

# Unit - 4

## MODULE - 6

### Absorption Costing and Marginal Costing

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## Introduction:

The costs that vary with a decision should only be included in the decision analysis. For many decisions that involve relatively small variations from existing practice and/or are for relatively limited periods of time, fixed costs are not relevant to the decision. This is because either fixed costs tend to be impossible to alter in the short term or managers are reluctant to alter them in the short term. This is a technique where only the variable costs are considered while computing the cost of a product.

The perception of marginal cost has been borrowed from economic theory. In economics, marginal cost is an incremental cost; it is considered as the addition to the total cost, which results from the production of one more unit of output. According to the perception of marginal cost, it requires a thorough understanding of various classes of costs and their relation with the change in the level of activity.

Thus, Marginal Costing is a costing method in which only variable costs are accumulated and cost per unit is ascertained only on the basis of variable costs. Prime Costs and Variable Factory Overheads are used to determine the value of stock lying with the enterprise.

For decision-making, it is more important to the management for taking further steps for the improvement of the business. It can be called direct costing, differential costing, incremental costing and comparative costing.

## Meaning and Definition:

Marginal costing distinguishes between fixed costs and variable costs as conventionally classified.

*The marginal cost of a product* –is its variable cost. This normally includes direct labour, direct material, direct expenses and the variable part of overheads.

According to CIMA Terminology, Marginal Costing is defined as the  
“Ascertainment of marginal costs and the effect on profit of changes in volume or type of output by differentiating between Fixed Costs and Variable Costs.”

*Marginal Costing* can be formally defined as,

‘The accounting system in which variable costs are charged to cost units and the fixed costs of the period are written-off in full against the aggregate contribution. Its special value is in decision making’.

The theory of marginal costing as set out in a report on Marginal Costing published by CIMA, London is as follows:

In relation to a given volume of output, additional output can normally be obtained at less than proportionate cost because within limits, the aggregate of certain items of cost will tend to remain fixed and only the aggregate of the remainder will tend to rise proportionately with an increase in output. Conversely, a decrease in the volume of output will normally be accompanied by less than proportionate fall in the aggregate cost.

The theory of marginal costing may, therefore, be understood in the following two steps:

1. If the volume of output increases, the cost per unit in normal circumstances reduces. Conversely, if an output reduces, the cost per

unit increases. If a factory produces 100 units at a total cost of Rs. 5,000 and if by increasing the output by one unit the cost goes up to Rs. 5,030, the marginal cost of additional output will be Rs. 30.

2. If an increase in output is more than one, the total increase in the cost divided by the total increase in output will give the average marginal cost per unit. If, for example, the output is increased to 1020 units from 1000 units and the total cost to produce these units is Rs. 1,045, the average marginal cost per unit is Rs. 2.25. It can be described as follows:

$$\frac{\text{Additional cost}}{\text{Additional units}} = \frac{\text{Rs. 45}}{20} = \text{Rs. 2.25}$$

The ascertainment of marginal cost is based on the classification and segregation of cost into fixed and variable cost. In order to understand the marginal costing technique, it is essential to understand the meaning of marginal cost.

*Marginal cost* means the cost of the marginal or last unit produced. It is also defined as the cost of one more or one less unit produced besides existing level of production. In this connection, a unit may mean a single commodity, a dozen, gross or any other measure of goods.

For example, if a manufacturing firm produces X unit at a cost of Rs. 500 and X+1 units at a cost of Rs. 540, the cost of an additional unit will be Rs. 40 which is a marginal cost. Similarly, if the production of X-1 units comes down to Rs. 460, the cost of marginal unit will be Rs. 40 (500–460).

The marginal cost varies directly with the volume of production and marginal cost per unit remains the same. It consists of prime cost, i.e. cost of direct

materials, direct labor and all variable overheads. It does not contain any element of fixed cost which is kept separate under marginal cost technique.

*Marginal costing* may be defined as the technique of presenting cost data wherein variable costs and fixed costs are shown separately for managerial decision-making. It should be clearly understood that marginal costing is not a method of costing like process costing or job costing. Rather, it is simply a method or technique of the analysis of cost information for the guidance of management which tries to find out an effect on profit due to changes in the volume of output.

There are different phrases being used for this technique of costing. In the UK, marginal costing is a popular phrase whereas in the USA, it is known as direct costing and is used in place of marginal costing. Variable costing is another name for marginal costing.

Marginal costing technique has given birth to a very useful concept of contribution where contribution is given by sales revenue less variable cost (marginal cost)

Contribution may be defined as the profit before the recovery of fixed costs. Thus, contribution goes toward the recovery of fixed cost and profit, and is equal to fixed cost plus profit ( $C = F + P$ ).

In case a firm neither makes profit nor suffers loss, contribution will be just equal to fixed cost ( $C = F$ ). This is known as break even point.

The concept of contribution is very useful in marginal costing. It has a fixed relation with sales. The proportion of contribution to sales is known as P/V ratio which remains the same under given conditions of production and sales.

## Absorption Costing:

Absorption Costing is a conventional technique of ascertaining cost. It is the practice of charging all costs, both variable and fixed to operations, processes or products and is also known as 'Full Costing Technique.'

In this technique of costing, cost is made up of direct costs plus overhead costs absorbed on some suitable basis. Here, cost per unit remains the same only when the level of output remains the same for some duration. None the less, the level of output cannot remain the same forever and so does the cost per unit because the fixed cost remains the same despite the changes in the level of output. The change in the cost per unit with a change in the level of output in Absorption Costing Technique poses a problem to the management in taking managerial decisions. Absorption Costing is useful if there is only one product; when there is no inventory and overhead recovery rate is based on normal capacity instead of actual level of activity. Two distinguishing features of Absorption Costing are that fixed factory expenses are included in unit cost as well as inventory value.

## Difference between Marginal Costing and Absorption Costing:

The difference between marginal costing and absorption costing is as below:

1. In the marginal costing only variable cost is considered for product costing and inventory valuation, whereas in the absorption costing both fixed cost and variable cost are considered for product costing and inventory valuation.

2. In the marginal costing, there is a different treatment of fixed overhead. Fixed cost is considered as period cost and by Profit/Volume ratio (P/V ratio), profitability of different products is judged. On the other hand, in absorption costing system, the fixed cost is charged to cost of production. A reasonable share of fixed cost is to be borne by each product and thereby subjective apportionment of fixed overheads influences the profitability of product.
3. In the marginal costing, the presentation of data is so oriented that the total contribution and contribution from each product gets highlighted. In absorption costing, the presentation of cost data is on conventional pattern. After deducting fixed overhead, the net profit of each product is determined.
4. In the marginal costing, the unit cost of production does not get affected by the difference in the magnitude of opening stock and closing stock. Whereas, in the absorption costing, due to the impact of the related fixed overheads, the unit cost of production gets affected by the difference in the magnitude of opening stock and closing stock.
5. In the marginal costing, classification of expenses is based on nature, i.e. Fixed and Variable whereas, in Absorption Costing, classification of expenses is based on functions, i.e. Production, Administration and Selling & Distribution.
6. In the marginal costing, fixed overhead Expenditure Variance is to be computed for Variance Reporting. There is no Volume Variance since Fixed Overheads are not absorbed. On the other hand under the Absorption Costing, in Variance Reporting, FOH Expenditure and Volume variances can be computed. Volume Variances can also be sub-classified into Capacity, Efficiency and Calendar variances.

## Effects of Opening and Closing Stock on Profit:

When income statements under absorption costing and marginal costing are compared, the under mentioned points should be considered:

1. The results under both the methods will be the same in situations where sales and production coincide, i.e., there is neither opening stock nor closing stock.
2. Profit shown under absorption costing will be more than the profit shown under marginal costing when closing stock is more than the opening stock. The reason for this is that in absorption costing, a portion of fixed overhead, instead of being charged to the current period, is charged to the closing stock and carried over to the next period.
3. Profit shown under absorption costing will be lower than the profit shown under marginal costing when closing stock is less than the opening stock. The reason for this is that, in the absorption costing, a portion of fixed cost related to previous year is calculated in the current period.

## Reconciliation of results of Absorption Costing and Marginal Costing:

When comparison of the results of absorption costing and marginal costing is undertaken, the adjustment for under absorbed and / or over absorbed overheads becomes necessary. In absorption costing, on the basis of normal level of activity, the fixed overhead rate is predetermined. A situation of under-absorption and/or over-absorption arises when there is a difference between actual level of activity and normal level of activity.



(i) Under-absorbed fixed overhead = Excess of normal level of activity over actual level of activity  $\times$  Fixed overhead rate per unit.

If there is under-absorption, the profit in absorption costing, before comparison with profit as per marginal costing, should be reduced with under-absorbed fixed overheads. Alternatively, by adding the under-absorbed fixed overhead to the cost of production, the same objective can be achieved.

(ii) Over absorbed Fixed overhead = Excess of actual level of activity over normal level of activity  $\times$  Fixed overhead rate per unit.

If there is an over absorption, then while comparisons the profit calculated under absorption costing with the profit calculated under marginal costing, along with over-absorbed fixed overheads, the profit under absorption costing will eventually look higher. Alternatively, by reducing the over-absorbed fixed overhead from the cost of production, the same objective can be achieved.

# Pro-forma of Marginal Costing and Absorption Costing:

## ***MARGINAL COSTING PRO-FORMA***

Particulars	Rs.	Rs.
Sales Revenue		Xxxxx
Less: Marginal Cost of Sales		
Opening Stock (Valued @ marginal cost)	xxxx	
Add: Production Cost (Valued @ marginal cost)	xxxx	
Total Production Cost	xxxx	
Less: Closing Stock (Valued @ marginal cost)	(xxx)	
Marginal Cost of Production	xxxx	
Add: Selling, Admin & Distribution Cost	xxxx	
<b>Marginal Cost of Sales</b>		<b>(xxxx)</b>
<b>Contribution</b>		<b>Xxxxx</b>
Less: Fixed Cost		(xxxx)
<b>Marginal Costing Profit</b>		<b>Xxxxx</b>

## ***ABSORPTION COSTING PRO-FORMA***

<b>Particulars</b>	<b>Rs.</b>	<b>Rs.</b>
Sales Revenue		XXXXXX
Less: Absorption Cost of Sales		
Opening Stock (Valued @ absorption cost)	XXXX	
Add: Production Cost (Valued @ absorption cost)	XXXX	
Total Production Cost	XXXX	
Less: Closing Stock (Valued @ absorption cost)	<u>(XXX)</u>	
Absorption Cost of Production	XXXX	
Add: Selling, Admin & Distribution Cost	XXXX	
Absorption Cost of Sales		(XXXX)
<b>Un-Adjusted Profit</b>		<b>XXXXXX</b>
Fixed Production O/H absorbed	XXXX	
Fixed Production O/H incurred	(XXXX)	
(Under)/Over Absorption		XXXXXX
<b>Adjusted Profit</b>		<b>XXXXXX</b>

### **Reconciliation Statement for Marginal Costing and Absorption Costing Profit**

<b>Particulars</b>	<b>Rs.</b>
Marginal Costing Profit	---
ADD:	---
(Closing stock – opening Stock) x OAR	
= Absorption Costing Profit	---

Where OAR  
( overhead absorption rate) =

Budgeted fixed production overhead  
Budgeted levels of activities

## Limitations of Absorption Costing:

The following are the contentions against absorption costing:

1. It is observed that in the absorption costing, a portion of fixed cost is carried over to the subsequent accounting period as part of the closing stock. This is an unsound practice because costs pertaining to a period should not be allowed to be vitiated by the inclusion of costs pertaining to the previous period and vice versa.
2. Further, absorption costing is dependent on the levels of output which may vary from period to period, and consequently cost per unit changes due to the existence of fixed overhead. Unless the fixed overhead rate is based on normal capacity, such changed costs are not helpful for the purposes of comparison and control.

The cost to produce an extra unit is a variable production cost. It is realistic to the value of closing stock items as this is a directly attributable cost. The size of the total contribution varies directly with sales volume at a constant rate per unit. For the decision-making purpose of the management, better information about expected profit is obtained from the use of variable costs and contribution approach in the accounting system.

## Principles of Marginal Costing:

The principles of marginal costing are as follows:

- a) For any given period of time, fixed costs will be the same for any volume of sales and production (provided that the level of activity is within the 'relevant range'). Therefore, on selling an extra item of product or service, the following will happen:

- a. Revenue will increase by the sales value of the item sold,
  - b. Costs will increase by the variable cost per unit,
  - c. Profit will increase by the amount of contribution earned from the extra item,
- b) Similarly, if the volume of sales falls by one item, the profit will fall by the amount of contribution earned from the item.
- c) Profit measurement should therefore be based on an analysis of total contribution. Since fixed costs relate to a period of time, and do not change with increases or decreases in sales volume, it is misleading to charge units of sale with a share of fixed costs.
- d) When a unit of product is made, the extra costs incurred in its manufacturing are the variable production costs. Fixed costs are unaffected, and no extra fixed costs are incurred when output is increased.

## Features of Marginal Costing:

The main features of marginal costing are as follows:

**(1) Cost Classification:**

The marginal costing technique makes a sharp distinction between variable costs and fixed costs. It is the variable cost on the basis of which production and sales policies are designed by a firm following the marginal costing technique.

**(2) Stock/Inventory Valuation:**

Under the marginal costing, inventory/stock for profit measurement is valued at the marginal cost. It is in sharp contrast to the total unit cost in costing method.

**(3) Marginal Contribution:**

Marginal costing technique makes use of marginal contribution for making various decisions. Marginal contribution is the difference between sales and marginal cost. It forms the basis for judging the profitability of different products or departments.

**(4) Selling Price Determination:**

Selling price of the product in the marginal costing method is determined based on the cost plus the contribution always. Here, the contribution, of course, means the difference between the sales and the variable cost.

**(5) Profitability:**

The profitability of the product/department is based on the contribution made available by each product/department.

**(6) Fixed Costs vs. Period Costs:**

Fixed costs are treated as period costs and are charged to the costing Profit and Loss Account of the period in which they are incurred.

## **Advantages of Marginal Costing:**

1. **Simple Method:** Marginal costing is simple to understand. It is calculated only on the basis of variable costs. By not charging fixed overhead to the cost of production, the effect of varying charges per unit is avoided.
2. **Overhead Simplification:** In the stock valuation, the marginal costing prevents the illogical carry-forward of some proportion of current years fixed overhead to the next year. It reduces the degree of over or under-recovery of overheads due to the separation of fixed overheads from production cost.

3. **Effective for Sales and Production Policy:** The effects of alternative sales or production policies can be more readily available and assessed, and decisions taken would yield the maximum return to the business.
4. It eliminates large balances left in overhead control accounts which indicate the difficulty of ascertaining an accurate overhead recovery rate.
5. Practical cost control is greatly facilitated. By avoiding arbitrary allocation of fixed overhead, efforts can be concentrated on maintaining a uniform and consistent marginal cost. To the management, it is useful at various levels.
6. It helps in the planning of short-term profit by breakeven and profitability analysis; both in terms of quantity and graphs. Comparative profitability and performance between two or more products and divisions can easily be assessed and brought to the notice of the management for decision making.

## Disadvantages of Marginal Costing:

1. The separation of costs into fixed and variable is difficult and sometimes gives misleading results.
2. Normal costing systems also apply overhead in the situation of normal operating volume and this shows that no advantage is gained by the marginal costing.
3. In the marginal costing, stocks and work-in-progress are understated. The exclusion of fixed costs from inventories affects the profit, and true and fair view of financial affairs of an organization may not be clearly visible.
4. Volume variance in the standard costing also discloses the effect of fluctuating output on fixed overhead. The marginal cost data becomes

unrealistic in case of highly fluctuating levels of production, e.g., in case of seasonal factories.

5. Application of fixed overhead depends on estimates and not on the actual and as such there may be under or over absorption of the same.
6. Control affected by means of the budgetary control is also accepted by many. In order to know the net profit, one should not be satisfied with the contribution and hence, fixed overhead is also a valuable item. A system which ignores fixed costs is less effective, for a major portion of fixed cost is not taken care of in the marginal costing.
7. In practice, sales price, fixed cost and variable cost per unit may vary. Thus, the assumptions underlying the theory of marginal costing sometimes becomes unrealistic. For the long term profit planning, absorption costing is the only answer.

## Contribution:

The term 'contribution' mentioned in the formal definition is the term given to the difference between Sales and Marginal cost. The analysis of marginal costing depends a lot on the idea of contribution. In this technique, the efforts are directed only to the increase of the total contribution. Contribution is a term which defines the surplus that remains after variable cost of sales is deducted from sales revenue as indicated below:

$$\begin{array}{rcl} \text{MARGINAL COST} = & & \text{VARIABLE COST} \\ & & \text{DIRECT LABOUR} \\ & & + \\ & & \text{DIRECT MATERIAL} \\ & & + \\ & & \text{DIRECT EXPENSE} \\ & & + \\ & & \text{VARIABLE OVERHEADS} \\ \text{CONTRIBUTION} = & \text{SALES} - & \text{MARGINAL COST} \end{array}$$



The term marginal cost sometimes refers to the marginal cost per unit and sometimes to the total marginal costs of a department or batch or operation. The meaning is usually clear from the context.

A product whose selling price exceeds its variable cost is said to have:

- (a) Covering its variable cost and
- (b) Making a contribution,
  - (i) towards the firm's fixed cost and after these have been covered;
  - (ii) towards the firm's profit.

In normal circumstances, the selling price of the product contains some element of profit, but there may be some exceptional or adverse circumstances, when the products may have to be sold on cost to cost basis or even at loss. Therefore, the character of contributions will have the following composition under different circumstances:

❖ Selling Price containing Profit:

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

❖ Selling Price at Cost:

$$\text{Contribution} = \text{Fixed Cost}$$

❖ Selling Price at Loss:

$$\text{Contribution} = \text{Fixed Cost} - \text{Loss}$$

It becomes easy to determine the missing one if any three of these four items is known to us. In the break-even analysis, some of the specific uses of contribution are:

- a. Break-even point determination;
- b. Profitability of products assessment;
- c. Different department's selling price determination;
- d. The optimum sales mix determination.

## Process of Marginal Costing:

Marginal costing requires the calculation of the difference between sales and marginal cost of sales. This difference is known as the contribution which provides both the fixed cost and the profit. Excess of contribution over the fixed cost is known as the net margin or profit. Here emphasis remains on increasing the total contribution.

### ❖ **Variable Cost:**

Variable is that part of total cost which in proportion with volume changes directly. With the change in volume of output, total variable cost changes. Increase in the total variable cost results from an increase in the output and reduction in the total variable cost results from a decrease in the output. However, irrespective of increase or decrease in volume of production, there will be no change in variable cost per unit of output. Costs of direct material, direct labour, direct expenses, etc. are included in variable cost. By dividing the total variable cost by the units produced, variable cost per unit is sought. The variable cost per unit is also referred to as the variable cost ratio. By dividing the change in cost by the change in activity, the variable cost can be obtained.

Variable costs are very sensitive in nature and a variety of factors can influence the same. Helping the management in controlling the variable cost is the main aim of 'marginal costing' because this is the area of cost which itself needs control by the management.

### ❖ **Fixed Cost:**

Cost which is incurred for a period and which tends to remain unaffected by fluctuations in the level of activity, output or turnover, within certain output

and turnover limits. Examples are rent, rates, salaries of executive and insurance, etc.

## Break-Even Point (BEP):

The break-even point is the level of activity or sales at which a company makes neither profit nor loss. Sales revenue exactly equals total costs at this level. Thus, the sales volume at which operations break-even is indicated by the break-even point. In terms of number of units sold or in terms of sales value, it can be expressed.

$$\text{Sales} - \text{Variable cost} = \text{Fixed cost} + \text{Profit}$$

Since at the break-even point, profit is nil, it follows that:

$$\text{Sales at break-even point} - \text{Variable cost} = \text{Fixed cost}$$

Thus, at the break-even point, contribution is just enough to provide for the fixed cost. Thus, enough contribution is necessary to be earned to cover fixed costs before any profit can be earned. If the level of actual sales is above the break-even point, profit will be earned by the company. On the other hand, if actual sales are below the break-even point, loss will be incurred by the company.

By any of the following formula, the break-even point (BEP) can be calculated:

<i>(a) BEP (in terms of units) =</i>	$\frac{\text{Fixed Cost}}{\text{Contribution per unit}}$
<i>(b) B/E (in terms of sales value) =</i>	$\frac{\text{Fixed Cost} \times \text{Sales}}{\text{Contribution}}$
<b>Or</b>	$\frac{\text{Fixed Cost}}{\text{P/V Ratio}}$

When graphical presentation of cost-volume-profit relationship is made, the break-even point will be the point at which the total cost line and total sales line intersect each other.

The break-even point is crucial for the management in that it can show the lowest level to which the given activity can drop down without actually jeopardizing the life of the firm. Occasionally, operating below the break-even point may not be necessarily fatal for a concern, however, it must operate above this level in the long run.

By comparing the actual activity level with BEP, one can ascertain whether or not the company is making any profit.

Activity Level		B.E.P.	Situation
	>		Profit
	=		No Profit – No Loss
			Loss

## Profit-Volume Ratio:

Profit Volume Ratio means contribution for every Rs. 100 Sales Value. It is always calculated on the percentage basis or at times it is compared with the Sales Value.

When the contribution from sales is expressed as a sales value percentage, it is known as profit-volume ratio (or P/V ratio). The relationship between the contribution and the sales is expressed by it. Sound 'financial health' of a company's product is indicated by better P/V ratio. The change in the profit

due to the change in volume is reflected by this ratio. If expressed on equal footing with the sales, it will show how large the contribution will appear. If size of the sales is Rs.100, then the P/V Ratio of 60% will mean that the contribution is Rs. 60.

One important characteristic of P/V ratio is that at all levels of output it remains constant because at various levels the variable cost as a proportion of the sales remains constant. When P/V ratio is considered in conjunction with the margin of safety, it becomes particularly useful. P/V ratio can be referred to by other terms such as: (a) marginal income ratio, (b) contribution to sales ratio, and (c) variable profit ratio.

P/V ratio may be expressed as:

<i>P/V ratio</i>	=	<i>Contribution / Sales</i>
		<u><i>Sales – Variable cost</i></u> <i>Sales</i>
		<i>1 - </i> <u><i>Variable cost</i></u> <i>Sales</i>
<b>Or, P/V ratio</b>	=	<u><i>Fixed Cost + Profit</i></u> <i>Sales</i>
<b>Or, P/V Ratio</b>	=	<i>Difference in Profits/Difference in Sales × 100</i>

It is also possible to express the ratio in terms of percentage by multiplying by 100. Thus a relationship between the contribution and the sales is established by the profit/volume ratio. Hence, it might be better to call it a *Contribution/Sales ratio (or C/S ratio)*, though the term Profit/Volume ratio (P/V ratio) is now widely used.

In addition to the above, it is possible to compute the ratio by comparing the change in the contribution with the change in the sales or the change in the

profit with the change in the sales. it is possible to compute the ratio. Because it is assumed that the fixed cost will remain the same at different levels of output, an increase in the contribution will mean an increase in the profit.

P/V ratio =	$\frac{\text{Change in contribution}}{\text{Change in Sales}}$
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## Margin of Safety:

Margin of safety means the difference between the total sales and the sales at the BEP. It is also known as the amount of the sales above the Break Even Sales. Margin of safety can be expressed in absolute terms and also in terms of percentage. The higher the margin of safety, the better the situation for an organization. A high margin of safety provides strength and stability to a concern.

To increase the margin of safety, the company should endeavour to keep its BEP at its lowest level and should try to maintain actual sales at the highest level. This may be possible either by controlling fixed costs; by resorting to a dynamic sales policy, or by reducing variable costs. Reproducing the profitable products after discontinuing the unprofitable ones, can also help increase the margin of safety.

Margin of Safety in terms of units as well as Rupees will be found as under;

<b>M.O.S. (Units) =</b>	<b>Sales (Units) – B.E.P. (Units)</b>
<b>M.O.S. (Rs.) =</b>	<b>Sales (Rs.) – B.E.P. (Rs.)</b>

## Key Factor or Limiting Factor:

There are always factors which, for the purpose of managerial control, do not lend themselves. For example, there are legal restrictions on the import of a material for some specific time and that the material is the chief element for the company's product, then the company cannot carry out its production as much as it wants. Production has to be planned after taking into consideration this limiting factor. However, its efforts will be directed towards the maximum utilization of available sources. Thus, limiting factor is a factor, by which, at a given point of time, the volume of output of an organization gets influenced.

The key factor is the factor whose influence, for the purpose of ensuring the maximum utilization of resources, must be ascertained first. Profit can be maximized by gearing up the process of production in the light of influences of the key factors. Managerial action is constrained and the output of the company is limited by the key factor. Although sale is the usual limiting factor, any of the following factors could also be a limiting factor:

- (a) Material
- (b) Labour
- (c) Power
- (d) Capacity of the plant
- (e) Actions of government

When a decision has to be taken as regards the relative profitability of different products and a key factor in operation, the contribution for each product is divided by the key factors.

As regards products or projects, the choice rests with the management as to how will it secure more contribution of the key factors per unit. Thus, if the key factor is sales, then consideration should be given to the contribution to the sales ratio. If labour shortage is faced by the management, then consideration should be given to the contribution per labour hour. Suppose sales of product X & Y are Rs. 200 & Rs. 220 and the variable cost of sales are Rs. 60 and Rs. 46. The labour hours (key factor) required for these products are 4 hours and 6 hours respectively. The contribution will be: Product X,  $200 - 60 = \text{Rs.}140/\text{unit}$  or  $\text{Rs.}35/\text{hour}$ ; Product Y,  $220 - 46 = \text{Rs.}174/\text{unit}$  or  $\text{Rs.}29/\text{hour}$ . In this case, P/V ratio of product Y (79%) is better than P/V ratio of product X (70%) and producing product Y will be the normal conclusion. Here, the key factor is time. Contribution per hour is better in product X than in product Y. Thereby, the product X is more profitable than the product Y during labour shortage.

## Cost Indifference Point:

It is the point at which the total costs for two alternatives are the same. In other words, it is the point at which the total cost lines under two alternatives intersect each other. The Cost Indifference Point is calculated as under:

$$\frac{\text{Difference in Fixed Costs}}{\text{Difference in variable cost per unit}}$$
 Cost Indifference Point is used to choose between two alternative processes for achieving the same objective. The choice depends on the estimated activity level.



The decision regarding the choice of process based on the Cost Indifference Point is considered as follows:

Activity Level		Indifference Point	Product should be manufactured by a process having
	>		Lesser variable Cost & Higher Fixed Cost
	=		Indifferent
	<		Lesser Fixed Cost & Higher Variable Cost

## Cost-Volume-Profit Analysis (CVP Analysis):

Cost-Volume-Profit Analysis is the analysis of three variables viz. Cost, Volume and Profit, which explores the relationship existing amongst Costs, Revenue, Activity Levels and the resulting Profit.

There exists a very close relation among cost, volume and profit. As a simple fact, one knows that if the volume increases, the cost per unit will decrease and the profit per unit will increase. Thus, one can conclude that there is a direct relation between volume and profit but there exists an inverse relation between the volume and cost. This analysis of CVP may be applied for profit planning, cost control, evaluation of performance and decision making.

The main objectives of such analysis are:

- The CVP Analysis helps to forecast profit with more accuracy as it is essential to know the relation between profits and costs on the one hand and volume on the other.
- As one knows that the sales and the variable costs tend to vary with the variance in the volume of output, it is necessary for the business concern to budget the volume first for establishing budgets for sales and variable

costs. This is where CVP analysis becomes useful as it helps in setting up Flexible Budgets which indicate cost at various levels of activity.

- The CVP analysis also helps in evaluating the performance for the purpose of control in the post implementation stage in a business plan. It is very necessary to evaluate the effects of changes in volume on costs in order to review whatever results are achieved and the costs incurred.
- It is common knowledge that pricing plays a vital role in fixing up the volumes especially in a period of recession. So, the CVP analysis is also helpful in deciding the price policies as it shows the effect of different price structures on costs and profits.
- As the predetermined overhead rates are related to a selected volume of production, study of Cost-Volume relation is necessary in order to know the amount of the overhead costs which could be charged to product costs at various levels of operation.

However, in order to get the maximum results out of the CVP analysis, it is pivotal to understand the assumptions based on which the CVP analysis is based. The CVP analysis provides useful results only when certain assumptions are made, such as:

- Fixed Costs do not change.
- Profits are calculated on the variable costs basis.
- All variables per unit remain constant.
- There is a single product or a constant sales mix in case of multiple products.
- Costs can be accurately divided into fixed and variable components.
- The analysis applies only to short-term horizon.
- The analysis applies to a relevant range only.
- Total costs and total revenues are linear functions of output.

# Formulas:

➤ **Contribution:**

$$\text{Contribution} = \text{Sales} - \text{Variable Cost}$$

➤ **P/V Ratio:**

$$\text{P/V Ratio} = \text{Contribution/Sales} \times 100$$

➤ **Profit/Loss:**

Sales	Xx
Variable cost	(xx)
Contribution	Xxx
Fixed cost	(xxx)
Profit/(Loss)	xxxx/(xxxx)

➤ **Break-Even Point:**

$$\text{B.E.P. (Volume)} = \text{Fixed Cost/Contribution Per Unit}$$

$$\text{B.E.P. (Value)} = \text{Fixed Cost/P/V Ratio}$$

➤ **Margin of Safety:**

$$\text{Margin of Safety (Volume)} = \text{Sales (Units)} - \text{B.E.P. (Units)}$$

$$\text{Margin of Safety (Value)} = \text{Sales (Rs.)} - \text{B.E.P. (Rs.)}$$

➤ **Total Cost** = Variable Cost + Fixed Cost

➤ **Variable Cost** = Variable Cost Per Unit × Units

➤ **Indifference Production Level =**

### Difference between Fixed Cost/Difference between Variable Cost per Unit

Activity Level		Indifference Point	Product should be manufactured by a Machinery having
	>		Lesser Variable Cost & Higher Fixed Cost
	=		Indifferent
	<		Lesser Fixed Cost & Higher Variable Cost

Sales		Break Even Point	Profit or Loss
	>		Profit
	=		No Profit / No Loss
	<		Loss

#### ➤ **Shut Down Point:**

Shut Down Point (Sales) = Avoidable Fixed Cost/P/V Ratio

Avoidable Fixed Cost = Total Fixed Cost – Fixed Cost if operation is shut down

➤ **Profit/(Loss) = Margin of Safety (Value) × P/V Ratio**

➤ **Profit/(Loss) = Margin of Safety (Volume) × Contribution Per Unit**

➤ **Contribution Per Unit = Difference in Profit/Difference in Sales Units**

➤ **P/V Ratio = Difference in Profit/Difference in Sales × 100**