and quarters.

Examples

- Annual cost for last ten years.
- Number of people employed in each last 10 years
- Output per day of last month
- Sales per month of last 3 years.

The horizontal axis is always chosen to represent time, and the vertical axis represents the values of the data recorded.

The four components of a time series are:

- **The trend** this describes the long term general movement of the data recorded.
- **Seasonal variations** are short term fluctuations in recorded values, a regular variation around the trend over a fixed time period, usually one year.
- **Cyclical variations** are long term fluctuations in recorded values, economic cycle of booms and slumps. It takes several years to complete.
- **Random variations** irregular, random fluctuations in the data usually caused by factors specific to the time series. They are unpredictable.

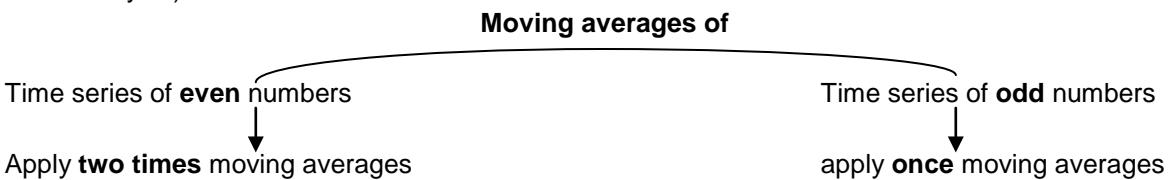
In examination problems there is generally insufficient data to evaluate the cyclical and random variations, hence, they are ignored.

✓ **Trends:** Long term movement over time in the value of data recorded

<i>Years</i>	<i>Downward trend</i> <i>Output/hour(units)</i>	<i>Upward trend</i> <i>Cost/unit (\$)</i>	<i>No clear movement/static</i> <i>Number of employees</i>
4	30	1	100
5	24	1.08	103
6	26	1.20	96
7	22	1.15	102
8	21	1.18	103
9	17	1.25	98

Finding a trend

One method of finding the trend is by the use of **moving averages**. (Take moving averages which covers a cycle)

**(Because trend value should relate to a specific period)**

Remember that when finding the moving average of an even number of result, a second moving average has to be calculated so that values can relate to specific actual figures. This method attempts to remove seasonal (or cyclical) variation from a time series by a process of averaging so as to leave a set of figures representing the trend. Moving average figure relate to midpoint of overall period

Moving average of an even number of results

Year	Quarter	Volume of sales ('000 units)
2005	1	600
	2	840
	3	420
	4	720
2006	1	640
	2	860
	3	420
	4	740
2007	1	670
	2	900
	3	430
	4	760

Example 1**Required:** Calculate the trend using moving average?**Solution**

Year	Quarter	Actual volume of sales ('000 units)	Moving average of 4 quarters' sales ('000 units)	Midpoint of 2 moving averages trend line ('000 units)
		(A)	(B/A)	(C)
2005	1	600		
	2	840		
	3	420	645	
	4	720	655	650
2006	1	640		657.50
	2	860		660
	3	420	660	
	4	740	665	662.50
2007	1	670		668.75
	2	900		672.50
	3	430		677.50
	4	760	682.50	683.75

- ✓ **Seasonal Variation:** Short term fluctuations due to change in season. Affect seasonal businesses like ice-cream manufacturing

Finding the seasonal variation: There are two models use to find out seasonal variations, additive model and multiplicative model.

- ❖ **Additive model:** Seasonal variations are the difference between actual and trend figures. An average of the seasonal variations for each time period within the cycle must be determined and then adjusted so that the total of the seasonal variations sums to zero.

$$\text{Here } Y = T + R + S$$

Time series (actual sales) = trend + seasonal variation

Seasonal variation = actual sales – trend

Continue example 1

Year	Quarter	Actual volume of sales '000 units	Trend '000 units	Seasonal variation '000 units
2005	1	600		
	2	840		
	3	420	650	-230
	4	720	657.50	62.50
2006	1	640	660	-20
	2	860	662.50	197.50
	3	420	668.75	-248.75
	4	740	677.50	62.50
2007	1	670	683.75	-13.75
	2	900	687.50	212.75
	3	430		
	4	760		

The variation between the actual result for any particular quarter and the trend line average is not the same from the year to year, but an average of these variations can be taken.

	Q1	Q2	Q3	Q4
2005			-230	62.50
2006	-20	197.50	-248.75	62.50
2007	-13.75	<u>212.50</u>		
Total	<u>-33.75</u>	<u>410</u>	<u>-478.75</u>	<u>125</u>
Average (divided by 2)	<u>-16.875</u>	<u>205</u>	<u>-239.375</u>	<u>62.50</u>

Estimate of the seasonal or quarterly variation is almost done, but there is one more important step to take. Variations around the basic trend line should cancel each other out, and add to the 'zero'. At the moment they do not. Therefore spread the total of the variations (11.25) across the four quarters (11.25/4) so that the final total of the variations sum to zero.

	Q1	Q2	Q3	Q4	Total
<i>Estimated quarterly variations</i>	-16.875	205	-239.375	62.50	11.25
<i>Adjusted to reduce variations to 0</i>	-2.8125	-2.8125	-2.8125	-2.8125	-11.25
<i>Final estimates of quarterly variations</i>	-19.6875	202.1875	-242.1875	59.6875	0
<i>These might be rounded as follows:</i>	Q1 = -20	Q2 = 202	Q3 = -242	Q4 = 60	Total = 0

Examiner is unlikely to ask you to derive the seasonal variations

Drawbacks of additive model: When there is a steeply arising or a steeply declining trend, the trend will either get ahead of a fall behind the real trend. So,

- The trend is not a good representation of actual figures
 - The trend is probably unsuitable for forecasting.
- ❖ **Multiplicative model:** This model assumes that the components of the series are independent of each other. In this model, each actual figure is expressed as a proportion of the trend. Time series Y = T x S x R

Seasonal variation = actual sales / trend

The trend component will be same in both models but the seasonal and random component will vary according to the model. In our example, we assume that random component is small and so ignore it.

So: $Y = T \times S$

Then: $S = Y/T$

Continue Example 1

Year	Quarter	Actual volume of sales (Y) '000 units	Trend (T) '000 units	Seasonal variation (Y/T) '000 units
2005	1	600		
	2	840		
	3	420	650	0.646
	4	720	657.50	1.095
2006	1	640	660	0.970
	2	860	662.50	1.298
	3	420	668.75	0.628
	4	740	677.50	1.092
2007	1	670	683.75	0.980
	2	900	687.50	1.309
	3	430		
	4	760		

An average of these variations can be taken.

	Q1 %	Q2 %	Q3 %	Q4 %
2005			0.646	1.095
2006	0.970	1.298	0.628	1.092
2007	0.980	1.309		
Total	<u>1.950</u>	<u>2.607</u>	<u>1.274</u>	<u>2.187</u>
Average (divided by 2)	<u>0.975</u>	<u>1.3035</u>	<u>0.637</u>	<u>1.0935</u>

Instead of summing to zero, average should sum to 4 or 1 for each of the four quarters

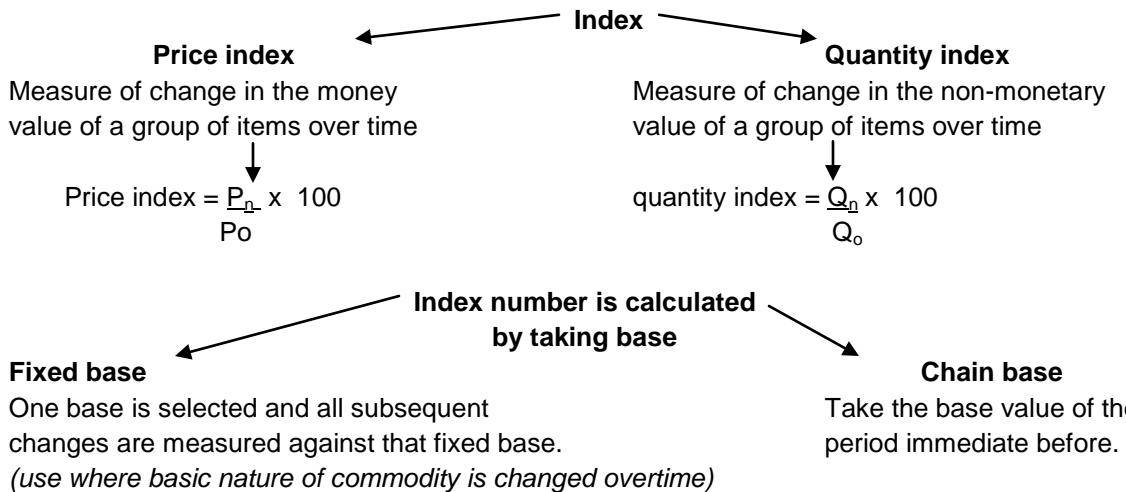
	Q1	Q2	Q3	Q4	Total
Estimated quarterly variations	0.975	1.3035	0.637	1.0935	4.009
Adjusted to reduce variations to 4	-0.00225	-0.00225	-0.00225	-0.00225	-0.009
Final estimates of quarterly variations	0.97275	1.30125	0.63475	1.09125	4
These might be rounded as follows:	Q1 = 0.97	Q2 = 1.30	Q3 = 0.64	Q4 = 1.09	Total = 4

This model is better than additive model.

De-seasonalise: This means that seasonal variations have been taken out, to leave a figure which might be taken as indicating the trend

✓ Index number/ indices

Index is a measure of change over time by making some base. It provides standard way of comparing the values.



Composite index numbers: It covers more than one item and are hence termed composite index number

$$\text{Index number} = \frac{\sum P_n}{\sum P_o} \times 100$$

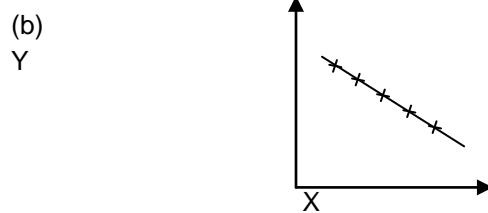
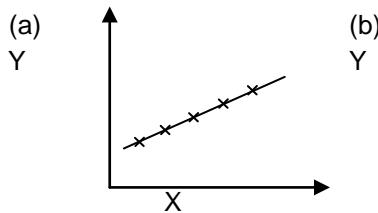
➤ CORRELATION

Two variables are said to be correlated if a change in the value of one variable is accompanied by a change in the value of another variable. For example:

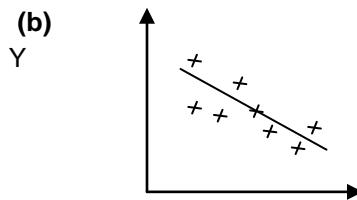
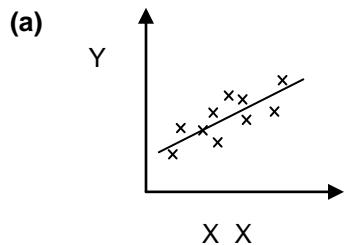
- Total variable cost and production units
- Selling price of a product and its demand.

The purpose of correlation analysis is to measure and interpret the strength of linear relationship between two variables.

Degrees of correlation: Two variables might be perfectly correlated, partly correlated or uncorrelated. Correlation can be positive or negative. The differing degrees of correlation can be illustrated by scatter diagrams.

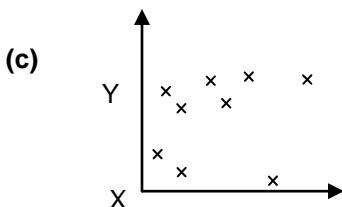
1. Perfect correlation

All the pairs of values lie on a straight line. An exact **linear relationship** exists between the two variables

2. Partial correlation

In (a), although there is no exact relationship, low values of X tend to be associated with low values of Y, and high values of X with high values of Y.

In (b) again, there is no exact relationship, but low values of X tend to be associated with high values of Y and vice versa.

3. No correlation

The values of these two variables are not correlated to each other.

Positive and negative correlation: Correlation can be **positive** or **negative**.

Positive correlation means that the low values of one variable are associated with low values of other, and high values of one variable are associated with high values of other.

Negative correlation means that the low values of one variable are associated with high values of other, and high values of one variable are associated with low values of other.

Correlation Coefficient Value	Direction and Strength of Correlation
-1.0	Perfectly negative
-0.8	Strongly negative
-0.5	Moderately negative
-0.2	Weakly negative
0.0	No association
+0.2	Weakly positive
+0.5	Moderately positive
+0.8	Strongly positive
+1.0	Perfectly positive

Correlation coefficient (r): it express degree of linear correlation between two variables. It is from +1 to -1. Two variables are perfectly or partially correlated and if they are partially correlated ,they there may be high or low degree of correlation.

FORMULA: The degree of correlation between two variables is measured as,

$$r = \frac{n(\Sigma xy) - (\Sigma x)(\Sigma y)}{\sqrt{[n\Sigma x^2 - (\Sigma x)^2][n\Sigma y^2 - (\Sigma y)^2]}}$$

Where X and Y represents pairs of data for two variables X and Y. And 'n' stands for number of pairs of data used in calculation. Remember that correlation coefficient (r) always lie between -1 and +1. If your calculation results in anything outside this range you must revise your calculations.

Correlation in time series: The correlation coefficient is calculated with time as X variable, the independent variable and other variable as Y, the dependent variable. It is recommended that when analysing correlation in a time series it is more convenient to replace years (time) with digits, i.e. X variable having time values of year 2001,2002,2003,2004 and so on should be replaced with 0, 1, 2, 3 and so on. Note that first year is replaced with 0 not 1. You can use whatever figure for years but using 0, 1, 2, 3... is most simplified.

The coefficient of determination (r^2): The coefficient of determination, r^2 , is simply the square of correlation coefficient, r. it is useful because it gives the proportion of variance (fluctuation) of one variable that is predictable from the other variable. In other words r^2 expresses the proportion of total variance in the value of one variable that can be fully explained by the other variable.

The coefficient of determination is such that $0 \leq r^2 \leq +1$, i.e. it cannot be a negative value. The coefficient of determination denotes the strength of linear association between X and y. If $r = -0.99$ so coefficient of determination is $+0.98$, which means that 98% of variation in a variable is explained by other variable.

➤ LINEAR REGRESSION

Regression analysis is the study of the relationship between variables. It is one of the most commonly used business analysis tool and easy to use.

Line of best fit: Although correlation coefficient is used to trace out that whether there is any linear relationship between any two variables but correlation coefficient solely cannot be used to predict the value of dependent variable Y based on independent variable X. Once it is found that two variables are correlated we can use the **line of best fit**. We can use this equation for forecasting; putting a value for variable X and deriving a forecast value for dependent variable Y.

Dependent variable is the single variable is being explained/predicted by regression model.

Independent variable is the explanatory variable used to predict dependent variable.

Estimating line of best fit: The line of best fit is a cost equation and is of the form:

$$Y = a + bx$$

Where,

a = total fixed cost,

b = gradient/slope of line or variable cost per unit

Regression analysis uses following formulas for estimating line of best fit:

$$b = \frac{n \sum xy - \sum x \sum y}{n \sum x^2 - (\sum x)^2} \quad \text{and}$$

$$a = \frac{\sum y}{n} - b \frac{\sum x}{n}$$

Where n is the number of data pairs used in analysis.

Regression line and time series analysis: Regression line can also be used in time series analysis. Time to be taken as independent variable and years to be replaced with 0,1,2,3 and so on correlation coefficient is calculated.

The reliability of regression model in forecasting

As is the case with any other model, results from regression analysis will not be accurate or reliable. There are a number of limitations of this model which cast doubt on its results:

- This model assumes that there exists a linear relationship but this is not always true, there might be a non-linear relationship. The model is only appropriate if there is a linear relationship between two variables.
- The model assumes that there are only two variables. Value of one variable, the dependent variable Y, is predicted from value of one other variable, the independent variable X. This is quite unrealistic as the value of Y might be affected by many other factors not considered at all.
- Past behavior is used to forecast future. The model assumes that past movement pattern of two variables will continue in the future. Again, this is an unrealistic assumption.
- Linear regression model is limited to predicting numeric output only. It cannot be used to predict any other sort of information.
- A lack of explanation about what has been learned can be a problem. Prediction of a figure not that is all desired.
- The model is only appropriate if used to predict value of dependent variable within relevant range. Predicted results are not reliable if model is used for extrapolation.
- Interpolation means using a line of best fit to predict a value within the two extreme points of the observed range.
- Extrapolation means using a line of best fit to predict a value outside the two extreme points.
- There must be sufficient number of data pairs. Even if correlation is high between two variables and have less than ten pairs of data any forecast value should be regarded as somewhat unreliable.

We can still use the forecast produced by the model with high confidence if correlation coefficient between two variables is high. Coefficient of determination tells us that how much of the variation in cost can be explained by volume level. Higher the coefficient of determination the higher the reliance that could be placed on predicted result.

Advantages of regression analysis:

- It gives definitive line of best fit after taking account of all the given data.
- It produces good forecasting results.
- Many processes are linear so they are well defined by regression analysis.

Forecasting problems:

All forecasting methods are subject to have errors but it varies from case to case. Some main problems are:

- Future is always unpredictable or uncertain.
- Less data is available so less reliable forecasts.
- Pattern of forecasts and seasonal variations cannot be guaranteed to be continued in future.
- There is always a danger of random variations.

Other changes which affects future forecasts:

- Political and economic changes: (It creates uncertainty for example change in interest rates, exchange rates or inflation).
- Environmental changes: (Changes in market will affect other company's' market)
- Technological changes
- Technological advances
- Social changes

Cost Reduction

COST MANAGEMENT

Cost can be managed by:

- Reducing cost
- Controlling cost

Cost reduction

- Cost reduction is a planned and positive approach to reduce expenditure.
- Its aim is to reduce cost to below budget.
- By changing working method, cost can be reduced to below current budget or standards.

Cost control

- Cost control is concerned with regulating the costs of operating a business and keeping costs within acceptable limits.
- Acceptable limits mean standards or budgets.
- If actual cost varies from budgeted cost then cost action will be required.
- It means actual cost should be below the budget.
- Cost control actions lead to reduction in excessive spending.

❖ APPROACHES OF COST REDUCTION

There are two approaches used to reduce cost.

➤ Crash programme to cut spending levels

- Immediate plan to reduce spending without any proper planning like:
 - ✓ Some projects might be abandoned
 - ✓ Deferred some expenses
 - ✓ Stop new recruitments
 - ✓ Redundant unnecessary employees.
- It might create a panic situation
- Poor planning may lead to poor efficiency
- May be cost reduced in short term but increase in long term.
- May be useful in time of crisis.

➤ Planned Programme to reduce cost

- It involves continual assessments of organization products, methods, services and so on
- It is a planned approach
- It reduces the cost for long term

Problems in introducing cost reduction programmes

- Resistance from employees
- To overcome this problem, proper communicate the programme through some campaign
- If the programme introduced in one area may lead extra cost in other area
- Not properly planned programme create panic situation

Managers' responsibilities in reducing cost

- They should have a positive approach
- They should do cost benefit analysis

- Investigate area of potential cost reduction and identify unnecessary costs
- Cost reduction should be planned, agreed, implemented and monitored by managers

Scope of cost reduction

- Cost reduction should be applied to whole organization through campaigns
- Cost reduction campaigns should have a long term aim as well as short term objectives
- In short term only variable cost can reduce easily. Fixed cost remains unchanged like rent
- Some fixed costs can be avoided in short term like advertising or sales promotions. These are called **discretionary fixed costs**
- In long term variable and fixed costs both can be either avoided or reduced

METHODS OF COST REDUCTION

✓ Improving efficiency

✓ Improving efficiency includes:

- Improving efficiency of material usage
- Low level of wastage
- Better quality checks

✓ Improving labour productivity

- Pay incentives
- Change working methods
- Improving coordination between departments
- Give challenging standards
- Improving efficiency of equipment usage
- Better use of equipment resources
- Provide proper maintenance to avoid down time

✓ Material costs

- Avail bulk purchase discounts
- Introduce EOQ
- Use Cheap substitute material
- Improve store controls

✓ Labour cost

Work study is a mean of raising the productivity of an operating unit by reorganization of work.

There are two parts of work study:

- **Method study:** It is the systematic recording and critical examination of existing and proposed ways of doing work in order to develop and apply easier and more effective methods and reduce costs.
- **Work measurement:** It involves establishing the time for qualified workers to carry out a specified job at a specified level of performance.

Methods of work study:

- ◆ Direct observation methods: It involves observing jobs in practice
- ◆ Synthetic methods: These are used to estimate work content of jobs without having to observe them.

✓ **Organization and methods (O&M)**

It is a term for techniques, including method study and work measurement that are used to examine clerical, administrative and management procedures for improvements.

Critical examination of existing and proposed ways of doing work in order to improve it through alternative cost reduction methods and establishing the time for a skilled worker to carry out a specified job at specified level of performance

✓ **Finance Cost**

- Avail cash discounts from suppliers
- Reassessed cash discounts offered to credit customers
- Borrow at low interest rates
- Improve foreign exchange dealings

✓ **Rationalization**

When organizations grow, especially through mergers and takeovers, there is a tendency for work to be duplicated in different parts of the organisation. The elimination of unnecessary duplication and concentration of resources is a form of rationalisation.

✓ **Expenses**

- Authorised expenses
- Evaluate capital expenditure
- Continually questions about expense items

❖ **ANOTHER APPROACH TO COST REDUCTION**

Value analysis: It is a planned, scientific approach to cost reduction, which reviews the material composition of a product and product's design so that modifications and improvements can be made which do not reduce the value of the product to the customer or user. This means the value of the product remains same with reduced cost.

Value engineering: It is the application of similar technique on new products so that new products are designed and developed to a given value at minimum cost.

Values: There are four types of values:

1. **Cost value:** It is a cost of producing and selling an item
2. **Exchange value:** It is the market value of the product or service
3. **Use value:** It is what the item does, what the purpose it fulfils
4. **Esteem value:** It is the prestige the customer attaches to the product. It is the value which is given by customer

STEPS OF VALUE ANALYSIS

- Reduce unit cost so cost value is the only value which we try to reduce
- Value analysis try to provide same or improved use value in a low cost
- Value analysis try to maintain or enhance the esteem value at low cost

ROLE OF SENIOR MANAGEMENT IN VALUE ANALYSIS

Value analysis programmes must have the full backing of senior management. Management must therefore do the following:

- Provide support like acting as a member of Value analysis programs, attend training sessions
- Establish goals for Value analysis programs to be achieved
- Select the personnel for value analysis
- Provide sufficient budget
- Insist on continual audit
- Give rewards

Performance Measurement

Performance measurement is a vital part of control and aims to establish how well something or somebody is doing in relation to a planned activity. Control is to compare actual results with the plan. Strategic management must decide what they want the business to be and how to get there.

Mission

Mission should identify the purpose of the business and what is it trying to achieve and just as importantly what the business does not do. The managers of the business will contribute their views of the desired position of the business in the future. For this reason, the mission has also become known as the **vision due to the requirement of being able to look into the future**.

Purpose of mission: It shows why the company exists

- To create wealth for shareholders
- To satisfy all stakeholders

Mission provides the commercial logic for the organisation like products or services it offers & its competitive position. It also defines its competence by which it hopes to prosper.

Mission statement: A *mission statement is a formal, short, written statement of the purpose of a company or organization*. The mission statement should guide the actions of the organization, spell out its overall goal, provide a sense of direction, and guide decision-making. It provides "the framework or context" within which the company's strategies are formulated. It should possess certain characteristics:

- **Brevity** Easy to understand and remember
- **Flexibility** To accommodate change
- **Distinctiveness** To make the firm stand out

Mission statement can play an important role in the planning process.

- Plans should outline the fulfilment of the organization's mission.
- Evaluate and screening (mission helps to ensure consistency in decisions)
- Implementation (mission also affects the implementations of a planned strategy, in the culture and business practice of the firm)

Goals: The goals set for different parts of the organization should be consistent with each other (**goal congruence**). There are two types of goals:

Operational goals: Can be expressed as objectives. It can be measurable. For example, cut cost, objective reduce budget by 10%.

Non-operational goals: Not all the goals can be measured. For example, a university goal might be to seek the truth, this goal cannot be measured.

Distinguish between goals and objectives

Goals:

- Goals will support the mission.
- This is primary long term objective of the organisation
- Goals are the main purpose of the organization.
- This is at overall organizational level.
- Goals are decided at corporate planning stage by strategic management.

Objectives:

- Objectives are sub-division of goals.
- Objectives are at departmental level.
- If the departments achieve their objectives, the organization will achieve its goal.

Objectives usually are smart

- Specific
- Measurable
- Attainable
- Result orientated
- Time bounded

Some objectives are primary corporate objectives (goals) and some are secondary objectives. Both should combine to ensure the achievement of the overall corporate objective. For example a company sets its **Primary objective** as to maximize profit, for this it has **Secondary objectives** like cost reduction, sales growth, customer satisfaction etc.

Objectives may be **long term and short term**. A company that suffering from losses in short term might continue to have a long term primary objective of achieving a growth in profits, but in short term its primary objective might be survival.

Strategic, tactical and operational objectives: Objectives can also be classified as strategic, tactical or operational.

- ◆ **Strategic objectives** would include matters such as required level of company profitability.
- ◆ **Tactical objectives** would concern with efficient and effective use of organizational resources.
- ◆ **Operation objectives** would include guidelines for ensuring that specific tasks are carried out.

Trade-off between the objectives: When there is number of objective, some might be achieved on the expense of others. For example, a company's objective of achieving good profits and profit growth might have adverse consequences for the cash flows of the business, of the quality of the firm's products.

Short-termism is when there is a bias towards short-term rather than long-term performance. It is often due to the fact that managers' performance is measured on short-term results.

Organizations often have to make a trade-off between short-term and long-term objectives. Decisions which involve the **sacrifice of longer-term objectives** include the following.

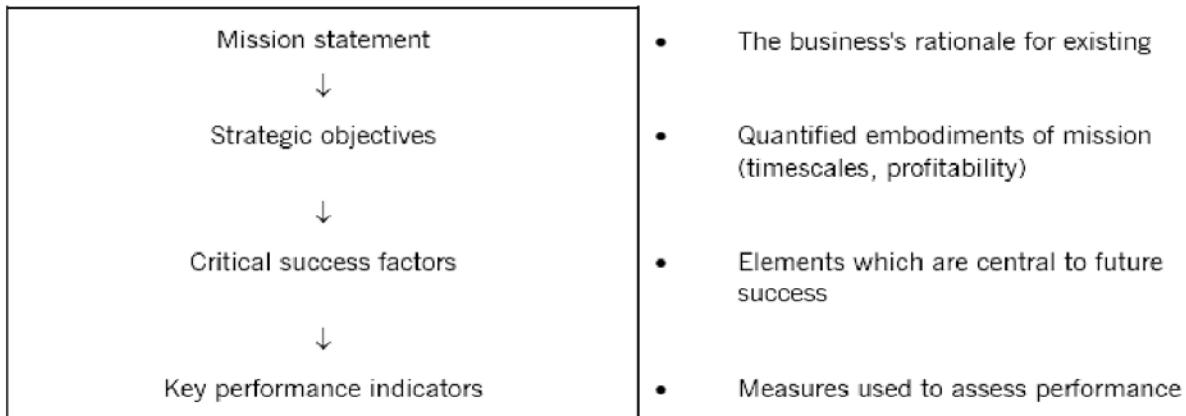
- Postponing or abandoning capital expenditure projects, this would eventually contribute to growth and profits, in order to protect short term cash flow and profits.
- Cutting R&D expenditure to save operating costs, and so reducing the prospects for future product development.
- Reducing quality control, to save operating costs (but also adversely affecting reputation and goodwill).
- Reducing the level of customer service, to save operating costs (but sacrificing goodwill).
- Cutting training costs or recruitment (so the company might be faced with skills shortages).

Managers may also **manipulate** results, especially if rewards are linked to performance. This can be achieved by changing the timing of capital purchases, building up inventories and speeding up or delaying payments and receipts.

Methods to encourage a long-term view: Steps that could be taken to encourage managers to take a long-term view, so that the 'ideal' decisions are taken, include the following:

- **Making short-term targets realistic.** If budget targets are unrealistically tough, a manager will be forced to make trade-offs between the short and long term.
- **Providing sufficient management information** to allow managers to see what trade-offs they are making. Managers must be kept aware of long-term aims as well as shorter-term (budget) targets.
- **Evaluating managers' performance** in terms of contribution to long-term as well as short-term objectives.
- **Link managers' rewards to share price.** This may encourage goal congruence.
- **Set quality based targets** as well as financial targets. Multiple targets can be used.

The link between mission statements and key performance indicators



Performance measure can be divided in two groups

1. **Financial performance measures** (used to measure the performance of Profit Seeking Organizations)

It includes:

 - **Ratio analysis** - Several profitability and liquidity measures can be applied to divisional performance reports.
 - **Variance analysis** - is a standard means of monitoring and controlling performance; care must be taken in identifying the controllability of and responsibility for each variance. (already studied in standard costing)
 - Benchmarking (financial + non-financial)
 - Balanced scorecard (financial + non-financial)
2. **Non-financial performance measure** (used to measure the performance of Profit Seeking Organizations and Not For Profit Organizations)
 - Benchmarking (financial + non-financial)
 - Balanced scorecard (financial + non-financial)

❖ **FINANCIAL PERFORMANCE MEASURES**

Ratio Analysis

Financial ratios quantify many aspects of a business and are an integral part of the financial statement analysis. Financial ratios are categorized according to the financial aspect of the business which the ratio measures. *Financial ratios allow for comparisons;*

- Between companies

- Between industries
- Between different time periods for one company
- Between a single company and its industry average

➤ **Profitability Ratios:** measure the firm's use of its assets and control of its expenses to generate an acceptable rate of return. Management is always keen to measure its operating efficiency. Owners / shareholders invest their funds in the expectation of reasonable returns. The operating efficiency of a firm and its ability to ensure ample returns to its owners / shareholders depends basically on the profits earned by it.

✓ **Operating profit margin:** *Operating profit is an income of the company that is generated from its own operations. It excludes income from investment in other businesses.* The ratio illustrates what proportion of sales revenue was retained in the form of profit before the deduction of interest and tax. The operating profit ratio measures the operating efficiency and pricing efficiency through cost control. If profit margin unsatisfactory means excessive cost or low selling price.

$$\text{Operating profit margin} = \frac{\text{profit before interest and tax}}{\text{Total sales}} \times 100$$

$\text{Profit before interest and tax} = \text{Total Sales} - \text{Cost of Goods Sold} - \text{Non manufacturing overheads}$
(except tax and interest)

$\text{Total sales} = \text{Cash Sales} + \text{Credit Sales}$

Note: if no information about interest and tax is given then take NET PROFIT instead of Profit before interest and tax

Investors can measure the quality of the company's operations looking at the operating profit margin ratio over the period of time and comparing it with other competitors in the industry.

Typical implication/observation

- It indicate the profit per \$1 of sales (but not the volume of sales)
- If it increases during the period it is satisfactory
- Might be useful to compare the budget to assess expectations
- The possible causes of low or reducing profit margin are :
 - ◆ Costs are high /increasing
 - ◆ Sale price are low/reducing (but the result may be that turnover is increasing)
 - ◆ A worse of the sale mix (by selling low margin product in the place of high margin product)

✓ **Gross profit margin:** Gross profit margin ratio indicates how efficiently the material, labour and expenses related to production are used by an organization in order to produce a product at a lower cost. Higher percentage shows better control over the costs and reasonable profit on sales.

$$\text{Gross profit margin} = \frac{\text{gross profit}}{\text{Total sales}} \times 100$$

$\text{Gross Profit} = \text{Total Sales} - \text{Cost of Goods Sold}$

$\text{Total sales} = \text{Cash Sales} + \text{Credit Sales}$

Comparison of the business ratios to those of similar businesses will reveal the relative strengths or weaknesses in the business.

- ✓ **Cost of goods sold to sales ratio:** When profit targets are not met, cost to sales ratios are calculated to determine in which area of cost does the problem lie

$$\text{Cost of sold to sales ratio} = \frac{\text{cost of goods sold}}{\text{Total sales}} \times 100$$

The ratio has measured the efficiency with which the company has acquired and used resources to generate sales. Generally the lower the ratio, the better the cost efficiency is. The ratio does however need to be considered in context with quality, which influences the volume of sales revenue. The ratio can be sub analysed by different costs: material, labour and expenses.

$$\text{Cost to sales ratio} = \frac{\text{each element of cost}}{\text{Total sales}} \times 100$$

- ✓ **Non-manufacturing overheads to sales ratio**

$$\text{Non - manufacturing overheads to sales ratio} = \frac{\text{each element of non - manufacturing overheads}}{\text{Total sales}} \times 100$$

- ✓ **Earnings per share (EPS)**

$$\text{Earning per share} = \frac{\text{earnings available for ordinary shareholders}}{\text{number of shares}}$$

The earnings per share ratio are widely used to measure the profitability of the shareholders' investment. EPS represents the amount of profits attributable to each ordinary share or, what each share has generated in terms of profits. Investors compare the EPS of the company with the industry average and with the EPS of other companies before taking investment decisions.

- ✓ **Price earnings ratio (P/E ratio)**

$$\text{Price earning ratio} = \frac{\text{market value per share}}{\text{earning per share}}$$

Price earnings ratio compares current market price of each share with the per share earnings in order to assess the company's performance. It reflects investors' expectations about the increase in the firm's earnings. A high P/E ratio indicates that investors are expecting higher growth in future compared to companies with low P/E ratio. It is more useful to compare one company's P/E ratio with that of the other companies in the same industry or the market in general and with the company's own P/E ratio of preceding years.

- ✓ **Return on capital employed (ROCE):** ROCE is probably the most popular ratio for measuring general management performance in relation to the capital invested in the business. Also known as Return on investment (ROI). ROI is normally used for divisional or investment centre performance appraisal. This ratio expresses profits earned as a proportion of capital employed. It illustrates how efficiently the company is using its capital to generate profits.

$$\text{ROCE} = \frac{\text{Profit before interest and tax OR Net Profit}}{\text{Capital employed}} \times 100$$

Capital employed = Net Assets = Fixed Assets + Current Assets – Current liabilities

Average Capital employed should be used. This is because if the company has purchased assets near the year end, they will be included in the capital employed figure increasing the value of the capital employed figure but the profits will only show one or two months of the assets contribution in generating profits. Comparisons of ROCE can be made between different years or different companies.

- ✓ **RESIDUAL INCOME (RI):** It is the measure of the centre's profits after deducting a notional interest cost. It can be calculated as

Residual income = (profit before interest and tax + profit from any other investments) – (Total capital employed x notional interest charge)

Notional interest is also called imputed interest.

Important: the amount of total capital employed is calculated by including the non-operational investments as well.

Advantages and disadvantages of residual income

Advantages

- It makes divisional managers aware of the cost of financing their divisions.
- It is an absolute measure of performance and not subject to the problems of relative measures such as return on investment.
- In the long run it supports the net present value approach to investment appraisal (the present value of a project's residual income equals net present value of that project).

Disadvantages

- Residual income gives the symptoms not the causes of problems. If residual income falls the figures give little clue as to why.
- Problems exist in comparing the performance of different sized divisions (large divisions will earn larger residual incomes simply due to their size).
- Residual income when applied on a short term basis is a short term measure of performance and may lead managers to overlook projects whose payoffs are long term. This could well be the case for the hotel chain.

- ✓ **Asset turnover**

$$\text{Asset turnover} = \frac{\text{total sales}}{\text{Capital employed}}$$

This ratio indicates the efficiency with which company is able to use all its (net) assets to gearing \$1 sales. Generally, the higher a company's total net asset turnover, the more efficiently its assets have been used. The total net asset turnover is probably of greatest interest to management, however, other parties, such as creditors and prospective and present shareholder, will also be interested in the measure.

The return on investment is widely used by external analysts of company performance when the primary ratio is broken down into its two secondary ratios:

ROI = Asset Turnover X Profit Margin

$$\text{ROI} = \frac{\text{total sales}}{\text{Capital employed}} \times \frac{\text{profit before interest and tax}}{\text{total sales}}$$

$$\text{ROCE} = \frac{\text{Profit before interest and tax OR Net Profit}}{\text{Capital employed}} \times 100$$

✓ **Fixed asset turnover**

$$\text{Fixed asset turnover} = \frac{\text{sales}}{\text{fixed assets}}$$

The ratio is used to measure the efficiency with which a company has used its fixed assets to generate sales. Generally higher fixed asset turnover are preferred, although the value is meaningful only when compared inter-period or against the industry. This ratio can be sub-analysed by land, building machinery fixtures and fittings turnover etc.

✓ **Current asset turnover**

$$\text{Current asset turnover} = \frac{\text{sales}}{\text{current assets}}$$

The ratio is used to measure the efficiency with which a company has used its current assets to generate sales. It helps to measure the effectiveness of working capital management. Generally higher current asset turnover are preferred, although the value is meaningful only when compared inter-period or against the industry. This ratio can be sub-analysed by debtor, stock (shown next), cash turnover etc.

✓ **Stock turnover times**

$$\text{Stock turnover through sales} = \frac{\text{sales}}{\text{average stock}}$$

The time which stock turnover measure is the efficiency with which a company has used is stock (or inventory).

- **Liquidity Ratios:** Liquidity refers the state of an asset's nearness to cash. Nearness to cash has been defined in terms of the time and effort needed to sell an asset. Liquidity is vital to the financial health of any company too much liquidity is a misuse of money, and too little leads to severe cash problems.

✓ **Current ratio**

$$\text{current ratio} = \frac{\text{current assets}}{\text{current liabilities}}$$

Current ratio measures the short-term solvency of a firm. It shows the availability of current assets for every one dollar of current liability. The higher the current ratio, the larger is the amount of current assets in relation to current liabilities and the company's ability to meet its current obligations is greater too. If the current ratio is 2:1 or more, the company is generally considered to have good short-term financial strength. If the current ratio is less than 1 (liabilities exceed current assets), the company may face difficulties in meeting its short term obligations.

✓ **Quick ratio or acid test ratio**

$$\text{Quick ratio} = \frac{\text{current asset} - \text{stock}}{\text{current liabilities}}$$

Quick ratio determines the relationship between liquid assets and current liabilities. Liquid assets are the assets that can be easily and immediately converted into cash without loss of value. A quick ratio of 1 to 1 or more represents a satisfactory current financial position of a firm.

Activity ratios: Activity ratios measure the effectiveness of the firm's use of resources.

✓ **Inventory turnover ratio**

$$\text{Inventory turnover} = \frac{\text{costs of goods sold}}{\text{Average inventory}}$$

$$\text{Average inventory} = \frac{\text{beginning inventory} + \text{ending inventory}}{2}$$

Inventory turnover ratio identifies the efficiency of an organisation in producing and selling its product. It shows the number of times the inventory is sold or replaced during the given period. A high ratio indicates strong sales or ineffective buying and a low ratio indicates poor sales and excess inventory.

✓ **Receivable turnover ratio**

$$\text{Receivable turnover} = \frac{\text{credit sales}}{\text{Average receivables}}.$$

The ratio shows how long an organisation takes to collect payments from its customers. It indicates the number of times the receivables turnover each year. The higher the ratio, the better is the efficiency of the credit management in the organisation.

✓ **Payables turnover ratio**

$$\text{Payables turnover} = \frac{\text{credit purchases}}{\text{Average payables}}$$

This ratio shows how long an organisation takes to pay its suppliers.

✓ **Receivables collection period:**

$$\text{Receivables collection period} = \frac{\text{average debtors} \times 365}{\text{Sales}}$$

✓ **Inventory turnover period:**

$$\text{Inventory turnover period} = \frac{\text{average inventory} \times 365}{\text{Cost of goods sold}}$$

✓ **Payables payment period:**

$$\text{Payables payment period} = \frac{\text{average payables} \times 365}{\text{Purchases}}$$

➤ **Gearing ratios:** The debt position of a company indicates the amount of other people's money (other than the owner's money) that is being used by it in generating its profit. Typically, attention is placed on long-term debts, since these commit the company to pay interest over the longest run and eventually repay the sum borrowed. Since long term, debt has prior claims, present and prospective shareholders pay close attention to the degree of indebtedness and ability to repay debts. In general, the more debt (or financial leverage) a company uses the greater will be its risk and return.

✓ **Gearing ratio (debt to equity ratio)**

$$= \frac{\text{Prior charge capital (long term debt)}}{\text{Prior charge capital} + \text{shareholders' equity}}$$

The ratio is sometimes referred to as the debt-equity ratio indicates the relationship between the long-term funds provided by the loan group and those provided by the company's owner. The figure is only meaningful in light of the company's business and comparison with other organizations within the industry is useful. The ratio can also be measured as the relationship between prior-charge debt and the company's assets. If this ratio is too high, lenders will view the business as high risk and owners may have trouble obtaining new finance and if this ratio is too low usually indicates that the business is not using its cash and profits effectively to obtain business assets. This may discourage investors because it means that less profit are distributed to them.

✓ **Interest cover ratio**

$$\text{Interest cover} = \frac{\text{profit before interest and tax}}{\text{interest}}$$

The interest cover ratio shows whether company is earning enough profit before interest to pay its interest costs comfortably, or whether its interest costs are high in relation to the size of its profit, so that a fall in profit before interest and tax would then have a significant effect on profits available for ordinary shareholders. An interest cover of 2 times or less would be low, although benchmarks are different industry by industry.

✓ **Dividend cover**

$$\text{Dividend cover} = \frac{\text{profit before interest and tax}}{\text{dividend}}$$

The dividend cover indicates:

- The proportion of distributable profit for the year that is being retained by the company
- The level of risk that the company will not be able to maintain the same dividend payments in future years, should earnings ever fall.
- A high dividend cover means that a high proportion of profit is being returned, which might indicate that the company is investing to achieve earnings growth in the future.
-

Possible limitations of financial ratio analysis:

However, this analysis approach must be used with circumspection and in circumspection with other analytical tools and techniques as it has a number of limitations. These include:

1. That the approach is based on historical data and thus the ratio may not be a good guide to the future
2. The quality of the analysis is determined by the quality of the accounting information upon which

- it is based (considering the fact that here the distortion has taken place resulting from creative accounting such as window dressing of financial statement to hide short term fluctuation)
3. Difference in accounting practices adopted by company over the treatment of fixed asset depreciation and revaluation, stock valuation, research and development expenditure, goodwill write off and profit recognition
 4. The change in value of money and differences in trading enjoinders over time
 5. A difficulty in deciding on a suitable yardstick and the interpretation of change e.g. is a higher return on net asset (RONA) good or bad.
 6. The use of ratios to measure performance may encourage sub-optimal behaviours by managers e.g. short term manipulation of results
 7. Ratios are normally based exclusively on finance, and reflect only financial indicators of performance. There are of course non-financial implications associated with performance

Information required for meaningful ratio analysis:

In addition to a company's financial statement (balance sheet, profit and loss account and cash flow statement) the following information would be useful:

1. Statistics of the industry as a whole and in particular financial and other ratios showing best industry average and worst results
2. Detail of the company's budget plans with a schedule of variances
3. Cash flow forecasts
4. Details of the company's accounting policies and changes to any basis of accounting
5. Detail of future plans
6. Details of any post balance sheet event and of any contingencies
7. Detail of fixed assets with project remaining lives and likely replacement costs
8. Accounting adjustment to take account of inflation during the period under review
9. Government statistics concerning interest levels and other economic indicators

TRACEABLE AND CONTROLLABLE COSTS

The main problem with measuring controllable performance is in deciding which costs are **controllable** and which costs are **traceable**. The performance of the manager of the division is indicated by the **controllable profit** (and it is on this that he is judged) and the success of the division as a whole is judged on the **traceable profit**.

Consider, for example, depreciation on divisional machinery. Would this be included as a controllable fixed cost or a traceable fixed cost? Because profit centre managers are only responsible for the **costs and revenues** under their control, this means that they do not have control over the investment in noncurrent assets. The depreciation on divisional machinery would therefore be a **traceable fixed cost** judging the performance of the division, and not of the individual manager

❖ NON FINANCIAL PERFORMANCE MEASURES

These are the **qualitative measures** which are not expressed in numeric. Due to Changes in cost structure, more competitive environment and competitive manufacturing environment have led to an increased use of **non-financial indicators**.

- In modern businesses, a major investment is required for new technology and product life cycle have got shorten. Mostly costs are committed at planning stage so it is too late to control cost in further stages
- Financial measures do not convey full picture of the company's performance. In competitive environment companies are competing in terms of customer satisfaction, quality, product features, quality deliveries, after sales services etc.

- New competitive process of making a product focuses on reducing time of production, less machine setups, more efficient labour and machine, increase in productivity etc.

Non-financial measures	Key performance indicators
Competitiveness	<ul style="list-style-type: none"> ▪ <i>Sales growth by product or service.</i> ▪ <i>Measures of customer base.</i> ▪ <i>Relative market share and position.</i>
Quality of service	<ul style="list-style-type: none"> ▪ <i>Quality measures in every unit.</i> ▪ <i>Evaluate suppliers on the basis of quality.</i> ▪ <i>Number of customer complaints received.</i> ▪ <i>Number of new accounts lost or gained.</i> ▪ <i>Rejections as a percentage of production or sales.</i>
Customer satisfaction	<ul style="list-style-type: none"> ▪ <i>Speed of response to customer needs.</i> ▪ <i>Informal listening by calling a certain number of customers each week.</i> ▪ <i>Number of customer visits to the factory or workplace.</i> ▪ <i>Number of factory and non-factory manager visits to customers.</i>
Quality of working life	<ul style="list-style-type: none"> ▪ <i>Days absence</i> ▪ <i>Labour turnover</i> ▪ <i>Overtime</i> ▪ <i>Measures of job satisfaction</i>

✓ BALANCED SCORECARD

The balanced scorecard measures performance in four different perspectives. It employs a variety of financial and non-financial indicators.

- **Financial perspective** (*financial success*)—how do we create value for our shareholders?
- **Customer perspective** (*customer satisfaction*)—how do existing and new customers value from us?
- **Internal business perspective** (*process efficiency*)—what must process we excel at?
- **Innovation and learning perspective** (*growth*)—can we continue to improve and create future value?

In balanced scorecard these four perspectives are act as Critical Success Factors (CSF). A critical success factor is a performance requirement that is fundamental (critical) to competitive success. These critical success factors have number of Key Performance Indicators (KPI). These are the indicators used to measure performance. There are two types of key performance indicators.

- Financial key performance indicators(in monetary terms)
- Non-Financial key performance indicators(in non-monetary terms)

- **Financial perspective:** This considers how the organisation can create value for its stakeholders. Performance measures are likely to include traditional financial measures of profitability, cash flow and sales growth. This focuses on satisfying shareholder value. Examples;
 - Return on capital employed
 - Profit margins

- **Customer perspective:** This looks at how existing and potential customers see the organisation. Performance measures could include number of customer complaints, new customers acquired, on-time deliveries etc. This is an attempt to measure customers' view of the organization by measuring customer satisfaction. Examples;
 - Customer satisfaction with timeliness
 - Customer loyalty.
- **Internal business perspective:** This considers the processes at which an organisation must excel if it is to achieve customer satisfaction and financial success. Measures might include the speed of innovation, the quality of after sales service or manufacturing time. This aims to measure the organization's output in terms of technical excellence and consumer needs. Examples;
 - Unit cost
 - Quality measurement
- **Innovation and learning perspective:** This looks at the organisation's capacity to maintain its competitive position through the acquisition of new skills and the development of new products and services. This focus on the need for continual improvement of existing products and techniques and developing new ones to meet customers' changing needs. Examples;
 - A measure would include % of turnover attributable to new products.

The following important features of this approach have been identified:

- *It looks at both internal and external matters concerning the organization.*
- *It is related to the key elements of a company's strategy.*
- *Financial and non-financial measures are linked together.*

The balanced scorecard approach may be particularly useful for performance measurement in organizations which are unable to use simple profit as a performance measure. For example the **public sector** has long been forced to use a **wide range of performance indicators**, which can be formalized with a balanced scorecard approach.

Advantages

- **All four perspectives considered by manager:** Managers need to look at both internal and external matters affecting the organization. They also need to link together financial and non-financial measures. Therefore they can see how factors in one area affect all other areas.
- **Consistency between objectives, control systems and staff:** It can be difficult to incorporate objectives into control systems such as budgets. So targets set by a budget may conflict with objectives. Moreover, staff may put their own interpretation on objectives against the actual intention of the original objective. The balanced scorecard should improve communication between different levels of the organization. The balanced scorecard strives to keep all of these factors in balance.

Disadvantages

- **Conflicting measures:** Some measures in the scorecard such as research funding and cost reduction may naturally conflict. It is often difficult to determine the balance which will achieve the best results.
- **Selecting measures:** Not only do appropriate measures have to be devised but the number of measures used must be agreed. Care must be taken that the impact of the results is not lost in a sea of information.
- **Expertise:** Measurement is only useful if it initiates appropriate action. Non-financial managers may have difficulty with the usual profit measures. With more measure to consider this problem will be

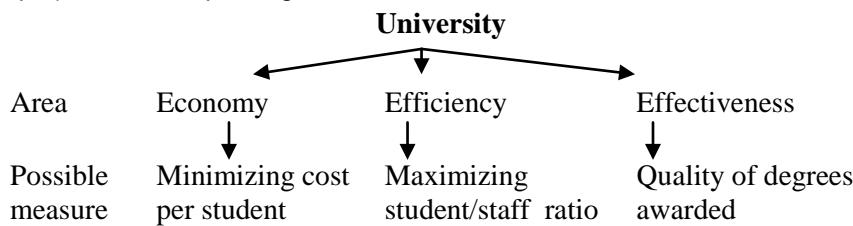
compounded.				
▪ Interpretation: Even a financially-trained manager may have difficulty in putting the figures into an overall perspective.				
> Application of Balance Scorecard for Electronic Circuits Inc.				
✓ Financial success				
Goals	Measures (KPI)			
Survive	Cash flows			
Succeed	Quarterly sales growth in income by division			
Prosper	Increased market share and ROCE.			
✓ Customer satisfaction				
Goals	Measures (KPI)			
New products	Percentage of sales from new products.			
Preferred supplier	Percentage of sales from proprietary products.			
Customer partnership	Share of key accounts purchased.			
✓ Process efficiency	Measures (KPI)			
Goals	Number of cooperative engineers efforts.			
Technology compatibility	Manufacturing geometry vs. competitors			
Manufacturing Excellence	Cycle time.			
Design productivity	Silicon and engineering efficiency			
New products introduced	Actual introduction schedule vs. planned			
✓ Growth	Measures (KPI)			
Goals	Time to develop next generation			
Technology leadership	Process time to maturity.			
Manufacturing learning	New product introduced vs. competition			
> Application of Balanced Scorecard for a Restaurant				
✓ Financial success				
Goals	Measures (KPI)			
To grow and open new restaurants	New restaurants opened			
Profitable	Net profit margins			
✓ Customer satisfaction	Measures (KPI)			
Goals	Excellent results on customer survey			
Great services	Customers booking to come again			
Repeat business	New menus on a regular basis			
Innovative food				
✓ Process efficiency	Measures (KPI)			
Goals	Time from order to delivery			
Timely food delivery	Processing of food order, few mistakes			
Efficient staff	Amount of food discarded			
Low food wastage				
✓ Growth	Measures (KPI)			
Goals	Employees with relevant training			
Trained staff	Number of new dishes introduced			
New menu choices				

Value for Money

Value for money means providing service in a way which is economical, efficient and effective.

Value for Money (VFM) is often referred to as the 3E's-Economy, Efficiency and Effectiveness.

- **Economy:** It implies that the least possible cost should be incurred for acquiring and using resources, while maintaining the appropriate quality ('doing things at a low price') like more clean plates per pound.
- **Effectiveness:** It focuses on the achievement of the desired objectives through the spending of available funds. It is concerned with the relationship between the planned results and the actual results of projects, programs and other activities ('doing the right things'). Like plates as clean as they should be.
- **Efficiency:** It is attaining desired results at minimum cost. It implies the maximisation of output to input ratio i.e. per unit of input the output should be the most. It is concerned with the relationship the resources (input) and the output of goods, services and other results.



It is clear that high effectiveness may conflict with economy and efficiency. Multiple and conflicting objectives may exist due to the multiple stakeholders involved

Performance Measurement of Labour Using Standard Hour

It is not possible to measure output in terms of units produced for a department making several different products. This problem can be overcome by ascertaining the standard hours produced,

✓ Activity ratio / production volume ratio

This ratio measures how the overall production compares to planned levels. It compares the number of standard hours equivalent to the actual work produced and budgeted hours.

$$\frac{\text{Standard hours for actual output} \times 100}{\text{Budgeted hours}}$$

✓ Capacity ratio:

This ratio measures the extent of worker's capacity by their working hour has been achieved in a period with the planned labour hours' utilization.

$$\frac{\text{Actual hours worked} \times 100}{\text{Budgeted hours}}$$

✓ Efficiency ratio:

This ratio measures the efficiency of the labour force by comparing equivalent standard hours for product produced and actual hours worked. The benchmark of efficiency is 100%.

$$\frac{\text{Standard hours for actual output} \times 100}{\text{Actual hours worked}}$$

$$\text{Activity ratio} = \text{Efficiency ratio} \times \text{capacity ratio}$$

$$\text{Standards hours per unit} = \text{Budgeted hours} \div \text{Budgeted units produced}$$

$$\text{Standard hours for actual output} = \text{Standard hours per unit} \times \text{Actual output}.$$

Performances measurement through cost per unit

In contract and process costing environment cost per unit is a useful performance measure.

$$\text{Cost per unit} = \frac{\text{Total cost}}{\text{Number of units produced in the period}}$$

Performance measure for Services

Characteristics of services: There are four particular characteristics of services, which affect both performance and its measurement:

Simultaneity – production and consumption of the service at the same time

Perishability – the inability to store the service

Heterogeneity also called variability – provision of a non-standardized service

Intangibility – there is no physical product.

Performance measurement in service sectors: *There are 6 key dimensions to performance in the service sector*

- Competitive Performance
- Financial Performance
- Quality
- Resource utilization
- Flexibility
- Innovation

Together these areas influence the competitiveness of the business and ultimately its profitability.

➤ **Competitive performance**

- Sales Growth
- Market Share
- Obtain New Business

➤ **Financial performance**

- Budgeted Expenditure Limit
- Standard Performance Measurement (Standard cost per unit; Productivity etc.)

➤ **Quality**

Quality cannot be measured physically so it is assessed by different means, this will be more understandable by following table:

Service quality factor	Measure	Mechanism
• Assess	Walking distance	Customer survey and internal operational data
• Cleanliness	Cleanliness of environment and equipment	Customer survey and management inspection
• Comfort	Crowdedness of airport	Customer survey and management inspection

• Friendliness	Staff attitude and helpfulness	Customer survey and management inspection
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➤ **Resource utilisation**

Resource utilization is measured in terms of productivity. The main output of accountancy firm is chargeable hours. Productivity will therefore be measured as ratio some of the ratios are given below:

Business	Input	Output
Accountancy firms	Man hours available	Chargeable hours
Common wealth hotels	Rooms available	Rooms occupied

➤ **Flexibility:** It has three aspects.

Speed of delivery	This is vital in some services industries. measure included factors such as waiting time in queries
Ability to respond in customer's specification	This will depend on type of services professional service such as legal advice must tailored exactly the customer's needs
Coping with demand	This is measureable in quantity terms. E.g. train company can measure exact overcrowding

➤ **Innovation**

How much cost it will take to develop new service and how effective this process is. In can be summarized as follows:

- Amount of spending on research and development
- Proportion of new service to total service provided
- Time between the identification of customer need and for a new service and making it available.

MONITORING PERFORMANCE MEASUREMENT

Non-financial performance measure (used to measure the performance of **Profit Seeking Organizations** and **Not for Profit Organizations**)

- Benchmarking (financial + non-financial)
- Balanced scorecard (financial + non-financial)

✓ **BENCHMARKING**

Benchmarking involves the establishment, through data gathering, of targets and comparators, through whose use relative levels of performance (and particularly areas of underperformance) can be identified. By the adoption of identified best practices the performance of the organisation should be improved.

Types of benchmarking

- **Internal benchmarking:** This involves the comparison of different departments or divisions within an organisation. Data for this is easy to obtain and conditions are often comparable. Learning may be limited as comparisons are only being made within the same company.
- **Competitive benchmarking:** This involves comparing performance with that of direct competitors. The potential for learning is improved but data may be difficult to obtain. For commercial reasons firms are often unwilling to divulge information to direct competitors. The growth of benchmarking clubs and trade associations has reduced the problems of competitive benchmarking

- **Functional benchmarking:** Various functions in the business are compared with those recognised as the best external practitioners of the function. A manufacturing company could compare its invoice preparation time with that of a credit card company, its delivery time with a firm of couriers etc. The potential for learning how to improve performance is very high, but comparability problems sometimes exist. (This is sometimes referred to as operational or generic benchmarking)
- **Strategic benchmarking:** This involves comparison of performance with competitors at the strategic level. Areas such as market share and return on capital employed could be considered. Such comparisons are important in designing competitive strategy.

Reverse engineering: *Buying a competitor's product and dismantling it in order to understand its content and configuration.*

Why use benchmarking?

- ✓ **For setting standards:** Benchmarking allows **attainable standards** to be established following the examination of both **external and internal information**. If these standards are **regularly reviewed** in the light of information gained through benchmarking exercises, they can become part of a program of **continuous improvement** by becoming increasingly demanding.
- ✓ Its flexibility means that it can be used in both the public and private sector and by people at different levels of responsibility.
- ✓ Cross comparisons (as opposed to comparisons with similar organisations) are more likely to expose radically different ways of doing things.
- ✓ It is an effective method of implementing change, people being involved in identifying and seeking out different ways of doing things in their own areas.
- ✓ It identifies the processes to improve.
- ✓ It helps with cost reduction.
- ✓ It improves the effectiveness of operations.
- ✓ It delivers services to a defined standard.
- ✓ It provides a focus on planning.

'Most importantly benchmarking establishes a desire to achieve continuous improvement and helps develop a culture in which it is easier to admit mistakes and make changes.' Stages involve,

1. Planning and organization e.g. setting up a steering group and setting out aims and objectives
2. Identification of key internal processes for analysis.
 - a. Practices. steps in a process
 - b. Metrics. measures of times and outcomes e.g. cost, quality
3. Researching potential partners. Collecting information and investigating metrics for comparison.
4. Making agreements and developing plans for exchange visits. Formulating a common program for internal data collection
5. Partner site visits by benchmarking teams collect data
6. Analyzing data and developing plans for improvements
7. Implementation and monitoring.

Benefits of performance measurement systems

- **Clarification and communication** of organizational objectives e.g. profitability.
- Developing **agreed measures** of performance within the organization e.g. ROCE.
- Allowing **comparison** of different organizations e.g. ratio analysis.
- **Promoting accountability** of the organization to its stakeholders.

Problems

- **Tunnel vision** – an obsession with maximizing measured performance at the expense of non-measured performance e.g. staff welfare.
- **Myopia** (short sightedness) – maximizing short run performance at the expense of long run success.
- **Manipulation of data** – “creative” reporting e.g. trying to classify all adverse variances as planning variances.
- **Gaming** – e.g. building slack into budgets.

Solutions

- **Participation** – involve staff at all levels in the design and implementation of the system.
- Encourage a **long-term view** among staff e.g. through company share option scheme.
- Ensure the system of performance evaluation is “**audited**” by experts to identify problems.
- **Review** the system **regularly**.
- Audit data used in performance measurement to **prevent/detect manipulation**.

PERFORMANCE MEASUREMENT IN NON-PROFIT MAKING ORGANISATIONS (NFMOs) AND PUBLIC SECTOR ORGANISATIONS

Performance measurement in Non-profit Making Organisations: Performance cannot be judged by Profitability rather than it is judged in terms of inputs and outputs which ties in with the Value for Money criteria.

- Economy
- Efficiency
- Effectiveness

Problems with Non-profit Making Organisations:

- NFMOs tend to have multiple objectives
- Outputs can seldom be measured

Performance can be measured by

- Input – Output Relation
- Judgments
- Comparisons
- Unit cost Measurement

Performance measurement in Public Sector Organisations: Large volume of information on performance and value for money is produced. This information is for internal and external use. Performance can be measured against;

- Financial Performance Targets
- Volume of Output Targets
- Quality of Service Targets
- Efficiency Targets

Management Performance Measures: It is necessary to consider a manager and measure performance in relation to his or her area of responsibility. It is unreasonable to assess manager's performance in relation to matters that are beyond their control. Management performance measures should therefore only include those items that are directly controllable by the manager. The way to control their performance is to establish in advance a set of measures that will be used to evaluate their performance

at the end of the period. It is of critical importance that the performance measures are designed well. Below are the possible performance measures of the management

Measures	Detail
Subjective Measures	<i>An example is performance on a scale of 1 to 5. This will measure managerial performance rather than divisional performance. The judgement should be made by somebody impartial.</i>
Judgement of Outsiders	<i>Bonus attached with the share price for example manager will receive bonus if share price out performs for three years. Increase in share price may reflect the performance aspect.</i>
Upward Appraisal	<i>This involves staff giving their opinions on the performance of their managers. To be effective this requires healthy working relationships.</i>
Accounting Measures	<i>These can be used, but must be tailored according to what or who is being judged.</i>

Practical problems involved in measuring the performance of manager: Difficult to devise performance measures that relate specifically to a manager to judge his or her performance as a manager. Statistics such as days absent, professional qualification, personality etc. can assess the manager as an employee but cannot assess his managerial performance

Impact of External Considerations: The organisation is not sealed off from its environment, it is subject to the conditions present in that environment and its performance is influenced by them. We must always be aware when measuring performance of the influence of external conditions and changes in them.

Market Conditions: A business operates in a competitive environment and suppliers, customers and competitors all influence one another's operations. The entry of a new and dynamic competitor, for example is certain to have an effect on budgeted sales.

General Economic Conditions: These influence businesses most obviously by increase and decrease in Demand and Supply. The role of government is very important as government economic policy affects the demand. For non-profit making organisations, economic conditions and government policy are still important e.g. charity organisations depending on donations will be subject to general feelings of prosperity. The general conclusion from these and similar conditions is that appropriate attention should be paid to general and specific external conditions when measuring performance.

Management Information

Data: is raw facts, figures, numbers and words relating to matters of an organization.

Information: is data processed to be meaningful and useful to an organization.

TYPES OF DATA

The data can be further classified as

- Primary and secondary data
- Quantitative and qualitative data

✓ Primary and secondary data

Primary data: is data collected for specific purpose; raw data is basically primary data. **Example:** list of numbers

Secondary data: is data which have already been collected elsewhere for some other purpose, but which can be used or adapted for the survey being conducted

✓ Quantitative data and Qualitative data

Qualitative data: is data that cannot be measured and expressed in numbers but may reflect distinguishing characteristics. For example, the quality of labour used.

Quantitative data: is data that can be measured and expressed in numbers. **Example:** the standard labour hours required to produce one unit of output.

Quantitative data can be further classified into discrete and continuous data

Discrete data: is data which only takes finite or countable number of values within given range. For example, number of goals scored by a football player in last world cup, shoe size, etc.

Continuous data: is data, which can take on any value. They are measured rather than counted. For example, height of all members of your family.

MANAGEMENT

- People in-charge of running the business
- For example Managers or Other Organization

MANAGEMENT INFORMATION (MI)

- Information required by the managers for the purpose of planning, control and decision making
- Information given to people who run the business
- Information required varies according to responsibilities. For example a supervisor at a factory would require a daily output report. A sales manager would require a weekly sales report etc.
- Information may be used for pricing, valuation of stock, determining profitability, deciding on purchase of capital assets (fixed assets) etc.

Types of Management Information

Most organisations require the following types of Management information

➢ Financial information

- Measured in terms of money
- For example sales of \$10,000 in May

➢ Non-financial information

- Not measured in terms of money.

- For example customer satisfaction, trends, quality
- **Combination of financial and non-financial information**
- Increase sales by \$2,000 due to good quality of product

PURPOSE OF MANAGEMENT INFORMATION

Major purpose of management information is

- Planning
- Control
- Decision-making

Decision making in a broader concept and the planning stage and control stage also includes decision making in it

- **Planning:** Planning involves the establishment of goals and objectives. It also involves selecting appropriate strategies to achieve that objective.

- The management has to plan and manage resources that will be required to achieve the objectives. Plan what resources are required and how they will be used.
- Resources can be monetary (like cash required for business) or human resources (like employees)
- Managing resources means how much would be spending on which project, how many people will be working on that project etc.

Planning involves long term planning & short-term planning.

Long term planning

It is also known as **Corporate Planning** involves selecting appropriate strategies for preparing long-term plans to achieve objectives.

- Time span depend on organization's industry and its environment usually for 3, 5, 7, 10 years.
- Detailed planning.
- Lengthy process.
- Decisions are taken by senior management or top-level management and approved by Board of Directors.

Short term or tactical planning

Long term plans should be sub-divided into short-term plans for operational purposes usually converted it into one year's planning.

- Time span is shorter usually one year like budgets.
- Planning at departmental or functional level.
- By achieving short-term plans, organization can achieve its long-term plans.

- **Control:** When the plan is implemented, it should be evaluated by comparing actual results with plan so that to identify derivation if any and investigate it.

Controls are at two stages:

1. Detailed operational plans compared with actual results of organization regularly, report any variance, and take corrective actions. **Management control** is the process by which managers ensure that resources are obtained and used effectively and efficiently in the accomplishment of the organization's objectives.
 - **Effectively** means that resources are used to achieve the organisation's objectives.
 - **Efficiently** means that the optimum (best possible) output is produced from the resources

- used.
2. Review long-term plan to assess whether the objective plan is modified if required to avoid serious damage in future.

Note: Planning is required for good control and without control, planning is useless.

- **Decision Making:** Decision-making involves a choice between different alternatives. Management accountant provide good information for each alternative so that managers take an **informed decision**. Decisions are taken at planning & control stages.

LEVELS OF MANAGEMENT AND INFORMATION REQUIREMENTS AT EACH LEVEL

There are **three** levels of management

- **Strategic level:** Strategic or high level management is involved in strategic planning, control and decision making. At this level of management, senior managers decide or change the goals & objectives of the organization. Senior managers take decisions about profitability of different segments of business, future market changes, capital requirements, and fixed assets requirement. Chief executive officers and board of directors are example of this level.

Strategic information has the following features:

- It deals with the **whole** organisation.
- It is derived from both **internal & external** source.
- It is relevant to **long term**.
- It is summarized at a **high level**.
- It is both **quantitative & qualitative**.
- It is often prepared on an '**ad hoc**' basis
- It is **not completely certain** because future is unpredictable.

- **Tactical level:** This is the middle level management. This level of management is involved in making departmental decisions including decision making, planning and control about resources. Departmental managers are best example of this level of management. They have to decide how much resources should be required and how efficiently they are being employed. Decisions like productivity measures, Efficient & Effective use of organization's resources, variance report, department's profit, raw material purchase, labour scheduling.

Tactical information has the following features:

- It deals with a **function or department**.
- It is mostly derived primarily from **internal sources**.
- It is prepared **regularly** and **routinely**.
- It is relevant to **short and medium term**.
- It is summarised at a **lower level** as compare to strategic information.
- It is based on **quantitative** measures.

- **Operational level:** They are the front line managers such as foreman or head clerks. They ensure that specific tasks are carried out effectively & efficiently as planned. Operational management is involved in day to day decision making, planning and control for example can be supervisor's decision etc. Direct labour is usually the operational level management.

Operational information has the following features:

- It is **task specific**.
- It is derived almost entirely from **internal sources**.

- It relates to the immediate terms (**current**).
- It is highly **detailed about operations**.
- It is prepared very **frequently** like weekly or daily.
- It is largely **quantitative**.

FEATURES OF MANAGEMENT INFORMATION

- **Reliable:** It should present a correct picture of what is happening. The source of the information should be reliable. For example if questionnaires in a survey filled out by same persons, it will not present the correct picture of the market demand
- **Timely:** It should be in time for the decisions to be made. Information should be provided when required.
- **Relevant:** It should be relevant according to the needs of the management. Mostly senior managers may require summaries. Unnecessary information should not be provided to the relevant person.
- **Complete:** It should have all required information for the job. Information that is correct but excludes something important is likely to be of little value.
- **Accurate:** No unnecessary detail but should be accurate. In certain cases, figures may be rounded off to make reports easier. There should be no mistake. Management information is not absolutely accurate.
- **Clear:** Information should be in understandable form, communicated properly, clearly presented and use right communication channel. Avoid accounting jargons.
- **Timeliness:** Time period covered by reports may vary for example monthly, weekly or daily
- **Cost effectiveness:** The costs of providing the information must not outweigh the 'value added' benefits derived from its use.

Costs of information

- Cost of collecting data
- Cost of processing data
- Cost of storing data
- Opportunity cost of management time

Benefits of information

- Helps in decision making
- Values arising from good decision
- Reduces unnecessary cost
- Adoption of better marketing strategies

SOURCES OF DATA AND INFORMATION

Data and information come from many sources - both internal (inside the business) and external.

Internal Information: Accounting records are a prime source of internal information. They detail the transactions of the business in the past - which may be used as the basis for planning for the future (e.g. preparing a financial budget or forecast).

A lot of internal information is connected to accounting systems-but is not directly part of them. *Example:*

- Records of the people employed by the business (personal details; what they get paid; skills and experience; training records)
- Data on the costs associated with business processes (e.g. costing for contracts entered into by the business)

- Data from the production department (e.g. number of machines; capacity; repair record)
- Data from activities in direct contact with the customer (e.g. analysis of calls received and missed in a call centre)

External Information:

As the term implies, this is information that is obtained from outside the business. There are several categories of external information:

- **Information relating to way a business should undertake its activities:** E.g. businesses need to keep records so that they can collect taxes on behalf of the government. So a business needs to obtain regular information about the taxation system (e.g. PAYE, VAT, Corporation Tax) and what actions it needs to take. Increasingly this kind of information (and the return forms a business needs to send) is provided in digital format. Similarly, a business needs to be aware of key legal areas (e.g. environmental legislation; health & safety regulation; employment law). There is a whole publishing industry devoted to selling this kind of information to businesses.
- **Information about the markets in which a business operates:** This kind of external information is critically important to a business. It is often referred to as "market" or "competitive intelligence".

Most of the external information that a business needs can be obtained from marketing research. Marketing research can help a business do one or more of the following:

1. **Gain a more detailed understanding of consumers' needs** – marketing research can help firms to discover consumers' opinions on a huge range of issues, e.g. views on products' prices, packaging, recent advertising campaigns.
2. **Reduce the risk of product/business failure** – there is no guarantee that any new idea will be a commercial success, but accurate and up-to-date information on the market can help a business make informed decisions, hopefully leading to products that consumers want in sufficient numbers to achieve commercial success.
3. **Forecast future trends** – marketing research can not only provide information regarding the current state of the market but it can also be used to anticipate customer needs/future customer needs. Firms can then make the necessary adjustments to their product portfolios and levels of output in order to remain successful.

TYPES OF SOURCE OF INFORMATION

- **Journal:** Journal articles are primary information resources. Journals are published on a regular basis. Each journal title focuses on a specific area or discipline. They describe research - the generation of new knowledge - and focus on very specific topics.
- **Newspapers:** Newspapers are primary sources of information. They are an excellent source when looking for current and up-to-date information.
- **Websites:** Websites are useful sources of current information and for an overview on a topic. Check our evaluating websites page to ensure the information you find is reliable.
- **Statistics:** Statistics are primary information. They can be very useful for looking at patterns and trends.
- **Trade association:** A **trade association**, also known as an **industry trade group, business association** or **sector association**, is an organization founded and funded by businesses that operate in a specific industry. An industry trade association participates in public relations activities such as advertising, education, political donations, lobbying and publishing, but its main focus is collaboration between companies, or standardization.
- **Government Authorities:** Official statistics are supplied by many governments. For example, In UK, The Annual Abstract of statistics, The United Kingdom National Accounts, Social Trends, etc.

- **Economic Environment:** The economic environment has important influence on local and national level. The forecast state of the economy will influence the planning process for organisations which operates within it. In the time of boom, the overall planning problem will be to identify the demand, whereas in times of recession, the emphasis will be on cost effectiveness, continuing profitability, survival and competition.

MANAGEMENT ACCOUNTING VERSUS FINANCIAL ACCOUNTING

Management Accounting:

To provide management with information to help them **manage resources** efficiently and make sensible **decisions**. There are no specific rules for management accounting. Depends on needs of organizations

Financial Accounting:

To provide accurate financial information for the company accounts which will be used by the **senior management** (Balance Sheet and Profit and Loss) and **external parties** (e.g. investors). Data used to prepare management accounts & financial accounts are same but analysed differently.

Management accounts

- Internal user
- It can be prepared daily, weekly, monthly or periodically.
- No legal requirement to prepare it.
- No specific format. Format is decided by management.
- It is about activities of organization
- It includes financial & non-financial information
- Historical, current & future planning of business.
- Help in planning, control & decision making

Financial accounts

- External user
- Prepare after a defined period mostly yearly
- Companies have legal requirement to prepare it.
- Have pre-determined formats. Format is defined by IAS, IFRS, and Law.
- It is about whole organization
- It is mostly financial information
- Historical and current picture of business

ROLE OF MANAGEMENT ACCOUNTANT

The role of a management accountant assists the managers to manage by

- Provide information for planning;
- Supplying performance reports for controlling;
- Tailoring the accounting system to the organisational structure and thus reinforcing the objectives of the organizational framework;
- Preparing the budgets that assist in providing the motivation to employees.

Limitations of Management Accounting Information

1. If any feature of management information is not present then this will be limit the usefulness of information.
2. It does not need to be accurate down to every penny/paisa. Management accounting information is not absolutely accurate it is just accurate.
3. Decisions taken will depend on how frequently the reports are produced. For example of a report comparing actual with budgeted is produced every month, information regarding any problems that are found will be useful in the next month not in the current month.
4. If managers do not communicate with the cost and management accountant, the information provided by the accountant might not be the type or of the format that the manager requires.

5. When comparisons are being made between different time periods, care has to be taken that price changes are taken into consideration.
6. Even if the information provided by the cost and management accountant is timely and reliable, if it is incomplete, it will not be of any use.
7. Most managers are not accountants so the cost accountant should ensure that the information that he/she is giving to the manager doesn't contain any accountancy jargon and explains matters in non-accountancy terms wherever possible so that it is understood by the manager
8. If the non-financial factors are not considered, a correct picture might not be obtained.

Sampling data: are the data arising because of investigating a sample. A sample is a selection from the population. To gain as much information as possible about the population by observing only a small proportion of the population such as observing a sample.

Population: The term population is used to mean all the items under consideration in a particular enquiry.

Sample: Groups of items **are drawn from the population.**

Census: In situation where whole population is examined **is called census. This situation is rare.**

Advantages of sample

- Time saving
- More questions can be asked to a sample.

Disadvantages of census

- More cost than benefits.
- Out of date when observation complete.
- May be population destroyed in the process like in testing (in order to check the lifetime of an electric light bulb it is necessary to leave bulb burning until it breaks)

Sample frame

- A sampling frame is a **numbered list of all items** in a population.
- Once a list of population is prepared, it is easier to choose a sample from it.
- Sometimes it is not possible to draw a sampling frame because population size is very large like a list of all persons in a country.

Characteristics of sample frame:

- **Complete:** All the members of a population should be included in it.
- **Accuracy:** Information about population should be correct.
- **Adequacy:** It should cover entire population.
- **Up to date:** It should always be up-to-dated
- **Convenience:** It is easily available for use.
- **No duplication:** Each item in population should include once.

Choice of sample:

One of the most important requirements of sample data is that they should be complete and represent all the population in other words covers all the information.

Types of sampling: There are two methods of sampling

- Probability sampling
- Non- probability sampling

✓ **Probability Sampling:** Probability sampling is a method in which there is a known chance of each member of the population appearing in the sample. It includes:

- Random sampling
- Stratified random sampling
- Systematic sampling
- Multistage sampling
- Cluster sampling

❖ **Random Sampling:** Random sampling is a sample selected in such a way that every item in the population has an equal chance of being included in a sample. Randomly choose sample. If random sampling is used, a sampling frame has to be constructed.

Advantages

- It is free from bias (equal choice of being selected)

Disadvantages

- Might be expensive
- An adequate sampling frame might not exist.
- Can produce an unrepresentative sample
- It might be difficult to obtain the data if the selected item covers a wide area
- It might be costly to obtain the data if the selected item covers a wide area

❖ **Stratified random sampling:** Stratified random sampling is a method of sampling which involves dividing the population into groups (strata) like males and females. Random sampling is then taken from each group.

Advantages

- Representative sample selected (every important category will have an elements in the final sample)
- The structure of the sample will reflect that of the population
- Influence can be made about each group

Disadvantages

- Requires prior knowledge of each item in the population

❖ **Systematic sampling:** Systematic sampling is a sampling method, which works by selecting every nth item after random start like 23rd, 26th. It is also called “Quasi Random” because it is not truly random.

Advantages

- It is easy to use
- It is cheap

Disadvantages

- It is possible that a biased sample might be chosen if there is a regular pattern to the population which coincides with the sampling method like population arrange in this pattern A B C D E A B C D E A B C D ...If every fifth item is selected in a sample then there is a sample of Es only.
- It is not completely random since some samples have a zero chance of being selected

- ❖ **Multistage Sampling:** Multistage sampling is a probability sampling method, which involves dividing the population into a number of sub-populations and then selecting a small sample of this sub-population at random. Each sub-population is then divided further, and then a small sample is again selected at random. This process is repeated as many times as it is necessary. Used where an entire country is a population. In this kind of sampling country divided into number of areas, areas sub-divided into small units and then choose a random sample.

Advantages

- Fewer investigators are needed
- It is not costly to obtain a sample
- Does not require a sample frame of the entire population

Disadvantages

- There is possibility of bias if only small number of region selected
- The methods not currently random once the final sampling areas have been selected the rest of the population cannot be in the sample.
- If the population is heterogeneous, the area chosen should reflect the full range of the diversity

- ❖ **Cluster sampling:** Cluster sampling is a non-random sampling method that involves selecting one definable subsection of the population as the sample, that subsection take to be representative of the population in question. For example Cluster sample of all children at school in one country.

Advantages

- It is good alternative to multistage sampling if a satisfactory sampling frame does not exist.
- It is inexpensive to operate

Disadvantages

- The potential for considerable bias

- ✓ **Non-probability sampling:** is a method in which the chance of each member of the population appearing in the sample is not known. There is only one method of such type of sampling.

- ❖ **Quota sampling** is commonly used by market researchers and involves stratifying the population and restricting the sample to a fixed number in each stratum

Advantages

- It is cheap and administratively easy
- A much larger sample can be studied
- No sampling frame is necessary
- Only possible approach in certain situation such as television audience research
- Quota sampling yields enough accurate information for many forms of commercial market research

Disadvantages

- The method can result certain biases

Presentation of information

> Presentation of information in Report writing

- The most formal way of communication.
- A formal report needed where a comprehensive/detailed investigation has taken place

- Many organizations have standard set of regular reports in prescribed formats which make it easier for employees to read and locate information.
- Use charts, tables and good report layouts to increase understanding.

Four stages approach to report writing

- Prepare
- Plan
- Write
- Review

- **Prepare:** Identify whether it is a detailed usual report, Ad Hoc report (unusual), short memo, discussion notes. Identify the language, Brief explanations; Main relevant key terms should be given.
- **Plan:** Plan the structure of the report how to present the answer. The format of report is determined.
- **Write:** The language used in a report should be clear and spelling should be correct. Use clear wordings and language.
- **Review:** Read again to ensure report is clear and complete.

The elements of a formal report are as follows:

- Title (subject of the report)
- Terms of reference (clarify what has been requested)
- Introduction (who the report is from and to how the information was obtained)
- Main body (details about the issue discussed)
- Conclusions (summaries or findings)
- Recommendations (writer's suggestions)
- Signature (of writer)
- Executive summary (summary of a detailed report to save manager's time, it is not more than 1-page)

Some tips

- avoid excessive long sentences
- avoid difficult words
- follow the professional manner
- if abbreviations are used explain them when they are first used in the report
- write correct English

➢ **Presentation of information in Tables**

Tabulation is a process of presenting numerical data or information in the form of table. Tables consist of Rows and Columns. Table is capable of showing only two variables, one shown in the columns and one in the rows. Each column should have proper headings. It is two-dimensional

Table requirements

The following points should be considered while presenting information in tables.

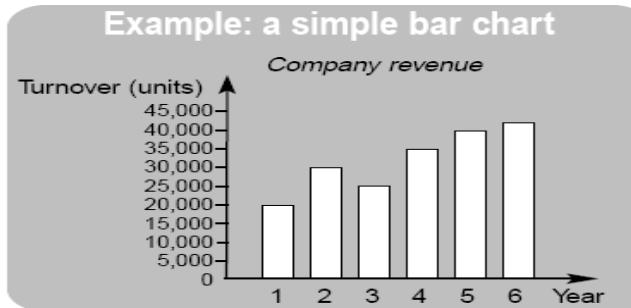
- Tables have proper title.
- All columns have clearly labeled.
- Make clear sub-totals.
- Information presented can easy to read.

➢ **Presentation of information in Bar charts**

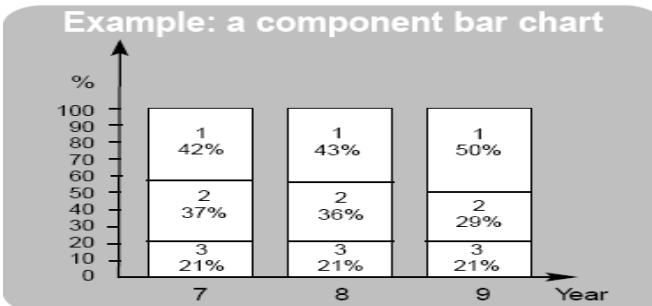
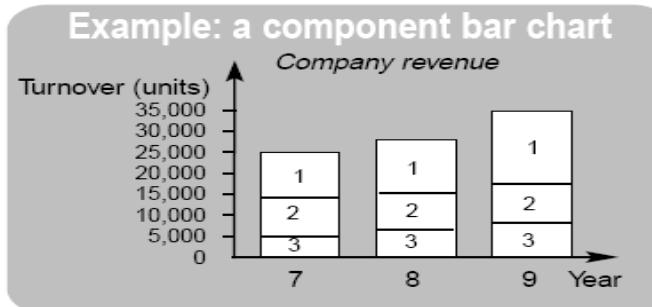
A bar chart is a method of presenting information in which quantities are shown in the form of bars on the chart, length of the bars being proportional to the quantities.

It is a most commonly used method of presenting information in a visual form. There are **three main types** of bar charts.

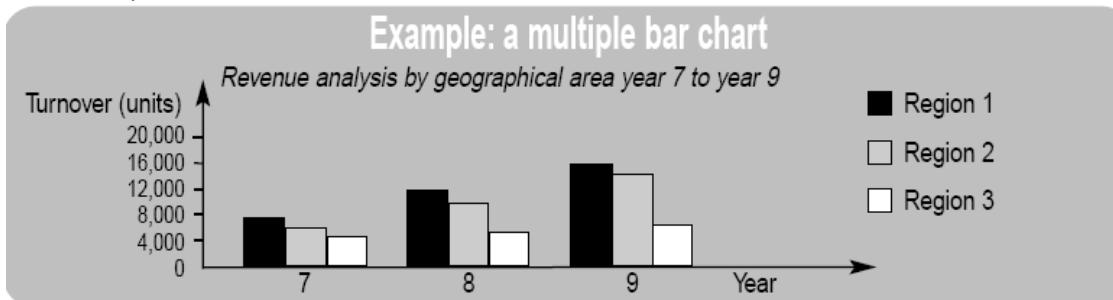
- Simple bar charts:** A simple bar chart is a chart consisting of one or more bars, in which the length of each bar indicates the magnitude of the corresponding information



- Component or percentage component bar charts:** A component bar chart is a bar chart that gives a breakdown of each total into its component



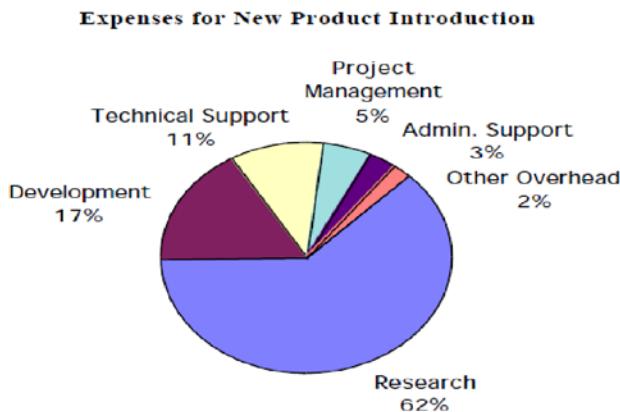
- Multiple bar charts:** A multiple bar chart is a bar chart in which two or more separate bars are used to present subdivisions of information.



4. Presentation of information in Line Graphs:

- Used to display a wide variety of information.
- Used in commercial context.
- Used for demonstrating trends.
- Trends are the progress of events or fluctuations over time of variables such as profit, prices, sales, customer complaints.
- May also be used to compare the performance of various products, which are competing with each other.
- May also be used for changes in share prices over time.

5. Pie Charts: A pie chart is a circular chart in which the circle is divided into sectors. Each sector visually represents an item in a data set to match the amount of the item as a percentage or fraction of the total data set. Pie charts are useful to compare different parts of a whole amount. They are often used to present financial information. E.g. A Company's expenditure can be shown to be the sum of its parts including different expense categories such as salaries, borrowing interest, taxation and general running costs (i.e. rent, electricity, heating etc.).



RESPONSIBILITY ACCOUNTING:

An accounting system under which responsibilities; like revenue and cost, are assigned to managers (responsible persons);

Responsibility Centre: a function or department of an organization that is headed by a manager and the manager has direct responsibility for its performance is known as a responsibility centre.

Responsibility centres are usually divided into different categories. Here describes **cost centre**, **revenue centre**, **profit centre** and **investment centre**.

- **Cost Centre:** A cost centre is a production or service location, function, activity or item of equipment for which costs are accumulated.
- A unit of an organization to which costs can be separately attributed
 - If a manager is responsible for costs attributable to his area of business, it means that the manager is responsible for a cost centre.
 - Each cost centre will have a *cost code* and so all items of expenditure will be recorded according to the correct cost code.

➤ **Revenue Centre**

- A centre, which raises **revenue** and has no responsibility for costs.
- Manager of revenue centre is accountable only for revenues.
- For example department which obtains grants and donations for a charity, sales department

➤ **Profit Centre:** A profit centre is a part of a business accountable for both cost and revenue.

- If a manager is responsible for costs as well as income attributable to his area of business, it means that the manager is responsible for a profit centre
- A profit centre manager is likely to be a **senior person** in the organization who influences over both revenue and cost.
- A profit centre is likely to cover a large area of operations
- A profit centre might be an entire division within the organization or there may be a separate profit centre for each product, brand, service etc.
- There are likely to be several cost centres within a profit centre.

➤ **Investment Centre:** It refers to a profit centre with an additional responsibility for capital investment.

- Manager of investment centre has the responsibility for profit in relation to capital invested in his area.
- Mostly used in public sector organizations where the organization is required to make a particular level of profit in relation to their fixed assets (return on capital employed)
- Several profit centres might share the same capital items e.g. same building, stores etc. So an investment centre is likely to include several profit centres.

Cost codes: After classifying cost, a coding system can be applied to make it easier to manage the cost data. It can be manual or computerized. Each cost is identified through its unique code. Some possible characteristics on which costs are separated are:

- Nature of cost (material, labour, overheads), It is known as subjective classification.
- Type of cost (direct and indirect)
- Cost centre or cost units to which cost should be related (known as subjective classification)

Features of good coding system: An effective and efficient coding system should include the following features:

- Code must be easy to use and well communicated.
- Unique code
- Coding system must allow for expansion
- Codes should be flexible
- It should be comprehensive system (suitable code)
- Codes should be time-saving
- Codes should be error free
- Regularly updated codes
- Code numbers should be issued from a single central point (standardisation)
- Dots, dashes, Colon etc. should be avoided in codes
- They should be uniform (length or structure)
- Not confusing.

TYPES OF CODES

➤ **Composite codes:** In costing, the first three digits in the composite code 211392 might indicate the nature of the expenditure (subjective classification) and the last three might indicate the cost centre of cost unit to be charged (objective classification).

So the digit 211 might refer to 2 materials, 1 raw material, 1 timber
 This would indicate to anyone familiar with the coding system that the expenditure was incurred on timber. The digit 392 might refer to: 3 direct cost, 9 factory alpha, 2 assembly department.
 This would indicate the expenditure was to be charged as a direct material cost to the assembly in factory alpha.

- **Sequence (or progressive) codes:** Numbers are given to items in ordinary numerical sequence, so that there is no obvious connection between an item and its code.

For example:

000042	4cm nails
000043	Office staplers
000044	Hand wrench

- **Group classification codes:** These are an improvement on simple sequence codes, in that a digit (often the first one) indicates the classification of an item. For example:

4NNNNN	Nails
5NNNNN	Screws
6NNNNN	bolts

NOTE: 'N' stands for another digit; NNNNN indicates there are five further digits in the code.

- **Faceted codes:** These are refinement of group classification codes, in that each digit of the code gives information about an item.
 ➤ **Significant digit codes:** These incorporate some digit(s) which is (are) part of the description of the item being coded. For example:

5000	Screws	5060	60mm screws
5050	50mm screws	5070	75mm screws

- **Hierarchical codes:** This is a type of faceted code where each digit represents a classification, and each digit further to the right represents a smaller subset than those to the left. For example:

32 = round headed screws	3 = screws
322 = steel (round headed) screws and so on	31 = flat headed screws

A coding system does not have to be structured entirely on any one of the above systems. It can mix the various features according to the items which need to be coded.

Advantages of coding system

- A code is usually briefer than a description, thereby saving clerical time in a manual system and storage in a computerised system
- A code is more precise than a description and therefore reduces ambiguity
- Coding facilitates data processing

Spreadsheet

Is a computer application that simulates a paper worksheet.

A spreadsheet is divided into rows (horizontal) and columns (vertical). The **rows are numbered 1, 2, 3 etc.** and the **columns lettered A, B, C... etc.** Each individual area representing the **intersection of a row and a column is called a 'cell'**. A cell address consists of its row and column reference. For example, in the spreadsheet below the word 'Packet 2' is in cell C2. The cell that the **cursor is currently in or over is known as the 'active cell'**. A simple Microsoft Excel spreadsheet, containing budgeted figures and average of all for different product brands for the year, is shown below.

	A	B	C	D	E	F	G
1	Colors	Packet 1	Packet 2	Packet 3	Packet 4	Average	
2	Green	10	7	15	8	10	
3	Yellow	12	9	10	15	11.5	
4	Red	15	14	7	17	13.25	
5	Orange	9	11	7	4	7.75	
6	Violet	8	13	15	10	11.5	
7							
8							

Spreadsheets provide a tool for calculating, analysing and manipulating numerical data. Spreadsheets make the calculation and processing of data easier and quicker. Spreadsheets can be used for a wide range of tasks. Some common applications of spreadsheet are:

- Management accounts
- Cash flow analysis and forecasting
- Reconciliation
- Revenue analysis & comparisons
- Cost analysis and comparisons
- Budgets and forecasts

CELL CONTENTS: The contents of any cell can be one of the following:

Text: A text cell contains words. Numbers that do not represent numeric values for calculation purposes (e.g. a Part Number) may be entered in a way that tells Excel to treat the cell contents as text.

Values: A value is a digit that can be used in a calculation.

Formulae: A formula refers to other cells in the spreadsheet, and some sort of computation with them.

For example, if a cell, D10 contains the formula=A10 - B10 + C10, cell D10 will display the result of the calculation subtracting the contents of cell B10 from the contents of cell A10 and

adding up contents of cell C10. In Excel, a **formula always begins with an equals sign; =**

FORMULA BAR: The following illustration shows the formula bar. (If the formula bar is not visible, choose View, Formula bar from Excel's main menu.)

The screenshot shows a Microsoft Excel window titled "Microsoft Excel - Book1". The formula bar at the top displays the formula $=A3+C2-B2$. The spreadsheet below has columns labeled A through H. Row 1 contains labels: Balance, Debit, Credit, To, Reference, Date, Cleared, and Bank. Row 2 contains values: \$ 500.00, (empty), (empty), Deposit to open account, (empty), 1/1/2009, x, (empty). Row 3 contains the formula $=A3+C2-B2$, which is highlighted with a purple selection border. The cell reference $A3$ is also highlighted in purple in the formula bar.

The formula bar allows you to see and edit the contents of the active cell. The bar also shows the cell address of the active cell (A3 in the example above).

Examples of spreadsheet formulae: Formulas in Microsoft Excel follow a specific syntax.

All Excel formulae start with the equals sign = followed by the desired function that need to be calculated and the calculation operators; +, *, / and. Formulae can be used to perform a variety of calculations. Here are some examples.

- **=D8*5.** This formula multiplies the value in D8 by 5. The result will appear in the cell holding the formula.
 - **=D7*B25.** This multiplies the value in D7 by the value in B25.
 - **=B11/E8.** This divides the value in B11 by the value in E8. (*means multiply and / means divide by.)
 - **=C5*B11-D1.** This multiplies the value in C5 by that B11 and then subtracts the value in D1 from the result. Note that generally Excel will perform multiplication and division before addition or subtraction. If in any doubt, use brackets (parentheses): =(C5*B11)-D1.
 - **=C7*117.5%.** This adds 17.5% to the value in C7. It could be used to calculate a price including 17.5% sales tax.
 - **= (C9+C10+C10)/3.** Note that the brackets mean Excel perform the addition first. Without the brackets Excel would first divide the value in C10 by 3 and then add the result to the total of the values in C9 and C10.
 - **=5^2** gives you 2 to the power of 5, in other words 5^2 . Likewise $=5^3$ gives you 5 cubed and so on.
 - **=9^(1/2)** gives you the square root of 9. Likewise $81^{(1/3)}$ gives you the cube root of 81 and so on.
- **Moving about:** The F5 key is useful for moving around within large spreadsheets. If you press the function key F5, a Go To dialogue box will allow you to specify the cell address you would like to move to.

Also experiment by holding down Ctrl and pressing each of the direction arrow keys in turn to see where you end up. Page up and page down keys are used to move up and down the sheet. Also try home and end and Ctrl + these keys. Try Tab and Shift + Tab, too. These are all useful shortcuts for moving quickly from one place to another in a large spreadsheet.

Editing cell content: Suppose in a spreadsheet cell E12 currently contains the value 333. If you wish to change the entry in cell E12 from 333 to 333456 there are four options-as shown below.

- **Activate cell E12, type 333456 and press Enter.**
- o To undo this and try the next option press Ctrl+Z: this will always undo what you have just done.
- **Double-click in cell E12.** The cell will keep its thick outline but you will now be able to see a vertical line flashing in the cell. You can move this line by using the direction arrow keys or the Home and the End keys. Move it to after 333 and then type 4556. Then press Enter. When you have tried this press Ctrl + Z to undo it.
- **Click once before the number 333 in the formula bar.** Again you will get the vertical line and you can type in 456 after the 333. Then press Enter. Undo this before moving onto (d).
- **Press the function key F2.** The vertical line cursor will be flashing in cell E12 at the end of the figures entered there (after the 6). Press Home to get to a position after 333 and then type in 456 and press Enter, as before.

Deleting cell contents: You may delete the contents of a cell simply by making the cell the active cell and then pressing Delete. The contents of the cell will disappear. You may also highlight a range of cells to delete and then delete the contents of all cells within the range.

Filling a range of cells: Start with a blank spreadsheet. Type the number 1 in cell A1 and the number 2 in cell A2. Now select cells A1: A2, this time by positioning the mouse pointer over cell A1, holding down the left mouse button and moving the pointer down to cell A2. When cell A2 is highlighted release the mouse button.

Now position the mouse pointer at the bottom right band corner of cell A2. When you have the mouse pointer in the right place it will turn into a black cross.

Then, hold down the left mouse button again and move the pointer down to cell A10. You will see an outline surrounding the cells you are trying to 'fill'.

Release the mouse button when you have the pointer over cell A10. You will find that the software automatically fills in the numbers 3 to 10 below 1 and 2.

Try the following variations of this technique.

- Delete what you have just done and type in Jan in cell A1. See what happens if you select cell A1 and fill down to cell A12: you get the months Feb, Mar, Apr and so on.
- Type the number 5 in cell B1. Select B1 and fill down to cell B10. The cells should fill up with 5's.
- Type the number 2 in cell A1 and 4 in cell A2. Then select A1: A2 and fill down to cell A10. You get 2, 4, 6, 8, and so on.
- If you click on the bottom right hand corner of the cell using the right mouse button, drag down to a lower cell and then release the button you should see a menu providing a variety of options for filling the cells.

Inserting columns and rows: Suppose we also want to add each row, for example cells A1 and B1. The logical place to do this would be cell C1, but column C already contains data. We have three options that would enable us to place this total in column C.

- a) Highlight cells C1 to C5 and position the mouse pointer on one of the edges. (It will change to an arrow shape). Hold down the left mouse button and drag cells C1 to C5 into column D. There is now space in column C for our next set of sums. Any formulae that need to be changed as a result of moving cells using this method should be changed automatically-but always check them.

- b) The second option is to highlight cells C1 to C5 as before, position the mouse pointer anywhere within column C and click on the right mouse button. A menu will appear offering you an option Insert... If you click on this you will be asked where you want to shift the cells that are being moved. In this case you want to move them to the right so choose this option and click on OK.
- c) The third option is to insert a whole new column. You do this by clicking on the letter at the top of the column (here C) to highlight the whole of it then proceeding as in (b). The new column will always be inserted to the left of the one you highlight.

You can now display the sum of each of the rows in column C.

You can also insert a new row in similar way (or stretch rows).

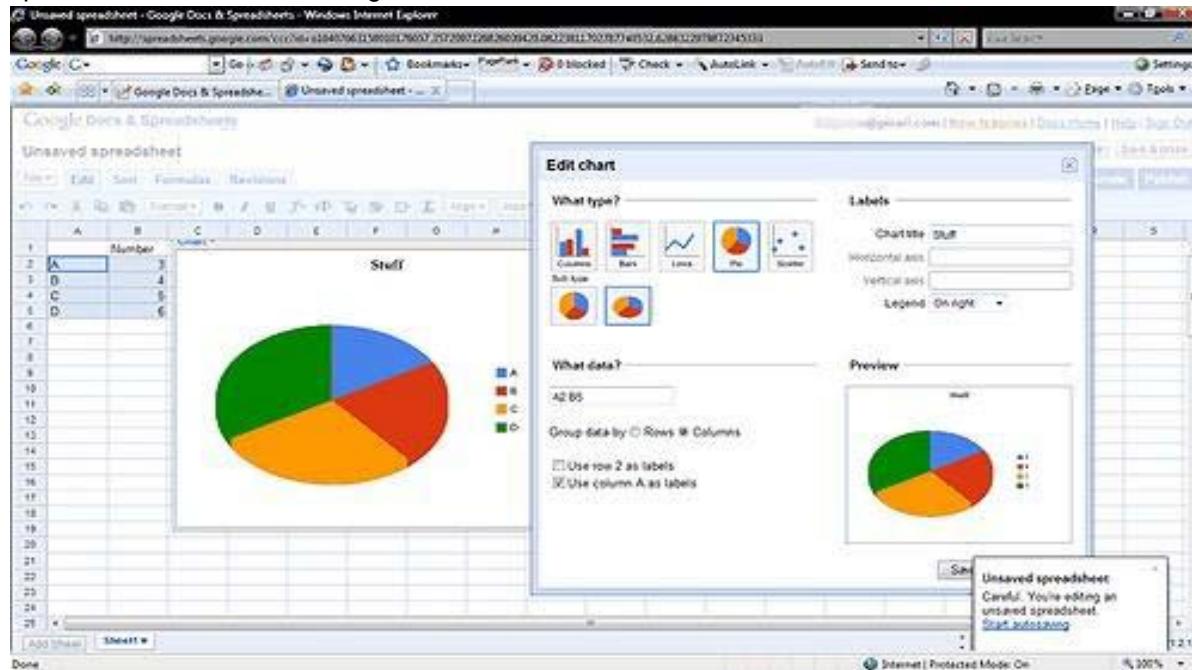
- (a) To insert one row, perhaps for headings, click on the row number to highlight it, click with the right mouse button and choose insert. One row will be inserted above the one you highlighted. Try putting some headings above the figures in columns A to C.
- (b) To insert several rows click on the row number immediately below the point where you want the new rows to appear and, holding down the left mouse button highlight the number of rows you wish to insert. Click on the highlighted area with the right mouse button and choose Insert (or if you prefer, choose Insert, Rows from the main menu).

KEYBOARD SHORTCUTS AND TOOLBAR BUTTONS

Here are a few tips to improve the appearance of your spreadsheets and speed up your work. To do any of the following to a cell or range of cells, first select the cell or cells and then:

- Press Ctrl + B to make the cell contents bold.
- Press Ctrl + I to make the cell contents Italic.
- Press Ctrl + C to copy the contents of the cell.
- Move the cursor and press Ctrl + V to paste the cell you just copied into the new active cell or cells.

CHARTS AND GRAPHS: Excel includes the facility to produce a range of charts and graphs. The chart wizard provides a tool to simplify the process of chart construction. Using Microsoft Excel, it is possible to display data held in a range of spreadsheet cells in a variety of charts or graphs. The data in the spreadsheet could be used to generate a chart, such as those shown below.



The Chart Wizard, which explains in moment, may also be used to generate a line graph. A line graph would normally be used to track a trend over time. For example, the chart below graphs the Total Revenue would normally be used to track a trend over time.



SPREADSHEET FORMAT AND APPEARANCE

Good presentation can help people understand the contents of a spreadsheet.

Titles and labels

A spreadsheet should be headed up with a title which clearly defines its purpose. Row and column headings (or labels) should clearly identify the contents of the row/column. Any assumptions made that have influenced the spreadsheet contents should be clearly stated.

Formatting

There are wide ranges of options available under the Format menu. Some of these functions many also be accessed through toolbar buttons. Formatting options include the ability to:

- a) Add shading or borders to cells.
- b) Use different sizes of text and different fonts.
- c) Choose from a range of options for presenting values, for example to present a number as percentage (e.g. 0.08 as 8%), or with commas every third digit, or to a specified number of decimal places etc.
- d) Invoices can be produced on a formatted spreadsheet.

A	B	C	D	E	
1	Invoice			#12566	
3	Product Id	Description	Price	Amount	Total
4	1001	PHP for dummies	20	1	€20.00
5	1012	OpenXML for dummies	22	2	€44.00
6					€0.00
7					€0.00
8					€0.00
9					€0.00
10					
11				Total excl.:	€64.00
12				VAT:	€13.44
13				Total incl.:	€77.44
14					
15					
16					
17					
18					
19	This invoice is payable within thirty days after the end of the month, unless specified otherwise on the invoice.				
20					
21					
22					

Experiment with the various formatting options you.

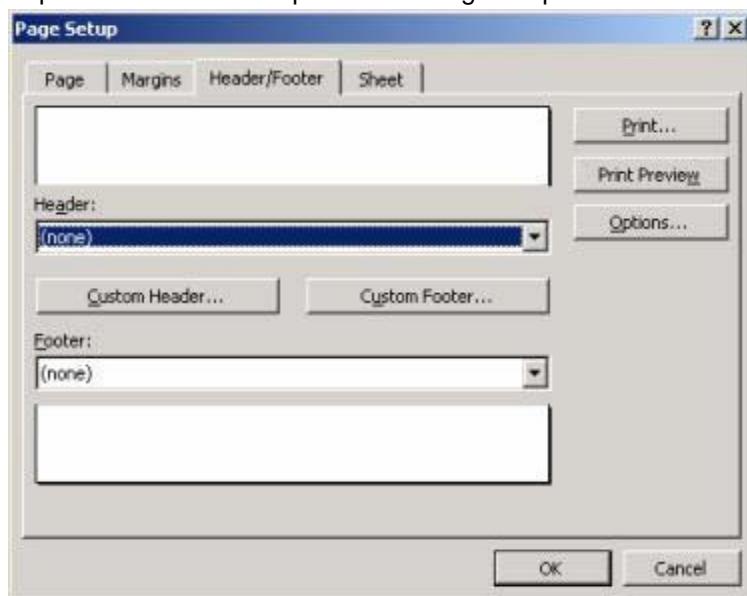
Other issues: printing; controls; using spreadsheets with word processing software

Backing up is a key security measure. Cell protection and passwords can also be used to prevent unauthorized access.

Printing spreadsheets

The Print options for your spread sheet may be accessed by selecting File and then Page Setup. The various Tabs contain a range of options. You specify the area of the spreadsheet to be printed in the Print area box on the Sheet tab. Other options include the ability to repeat headings on all pages and the option to print gridlines if required (normally they wouldn't be!)

Experiment with these options including the options available under Header/Footer.



Controls

There are facilities available in spreadsheet packages which can be used as controls-to prevent unauthorized or accidental amendment or deletion of all or part of a spreadsheet.

- Saving and backup. When working on a spreadsheet, save your file regularly, as often as every ten minutes. This will prevent too much work being lost in the advent of a system crash. Spreadsheet files should be included in standard backup procedures.
- Cell protection. This prevents the user from inadvertently changing or erasing cells that should not be changed. Look up how to protect cells using Excel's Help facility. (Select Help from the main menu within Excel, then select Contents and Index, click on the Find tab and enter the words 'cell protection'.)
- Passwords. You can set a password for any spreadsheet that you create. In Excel, simply click on Tools, then on Protection, then on Protect Sheet or Protect Workbook, as appropriate.

Using spreadsheets with word processing software

There may be situation where you wish to incorporate the contents of all or part of a spreadsheet into a word processed report. There are a number of options available to achieve this.

- The simplest, but least professional option is to print out the spreadsheet and interleave the page or pages at the appropriate point in your word processed document.
- A neater option if you are just including a small table is to select and copy the relevant cells from the spreadsheet to the computer's clipboard by selecting the cells and choosing Edit, Copy. Then switch to the word processing documents, and paste them in at the appropriate point.
- Office packages, such as Microsoft Office allow you to easily use spreadsheets and word processing files together.

For example, a new, blank spreadsheet can be 'embedded' in a document by selecting Insert, Object then, from within the Create New tab, selecting Microsoft Excel worksheet. The spreadsheet is then available to be worked upon, allowing the easy manipulation of numbers using all the facilities of the spreadsheet package. Clicking outside the spreadsheet will result in the spreadsheet being inserted in the document. The contents of an existing spreadsheet may be inserted into a Word documents by choosing Insert, Object and then activating the Create from File tab. Then click the Browse button and locate the spreadsheet file. Highlight the file, then click Insert, and then OK. You may then need to move and resize the object, by dragging its borders, to fit your document.

Advantages and disadvantages of spreadsheet software

Advantages of spreadsheets

- Excel is easy to learn and to use
- Spreadsheets make the calculation and manipulation of data easier and quicker
- They enable the analysis, reporting and sharing of financial information
- They enable 'what-if' analysis to be performed very quickly

Disadvantages of spreadsheets

- A spreadsheet is only as good as its original design, garbage in = garbage out!
- Formulae are hidden from sight so the underlying logic of a set of calculations may not be obvious
- A spreadsheet presentation may make reports infallible
- Research shows that a high proportion of large models contain critical errors
- A database may be more suitable to use with large volumes of data

Uses of spreadsheet software

Spreadsheets can be used in a variety of accounting contexts. You should practice using spreadsheets; hands-on experience is the key to spreadsheet proficiency.

Management accountants will use spreadsheet software in activities such as budgeting, forecasting, reporting performance and variance analysis.

BUDGETING

Spreadsheet packages for budgeting have a number of advantages.

- (a) Spreadsheet packages have a facility to perform 'what if' calculations at great speed. For example, the consequences throughout the organisation of sales growth per year of nil, 5%, 8% and 10.50% and so on can be calculated very quickly.
- (b) Preparing budgets may be needed to go through several drafts. If one or two figures are changed, the computer will automatically make all the computational changes to the other figures.
- (c) A spreadsheet model will ensure that the preparation of the individual budgets is co-ordinated. Data and information from the production budget, for example, will be automatically fed through to the material usage budget (as material usage will depend on production levels).

These advantages of spreadsheets make them ideal for taking over the manipulation of numbers, leaving staff to get involved in the real planning process.