costs and volumes, and also for evaluating the profit consequences of alternative decisions. In particular, the principles of cost-volume-profit relationships have been applied in marginal costing, flexible budgeting and pricing policy.

1. Uses of Cost-Volume-Profit Analysis

Cost-volume-profit analysis enables the management to reach planning and policy-making decisions more intelligently. Examples of specific uses to which information derived from cost-volume-profit analysis can be put are given below :

(a) Sales and pricing policies :

1. Determination of profit which will result from any given volume of sales.
2. Analysis of effect of changes in selling price.
3. Effect of changes in product mixture.
4. Additional sales volume needed to support an additional expenditure.
5. Lowest price at which business may be accepted to utilise facilities and contribute something towards net profit.
6. The particular products to be emphasised to reflect the highest net profit.

(b) Financial and production problems :

1. Interpretation of proposed or alternative budgets and effect of suggested cost and other changes — when the goals are not satisfactory to management.
2. Determination of unit costs at various volume levels.
3. Determination of probable effect of investment in new plant and equipment.
4. Determination of most profitable use of scarce materials.
5. Assistance in choice between make or buy decisions.

2. Marginal Cost

If the volume of production increases or decreases by one unit, the total variable costs will increase or decrease proportionately, whilst the total fixed costs will remain the same. On the basis of this, marginal cost is defined as the amount at any given volume of output by which aggregate costs are changed resulting from increasing or decreasing the volume of output by one unit. In other words, it is the additional cost of producing one additional unit or the saving in cost, if the production is curtailed by one unit. This definition is from an economist's point of view. A cost accountant often uses the term to mean the additional cost or the saving in cost of a block of units, because a manufacturer is usually more interested in a block of units rather than a single unit. On the assumption that fixed costs remain unaffected by changes in the volume of output, the marginal cost of a product will consist of the variable costs only. The main components are direct costs (materials, labour and expenses) and variable overheads. Let us take an example :

Direct material per unit	₹ 2
Direct labour per unit	₹ 3
Variable overheads	100% of direct labour
Fixed cost per month	₹ 5,000

If 500 units are produced in a particular month the cost of production will be $500 \times ₹(2 + 3 + 3) +$ ₹ 5,000 = ₹ 9,000. If in the next month 501 units are produced, the cost of production will be $501 \times ₹(2 + 3 + 3) + ₹ 5,000 = ₹ 9,008$. The change in aggregate cost by ₹ 8 (i.e., ₹ 9,008 – ₹ 9,000) represents the marginal cost. This is equal to the variable cost per unit.

An important feature of the accountant's marginal cost is that the marginal cost per unit remains constant regardless of the level of activity. So, it is usually distinctly traceable with units of output. Fixed cost, on the other hand, cannot normally be identified with any particular unit of output. It represents an amount of expenditure incurred during an accounting period. The other names of fixed cost are time cost, period cost, constant cost, capacity cost etc. The other names of marginal cost are direct cost, volume cost, activity cost, out-of-pocket cost, incremental cost, differential cost etc.

3 | Marginal Costing

Marginal costing is not a distinct method of ascertainment of cost such as process costing or job costing, but it is a technique applying existing methods in a particular manner in order to bring out the relationship between profit and volume of output. Marginal costing may be defined as "the ascertainment of marginal or variable costs and of the effect of changes in volume or type of output on profit, by differentiating between fixed costs and variable costs." The technique of marginal costing may be applied to any type of costing such as job, process, historical or standard.

Under marginal costing, fixed costs are excluded from the cost computations. The difference between the variable costs of activities and the revenues arising from those activities is known as the contribution or gross margin. It may relate to one unit or to total sales. For a specific product or group of products contribution may be calculated thus :

Sales revenue ...
Less : Variable cost of production ...
Contribution ...

The contributions earned by specific products, or by group of products, are added together to form a 'pool' of total contribution for the business as a whole. Out of this 'pool' the fixed costs of the business are paid and the part of the total contribution remaining, is the profit of the business as a whole. A typical format for marginal costing statement is :

Product-types or departments	A	B	C	Total
Sales revenue	×	×	×	×
Less : Variable cost	×	×	×	×
Contribution	×	×	×	×
Less : Total fixed costs				×
Total profit				×

It should be noted that, under marginal costing no attempt is made to calculate profits for individual products or departments — it is the individual contributions that are calculated. The fixed costs are not allocated to, or absorbed by, the individual products or departments. Thus, decisions based on

marginal costing statements will not be influenced by accounting technicalities relating to the treatment of fixed costs. Examples of typical problems requiring executive decisions are :

1. Should a particular order at a lower price be accepted or rejected ?
2. Should a particular component be purchased from an outside supplier or manufactured within the factory ?
3. What would be the effect on the business of closing an existing department or opening a new department ?
4. What are the products to concentrate on ?
5. Which product-mix will maximise profits ?
6. What additional volume of business can make up for wage rises ?
7. How will the level of profits of the business be influenced by changes in sales volume or selling prices ?
8. At what volume of sales will an organisation start to show a loss ?

All these decisions can be made quickly with the help of marginal costing techniques.

3.1 Features of Marginal Costing

1. Costs are classified into fixed costs and variable costs. Semi-fixed or semi-variable costs are also further analysed into fixed and variable elements.
2. Only variable elements of costs (which constitute marginal cost) are attached to products.
3. Price is fixed after taking into consideration the marginal cost and marginal contribution.
4. Marginal contribution decides the profitability of a department or product.
5. Fixed costs of any period are deducted from total in contribution for the period.
6. Work-in-progress and finished stock are valued at variable production cost.

3.2 Advantages of Marginal Costing

1. Marginal costing is easy to understand and operate, because it involves the computation of variable costs only.
2. It avoids any arbitrary apportionment of fixed costs among different products or departments and thus the problems of under- or over-recovery of overheads are eliminated.
3. The arbitrary apportionment of fixed costs complicates any attempt to measure relative profitability of different products or different sections of the business.
4. A marginal costing system leads to contribution analysis, break-even charts and cost-volume-profit analysis, all of which are useful for short-term decision-making.
5. The exclusion of fixed overhead costs from stock and work-in-progress valuations gives more uniform and realistic figures.
6. Responsibility for control is more easily apportioned, since only variable costs over which they have control are presented to each level of management.
7. All levels of management are more readily able to see the effects of their decisions — sometimes before an action is taken.

3.3 Disadvantages of Marginal Costing

1. The separation of semi-variable or semi-fixed costs into their variable and fixed elements is an arbitrary exercise which may be subject to inaccuracy and fluctuation at different levels of output. Consequently, the basic cost information used in decision-making may contain a substantial degree of error.

2. Great care must be exercised when selling prices are based on marginal costs, as prices should, in the long-run, cover all fixed overheads and leave a reasonable margin over and above total costs.

3. It may be difficult under many circumstances to deduce the contribution made by some production units. Thus the effectiveness of the system is lost.

4. Since stock of finished goods and work-in-progress are valued on the basis of variable costs only they are always understated. Profit is also understated as a result.

5. Increased production and sales may be effected by more effective utilisation of present resources or by expansion of the resources or by mechanisation. Marginal costing fails to disclose this fact.

4 Differential Costing and Marginal Costing

Differential costing is concerned with the effect on costs and revenues if a certain course of action is undertaken. An accountant uses the term **differential cost** to describe the same costs that an economist calls **incremental cost**. Differential costs may be defined as the increases or decreases in total cost, or the change in specific elements of cost, that result from any variation in operations. Incremental costs have been defined as the additional costs of a change in the level or nature of activity. Any cost that changes as a result of a contemplated decision is a differential cost or incremental cost relating to that decision. Differential costing eliminates the residual costs which are the same under each alternative, and therefore irrelevant to the analysis.

It is frequently contended that marginal costing is the same as differential costing or incremental costing. This is not true. The following points of difference between the two may be noted :

1. Marginal costing is essentially a study of the effect of cost-volume-profit relationships based on a classification of costs as fixed or variable. But cost-volume-profit relationships are not the only problems dealt with in differential costing. Differential costs and incremental costs include many costs that are normally classified as fixed or semi-fixed, and may be regarded as a general class of which marginal costs are a narrow part, for marginal costs refer to a single kind of increment only, i.e., the addition of another unit to fixed plant.

2. Marginal costing is essentially a short-run concept, while differential costing and incremental costing deal with short-run problems (i.e., tactical decisions) as well as long-run problems (i.e., investment decisions). The applications of marginal costing are, therefore, examples of the application of differential costing to short-run problems.

5 Break-Even Analysis

A technique commonly used to study cost-volume-profit relationships is what is called **break-even analysis**. Break-even analysis is concerned with the study of functional relationships between the rate of activity and costs, revenue and profits. Specifically, break-even analysis focuses attention on anticipated profit behaviour in response to change in underlying conditions by predicting the profit consequences of changes in sales volume, selling prices, product mix of the sales, variable cost per unit, and total fixed costs.

A specialised form of profit graph, called the **break-even chart**, is frequently used to present diagrammatically significant cost-volume-profit relationships, relating total costs at various sales volumes to the expected revenue and profit at each alternative volume. The break-even chart is also used for determining the break-even point. The break-even point identifies the volume of activity where revenue exactly equals total costs, both fixed and variable. Thus, it indicates the sales volume at which operations 'break even'. At sales levels below the break-even point, operations will result in a loss ; and above this point they will contribute profits, as illustrated in Figure 1.

Figure 1

Break-Even Chart
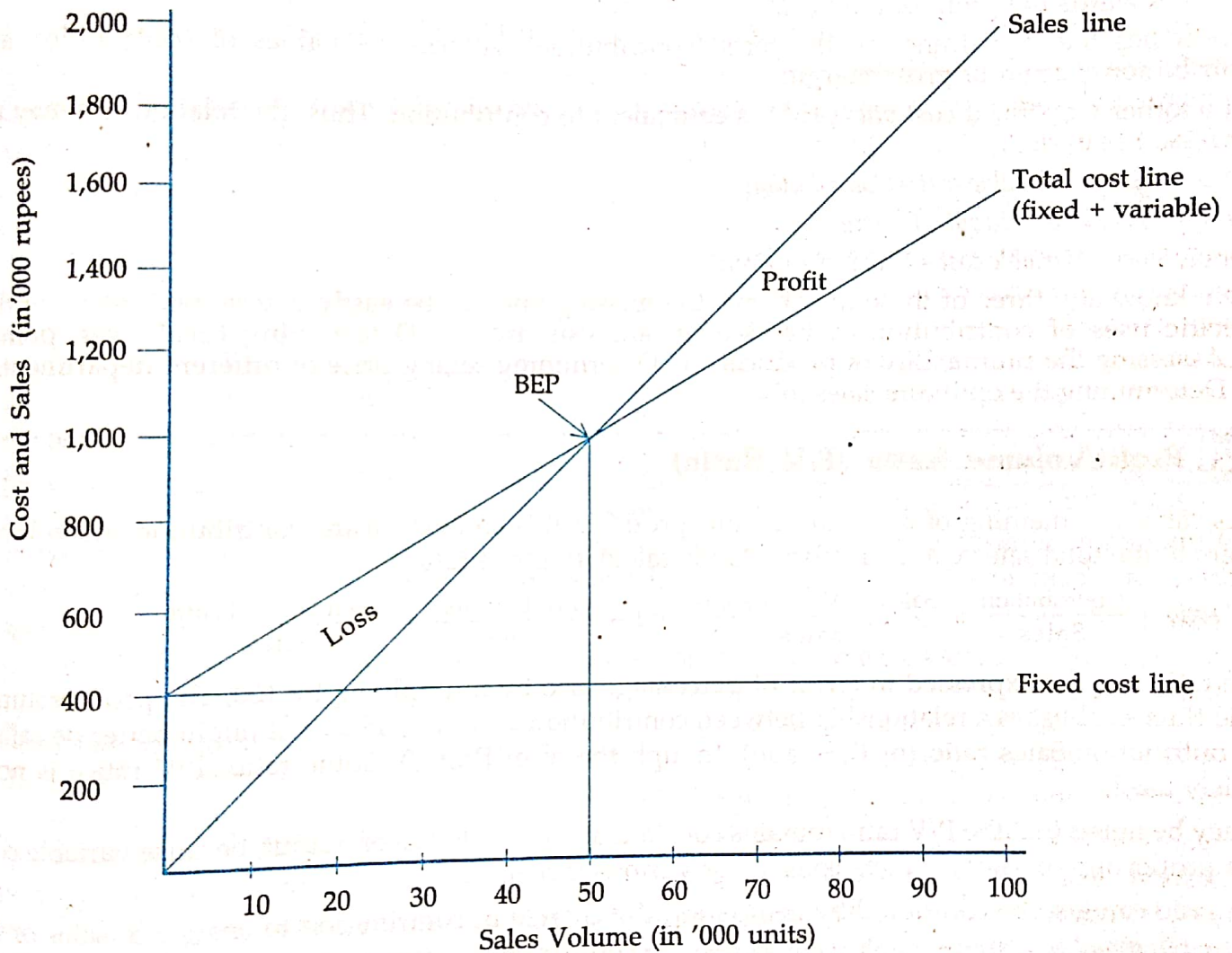
The numerical approach to break-even analysis is based on a financial balance, called the 'contribution', which may be defined as the excess of selling price over the variable cost. The first charge on the revenue from the sale of a unit is its variable cost ; any surplus is the contribution which goes to meet fixed costs. Once enough units have been sold to recover all the fixed costs, a profit is made. The break-even point, in terms of units, may be found by the formula :

$$B/E = \frac{\text{Fixed cost}}{\text{Contribution per unit}}$$

This quantity multiplied by selling price per unit gives the break-even point in terms of sales revenue.

5.1 Contribution

Contribution is a term which defines the surplus remaining after deducting the variable cost of sales from sales revenue as indicated below :

$$\text{Contribution} = \text{Sales revenue} - \text{Variable cost of sales}$$

If the selling price of a product exceeds its variable cost it may be said that such a product is :

1. Covering its variable cost, and
2. Making a contribution :
   (a) towards the fixed costs of the firm and, once these have been covered,
   (b) towards the profit of the firm.

Herein lies the significance of the term 'contribution'. Alternative names of contribution are contribution margin or gross margin.

Put another way, fixed cost *plus* profit is equivalent to contribution. Thus, the relationship may be expressed as under :

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

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

If we know any three of these four items, the missing one can be easily determined. Some of the specific uses of contribution in break-even analysis are : (a) Determining break-even point; (b) Assessing the profitability of products ; (c) Determining selling price of different departments; (d) Determining the optimum sales mix.

5.2 Profit/Volume Ratio (P/V Ratio)

This ratio is something of a misnomer, for 'profit' in this context means contribution. As volume refers to the total sales value, the formula for calculating this ratio is :

$$P/V \text{ ratio} = \frac{\text{Contribution}}{\text{Sales}} = \frac{\text{Sales} - \text{Variable cost}}{\text{Sales}} = 1 - \frac{\text{Variable cost}}{\text{Sales}} = \frac{\text{Fixed cost} + \text{Profit}}{\text{Sales}}$$

The ratio may be expressed in terms of percentage also by multiplying by 100. The profit/volume ratio thus establishes a relationship between contribution and sales. Hence, it might better be called a Contribution/Sales ratio (or C/S ratio), though the term Profit/Volume ratio (P/V ratio) is now widely used.

It may be noted that the P/V ratio remains constant at various levels of output, because variable cost as a proportion of sales remains constant at various levels.

The ratio can also be computed by comparing the change in contribution to change in sales or by change in profit to change in sales. An increase in contribution means increase in profit because fixed costs are assumed to remain the same at different levels of output.

Thus,

$$P/V \text{ ratio} = \frac{\text{Change in contribution}}{\text{Change in sales}} = \frac{\text{Change in profit}}{\text{Change in sales}}$$

Management should always try to bring about an improvement in P/V ratio. The higher the ratio, the greater the contribution towards fixed costs and profit. An improvement in this ratio can be achieved by :

1. An increase in the selling price ; but this involves the risk that the volume of sales might be affected.

2. A reduction in the variable cost per unit by purchasing the latest machinery, thereby cutting the number of hours required to complete each operation. This reduction might, however, be offset by higher fixed costs such as depreciation and insurance.

3. Concentrating on those products which provide the highest contribution.

The P/V ratio is an invaluable tool in the hands of management for business analysis. Some of its uses are mentioned below :

1. Determining profitability of a line of product and overall profitability of a number of products ;
2. Comparing profitability of different lines of products, sales areas, companies, factories etc. ;
3. Calculating break-even sales, profit at different levels of output, turnover required for a desired profit or to meet increased expenditure or to offset price reduction.

5.3 Break-Even Point (B/E Point)

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

It has been stated earlier that :

Sales – Variable cost = Fixed cost + Profit

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

Sales at break-even point – Variable cost = Fixed cost

Put another way, at break-even point, fixed cost equals contribution. Consequently, it is necessary to earn enough contribution to cover fixed costs before any profit can be earned. Once the break-even point is reached, all contribution will result in profit, seeing that fixed costs have already been covered. However, where the contribution from sale does not reach the level of fixed costs, a loss is incurred.

The break-even point (B/E) can be calculated by any of the following formula :

(i) *B/E (in terms of units)* $= \dfrac{\text{Fixed cost}}{\text{Contribution per unit}}$

(ii) *B/E (in terms of sales value)* $= \dfrac{\text{Fixed cost} \times \text{Sales}}{\text{Contribution}} = \dfrac{\text{Fixed cost}}{\text{P/V Ratio}}$

The break-even point is important to the management of a firm, because it indicates the lowest level to which activity can drop without putting the continued life of the firm in danger. It may not necessarily be fatal for a concern to operate below break-even point occasionally, but in the long-run it must operate above this level.

5.4 Break-Even Chart

The relationship between cost, sales and profit at different levels of activity can be presented diagrammatically by using a break-even chart. It is possible to see at a glance the estimated results of trading at various levels of activity. The chart shows fixed and variable costs and sales revenue so that profit or loss at any given level of production or sales can be ascertained. The chart also shows quite clearly the break-even point (i.e., the point at which neither profit nor loss is made) and the margin of safety (i.e., the amount by which sales could fall before a loss is experienced).

In a break-even chart, costs and sales revenues are shown on the vertical axis and volume either in units or rupees on the horizontal axis. Capacity in percentage terms may be an alternative horizontal axis notation. It is necessary to draw three lines on the chart as follows :

1. **The fixed cost line :** A fixed cost line, parallel to the horizontal axis, which will cut the vertical axis at the fixed cost level. The line runs parallel to the horizontal axis because the fixed cost is the same for all levels of activity.

2. **The total cost line :** The total cost at various levels of activity can be plotted on the graph and a line drawn. It is a straight upward-sloping line starting from the point where the fixed cost line cuts the vertical axis, indicating that when the activity is nil, the total cost is the same as the fixed cost.

3. **The sales line :** The sales values at various levels of activity are plotted on the graph and a line drawn. The typical break-even chart plots sales revenue as a straight-line starting from the point where the vertical and horizontal axis meet (as nil activity produces nil sales) and rising to the right. If actual sales rupees are selected as the index of volume, the sales line will appear as a straight line at a 45 degree angle to the base, provided the scales on the horizontal and vertical axis are the same. This means that the cost line will have to be changed to illustrate the effects of any changes in sales prices. This can be avoided by incorporating a schedule of fixed prices in the sales rupee index of volume ; i.e., the index of volume will be stated in terms of standard sales rupees. Any deviation of actual or proposed selling prices from standard selling prices can then be portrayed by shifting the sales line rather than the cost line.

The spread between the total cost and the sales lines at any volume indicates the expected profit or loss at that volume. The volume at which the two lines cross is known as the **break-even volume** and the point of intersection is known as the **break-even point**.

The break-even chart shown in Figure 2 is based on the following simple data :

Period fixed costs	₹ 40,000
Variable cost per unit	₹ 5
Selling price per unit	₹ 10
Production and sales volume	12,000 units

Figure 2
Break-Even Chart
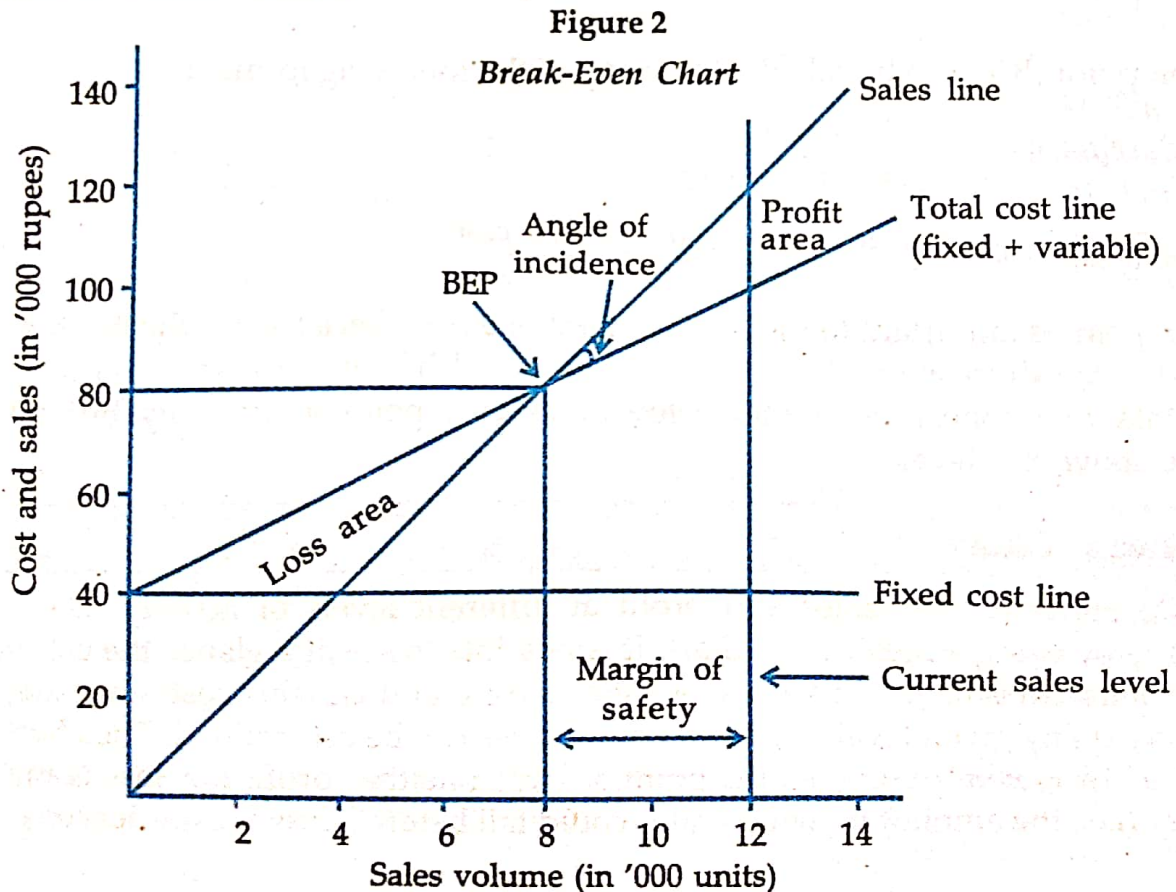
There is another method of preparing break-even chart (Figure 3), the difference being that a variable cost line is inserted first and then the fixed costs are placed on top of the variable costs. This method is an improvement on the previous one. By placing the fixed cost and profit together, it is possible to read clearly the contribution provided at different levels of activity. Hence, it is known as contribution break-even chart. The contribution is represented by the gap between the sales line and the variable cost line.

Figure 3
Break-Even Chart
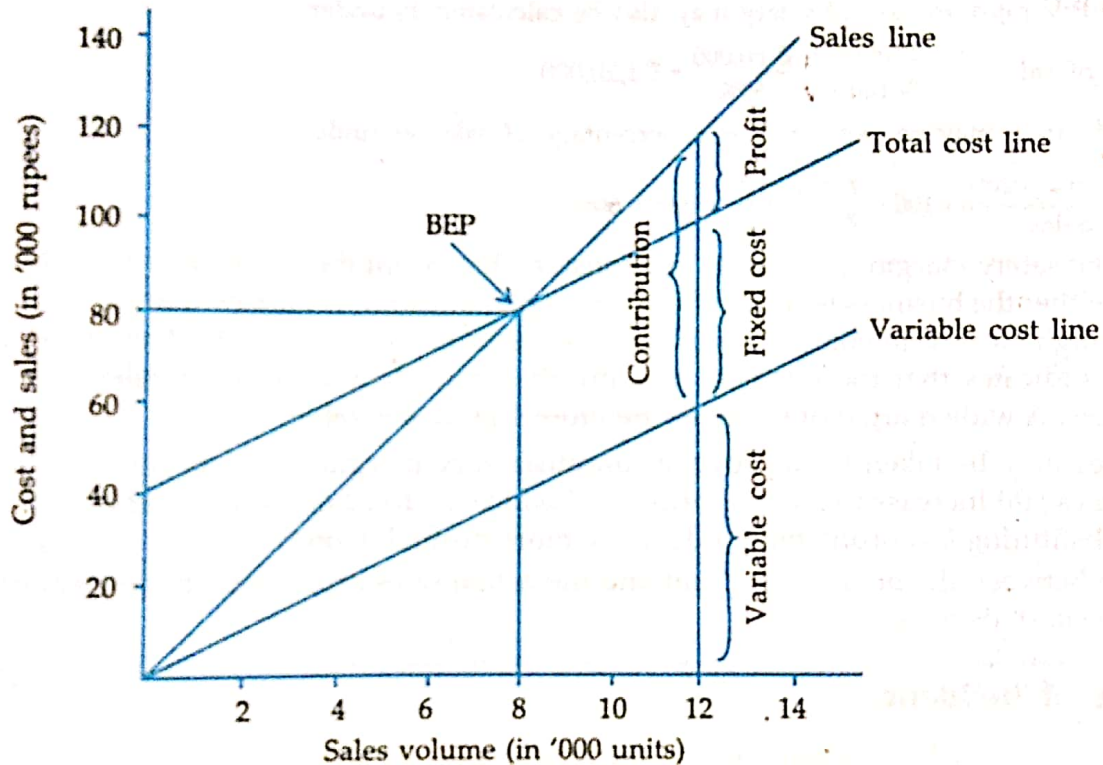
6 Margin of Safety

Margin of safety (M/S) is a useful concept in the context of cost-volume-profit analysis. It is defined as the excess of actual (or budgeted) sales over the break-even level of sales. The formula for its computation is :

Margin of Safety (M/S) = Actual sales – Break-even sales

EXAMPLE

	Per unit ₹	Total ₹
Sales (10,000 units)	20	2,00,000
Variable cost	10	1,00,000
Contribution	10	1,00,000
Fixed costs		40,000
Profit		60,000

Break-even point :

$$\text{in physical units} = \frac{\text{Fixed costs}}{\text{Contribution per unit}} = \frac{₹\,40,000}{₹10} = 4,000 \text{ units}$$

$$\text{in sales value} = \frac{\text{Fixed costs}}{\text{P/V ratio}} = \frac{₹\,40,000}{50\%} = ₹\,80,000$$

Margin of safety :

in physical units = 10,000 units – 4,000 units = 6,000 units

in sales value = ₹ 2,00,000 – ₹ 80,000 = ₹ 1,20,000

Using the P/V ratio, margin of safety may also be calculated as under :

$$\text{Margin of safety} = \frac{\text{Profit}}{\text{P/V ratio}} = \frac{₹\,60,000}{50\%} = ₹\,1,20,000$$

Margin of safety may be expressed as a percentage of sales as under :

$$\frac{\text{Margin of safety}}{\text{Sales}} \times 100 = \frac{₹\,1,20,000}{₹\,2,00,000} \times 100 = 60\%$$

The size of the safety margin determines to a considerable extent the soundness of the business and indicates whether the business is susceptible to a drop in demand. A narrow margin of safety would mean that a slight decline in volume might have a significant effect on profits. A wide margin, on the other hand, indicates that the business can absorb a considerable drop in sales volume before showing a loss. A wide margin of safety is, therefore, highly desirable.

The measures may be taken to improve an unsatisfactory margin of safety are : (a) Increase the volume of sales ; (b) Increase the selling price ; (c) Reduce the fixed or variable costs ; (d) Change the sales mix substituting *less* profitable products by more profitable ones.

The distance between the break-even point and the actual sales represents the margin of safety on a break-even chart. (See Figure 2).

7 | Angle of Incidence

The angle formed at the break-even point by the intersection of the sales line and the total cost line is known as the **angle of incidence**. It should be the aim of the management to have as large an angle as possible. The size of the angle indicates the rate of profit earned after break-even. A wide angle means a high rate of profit accruing after the fixed costs are absorbed. On the contrary, a narrow angle would mean a relatively low rate of profit indicating that variable costs constitute a large part of cost of sales. (See Figure 2.)

8 | Profit-Volume Graph

A drawback of break-even chart is that it is not possible to read profit directly from such a chart. A **profit-volume graph** (also called **profit-volume chart** or **profit-graph**) is often used in place of or in addition to a break-even chart to overcome this disadvantage.

A profit-volume graph is a development of the break-even chart in that by eliminating the fixed cost and total cost lines, attention is directed specifically to profit. The horizontal axis, representing sales or activity, is drawn in the centre of the graph ; the vertical axis represents profit, but that part of the line below the horizontal axis is the loss area. The profits and losses at various sales levels are then plotted on the graph and the point where this profit line cuts the horizontal sales line is the break-even point. The information from the previous break-even chart has been used to draw the following profit-volume graph.

Figure 4

Profit-Volume Graph
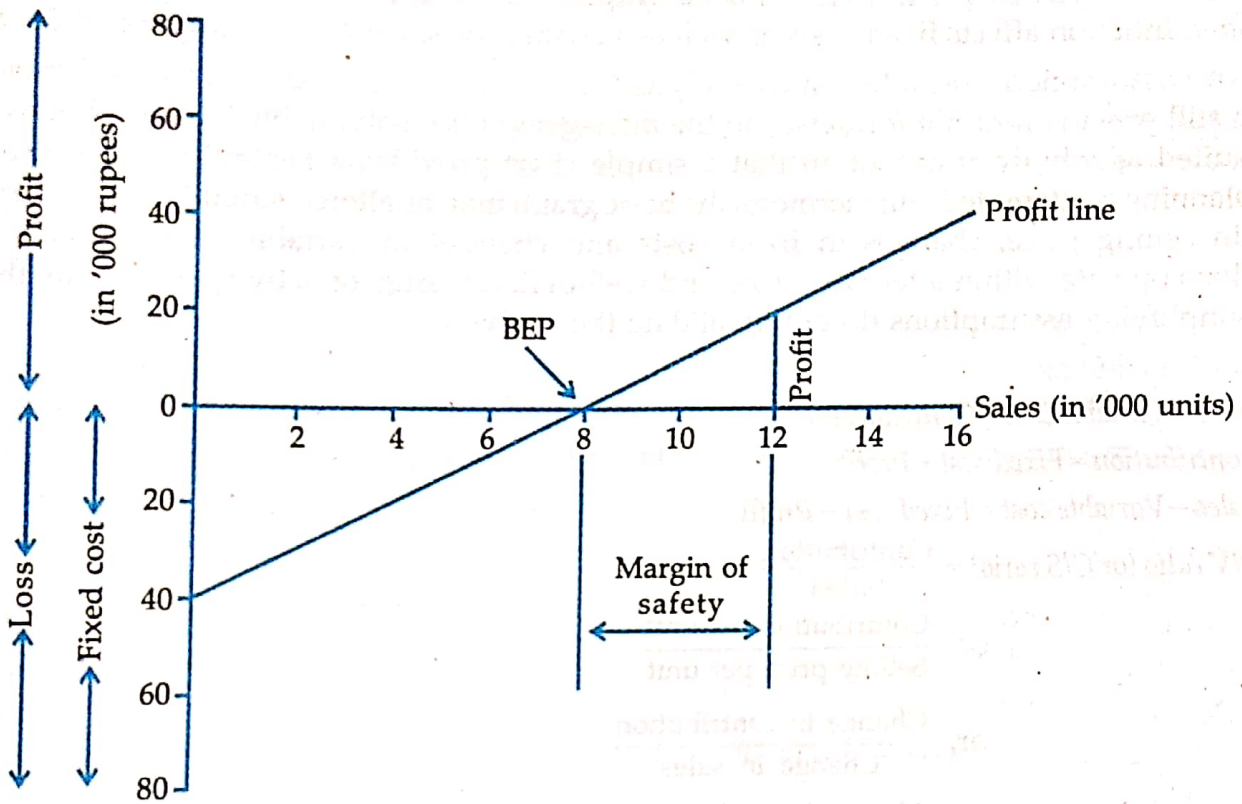
9 | Assumptions and Limitations of Break-Even Analysis

A great virtue of break-even analysis is its simplicity, but to achieve this simplicity a number of assumptions must be made, and these bring limitations and weaknesses. The main assumptions, and hence weaknesses, are :

1. **Constant selling price** : All units may be sold at the same price. This assumption is artificial in that volume is usually increased by reducing the price.

2. **Constant fixed costs** : Fixed costs remain the same in total for all levels of activity. In practice, fixed costs go up in steps as activity increases.

3. **Constant variable costs per unit** : This assumption is also too simplistic since quantity discounts are often available as activity increases.

4. **Common activity base** : Since both costs and revenues are being measured on the same graph, activity must represent both production and sales. In other words, stock levels do not change. This assumption is perhaps unrealistic, specially in the short term.

5. **Constant product mix** : A cost-volume-profit graph may be drawn for either a single-product firm, or for a firm which sells its several products in the same ratio. Thus, changes in the mix of products cannot be analysed.

6. **Fixed and variable costs** : All costs may be identified as either fixed, variable or semi-variable. Semi-variable costs in turn may be split into their fixed and variable components.

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This raises two problems. Firstly, the splitting of semi-variable costs relies on such techniques as regression analysis. Secondly, many costs may be either fixed or variable, depending on the particular circumstances.

7. **No change in general price level** : This assumption does not hold good in the present-day economy. Inflation affects fixed costs as well as variable costs. Costs are changing all the time.

All the above assumptions mean that such analysis is invariably of limited use ; cost-volume-profit graphs do still provide useful information to the management for solving business problems. They are well-suited as a budgeting tool, in that a simple chart provides a general view before more detailed planning is attempted. Furthermore, the basic graph may be altered suitably to accommodate changes in selling price, changes in fixed costs and changes in variable costs. Finally, most organisations operate within a fairly narrow and well-defined range of activity. It may be the case that the simplifying assumptions do not invalidate the analysis.

Summary of formula :

1. (a) *Sales – Variable cost = Contribution*

   (b) *Contribution = Fixed cost + Profit*

   (c) *Sales – Variable cost = Fixed cost + Profit*

2. (a) $P/V \text{ ratio (or } C/S \text{ ratio)} = \dfrac{\text{Contribution}}{\text{Sales}}$

   $\text{or, } \dfrac{\text{Contribution per unit}}{\text{Selling price per unit}}$

   $\text{or, } \dfrac{\text{Change in contribution}}{\text{Change in sales}}$

   $\text{or, } \dfrac{\text{Change in profit}}{\text{Change in sales}}$

   $\text{or, } \dfrac{\text{Profit}}{\text{Margin of safety ratio}}$

   (b) *Contribution = Sales × P/V ratio*

   (c) $Sales = \dfrac{\text{Contribution}}{\text{P/V ratio}}$

3. *Variable cost =   Sales × Complement of P/V ratio*

   $\text{or, } Sales \times (1 - P/V \text{ ratio})$

   $\text{or, } Sales \times (100 - P/V \text{ ratio } \%)$

4. *Profit = (Sales × P/V ratio) – Fixed cost*

   $\text{or, } P/V \text{ ratio} \times \text{Margin of safety}$

5. *Break-even point :*

   (a) *B/E (in units)* $= \dfrac{\text{Fixed cost}}{\text{Contribution per unit}}$

   (b) *B/E (in sales value) = Fixed cost $\times \dfrac{\text{Sales}}{\text{Contribution}}$*

   $\text{or, } \dfrac{\text{Fixed cost}}{\text{P/V ratio}}$

   $\text{or, Fixed cost} \times \dfrac{1}{\text{P/V ratio}}$

1. Budget

A business budget is a plan covering all phases of operations for a definite period in the future. It is a formal expression of policies, plans, objectives and goals laid down in advance by the top management for the concern as a whole and for each of its sub-divisions. Thus, there will be an overall budget for the concern composed of numerous sub-budgets in the form of departmental budgets. The budget expresses revenue goals in the sales budget and expense limitations in the expense budgets that must be attained in order to realise the desired profit objective. Besides, the budget expresses plans relating to such items as inventory levels, capital asset additions, cash requirements, production plans, purchasing plans, labour requirements, and so forth. The budget is a formal statement of management plans and policies for a given period to be used as a guide or blueprint in that period. *The Institute of Cost and Management Accountants, London,* defines budgets as, "Financial and/or quantitative statements, prepared prior to a definite period of time, of the policy to be pursued during that period for the purpose of attaining a given objective."

The basic elements of a budget are : (*a*) It is a future plan of activity for a specified period of time. (*b*) It is expressed in physical or monetary units or in both. (*c*) It is prepared in advance, i.e., before the period during which it is to operate. (*d*) The objectives to be attained and the policy to be pursued to achieve that objectives are required to be laid down before its preparation.

2. Budgetary Control

Budgetary control involves the use of budgets and budgetary reports throughout the period of budget to coordinate, evaluate and control day-to-day operations in accordance with the goals specified by the budget. The mere preparation of a budget is of little value ; its real value lies in the planning aspects and its utilisation for coordination and control purposes during the period. Budgetary control involves a constant checking and evaluation of actual results compared with the budgeted goals, which should result in corrective action where indicated. *The Institute of Cost and Management Accountants, London,* defines budgetary control as, "The establishment of budgets relating the responsibilities of executives to the requirements of a policy, and the continuous comparison of actual with budgeted results, either to secure by individual action the objective of that policy or to provide a basis for its revision." The process of budgetary control involves the following steps :

1. Defining and specifying the objectives to be achieved by the business.
2. Preparing business plans in order to ensure that the desired objectives are accomplished.
3. Translating the plans into budgets, and relating the responsibilities of individual executives and managers to particular sections of the budget.
4. Continuous comparison of actual results with the budget, and the calculation of differences between the budgeted and actual performance.

5. Investigating major differences in order to establish the causes.

6. Presentation of the information to management in a suitable form, relating the variances to individual responsibility.

7. Corrective action by the management in order to avoid a repetition of any wastage or over-expenditure. Alternatively, where it is not possible to achieve the budgeted targets due to change in circumstances, the revision of the budget.

2.1 Difference between Budget, Budgeting and Budgetary Control

The difference between budget, budgeting and budgetary control may be stated thus — budgets are the individual objectives of a department, etc., whereas budgeting may be said to be the act of setting budgets. Budgetary control embraces all and includes the science of planning the budgets themselves and utilisation of such budgets as an overall management tool for the business planning and control. Thus, the term budgetary control is wider in meaning and it includes both budget and budgeting.

2.2 Objectives of Budgetary Control

The objectives of budgetary control are :

1. **To compel planning.** This is the most important feature of budgetary control, because management is forced to look ahead, set targets, anticipate problems and give the organisation purpose and direction.

2. **To communicate ideas and plans** to everyone affected by them. It is necessary to have a formal system to make sure that each person is aware of what he is supposed to be doing.

3. **To coordinate the activities** of different departments or sub-units of the organisation. This concept of coordination implies, for example, that the purchasing department should base its budget on production requirements, and that the production budget should in turn be based on sales expectations.

4. **To establish a system of control** by having a plan against which actual results can be progressively compared.

5. **To motivate employees** to improve their performance.

2.3 Requisites of an Effective System of Budgetary Control

1. A clearly defined organisational structure, which emphasises areas of responsibility.

2. Adequate accounting records and procedures, so that measurement of performance may be relied on.

3. Participation by individuals within the budgeting process.

4. An awareness by management of the uses of the budgetary control system.

5. An awareness by the top management of the problems of budgetary control, and especially of the reaction of individuals to budgets.

6. Flexibility, so that plans and objectives may be revised.

2.4 Advantages of Budgetary Control

The advantages of a budgetary control system are as follows :

1. It defines the objectives of the organisation as a whole, and within this overall framework, it defines the results which each department should achieve.

2. It reveals the extent by which actual results have exceeded or fallen short of the budget.
3. It indicates, with variances or other measures of performance, the reasons why actual results differ from those budgeted, and establishes the magnitude of the differences.
4. As a result of reporting on actual performance along with variances and other performance measures, it provides a basis for guiding executive action to correct adverse trends.
5. It provides a basis for the revision of the current budget, or for the preparation of future budgets.
6. It provides a system whereby the resources of the organisation are used in the most efficient way possible.
7. It indicates the efficiency with which the various activities of the organisation have been coordinated.
8. It provides some centralising control where activities and responsibilities are decentralised.
9. Where the activities of an organisation are subject to seasonal variations, it provides a means of stabilising the organisation's activities.
10. It establishes a basis for internal audit by means of regular examination of departmental results.
11. It enables standard costs to be used.
12. It provides a basis for measuring productive efficiency with a view to paying a bonus to employees.

2.5 Limitations of Budgetary Control

The principal limitations of budgetary control are :
1. Estimates are used as a basis for the budget plan.
2. A budgetary programme must be continually adapted to fit changing circumstances. Normally it takes several years to attain a reasonably good budgetary programme.
3. Execution of a budget plan does not occur automatically. All levels of the management must participate enthusiastically in the programme.
4. No budgetary control system will eliminate the necessity of having a management and administration. It does not take the place of management, but is rather a tool of the management.

3 Steps in Preparing a Budget

Preparing a budget involves the following steps :
1. Establish budget centres.
2. Prepare a clearly defined organisational chart stating the functional responsibilities of each member of the management team.
3. Prepare a budget manual.
4. Form a budget committee.
5. Determine the limiting of key factor.
6. Select the budget period.
7. Set objectives to be reached by the end of the budget period.
8. Prepare forecasts for the period.
9. Determine enterprise policies (e.g., product range, normal hours of work per week, channels of distribution, stocks, research and development appropriation, investments).

7 | Limiting Factor

In each organisation there is always some factor which governs the scale of its activity. Such a factor is known as the 'limiting factor','principal budget factor' or 'key factor'. Some examples of limiting factors are : (a) Production capacity ; (b) Shortage of space ; (c) Shortage of skilled labourer ; (d) Shortage of material ; (e) Low market demand ; and (f) Lack of capital.

One factor of this nature will always be more dominant than the others, but it does not remain constant for each budget period. The most disturbing fact of life is that once limitations imposed by one factor are removed, another takes its place and becomes the limiting factor.

The limiting factor is of vital importance when the budget is being prepared. Generally, the two most important factors are demand for the products and production capacity.

If the sales department can sell only 10,000 units it is no use producing 20,000 units. If the production department has the capacity of producing 20,000 units, a sales potential of 30,000 units is not of much consequence. It is important, therefore, to establish the limiting factor and the limit it imposes on other functions before the functional budgets are begun. If the main factor is the level of demand, the sales budget should be prepared before the preparation of other functional budgets. The production budget and the other budgets will be based on the volume of goods that the business can sell.

13 | Cash Budget

The cash budget, as its name implies, summarises the estimated cash receipts and the estimated cash payments over the budget period. Its object is to ensure a balance between liquidity and profitability. It is the aim of the management to minimise the level of cash without, at the same time, running the risk of not being able to pay bills as they become due. Cash is minimised because by itself it is unproductive. Other assets are employed to earn profits, but cash is idle. On the other hand, sufficient cash must always be available to meet current needs and contingencies. A carefully developed estimate of cash position and cash needs projected for the near future is an absolute necessity to sound financial management. Money-lending agencies require such estimates before granting credit.

Determination of probable cash receipts and probable cash payments makes possible an evaluation of the probable cash position for the immediate budget period. Evaluation of the cash position in this manner may indicate : (a) The need for some form of financing to cover anticipated cash deficits ; or (b) The need for management planning to put excess cash to profitable use. The cash budget is closely related to the sales forecast, expense budgets, and capital expenditure budget. Planning and control of these factors, however, do not automatically bring about a desirable cash position. This statement suggests an essential distinction between the cash budget and other budgets. The cash budget is concerned with the timing of receipts and payments of cash (cash basis), whereas the other budgets are concerned with the timing or incurrence of the transactions themselves (accrual basis).

14 | Distinction between Cash Budget and Cash Flow Statement

The following are the important points of distinction between a cash budget and a cash flow statement :

1. A cash budget is futuristic in approach. It is prepared in advance and is based on future plan of action. A cash flow statement is based on past data.

2. A cash budget relates to objectives to be achieved and is a plan for future inflows and outflows of cash. A cash flow statement is a post-mortem analysis of actual inflows and outflows of cash.

3. The period of a cash budget is usually short (may be a week, fortnight, month or quarter). A cash budget may be prepared covering a long period also (say, a year) but divided into short sub-budget periods (say, a month or quarter). The time span to be covered by a cash budget will vary from one firm to another, depending on the nature of its business and the degree of accuracy with which estimates can be made. A cash flow statement covers a relatively longer period, usually an accounting year, and it is not divided into sub-periods.

4. A cash budget requires previous data only for the purpose of judicious forecasting. A cash flow statement is prepared from accounting data at the beginning and end of an accounting year.

5. A cash budget is a tool for budgeting and controlling cash. A cash flow statement is an analysis of the working of the concern for the past accounting year.

6. A cash budget usually serves the purposes of management only. A cash flow statement may serve the purposes of management as well as external parties.

15 | Flexible Budget

In some businesses it is extremely difficult to estimate future levels of activity with any accuracy because of external uncontrollable influences. For example, a business providing luxury goods and services may be very sensitive to changes in the economic climate. Some businesses are affected by weather, and weather conditions are difficult to predict. In such cases a comparison between actual results and budgeted figures may be extremely misleading. Without detailed investigation, it would not be cleared, for example, whether a large adverse cost variance had arisen because of overspending or merely because the level of business activity was above the budgeted level or both. As a result, control and performance appraisal become really difficult.

The problem can be solved by preparing a flexible budget. In essence, a flexible budget is a range of budgets covering a number of different expected levels of activity. Once actual production is known, an appropriate 'flexed' budget can be drawn up from the range, setting out the expenses which would be appropriate to the level of activity achieved.

The main requirement of a flexible budget is that expenses should be analysed into three distinct categories :

1. **Fixed expenses,** i.e., expenses which would remain the same irrespective of levels of activity.
2. **Variable expenses,** i.e., expenses which would change in proportion to levels of activity.
3. **Semi-variable expenses,** i.e., expenses which would need to be analysed into the fixed and variable elements.

The advantage of flexing a budget, as already stated, is that actual performance can be compared with the flexed budget for purposes of control and performance appraisal.

16 | Zero-Base Budgeting (ZBB)

As a modern technique of budgeting, considered ideal for planning and decision-making, ZBB was first applied by the United States department of agriculture as early as in 1964. The conceptual framework and structural development of ZBB was made by *Peter A. Pyhrr* who applied it in Texas Instruments, a multinational company of United States in 1969. *Peter A. Pyhrr* is regarded as the 'father of zero-base budgeting' owing to his contribution towards the development of the technique and making of the conceptual framework. President *Jimmy Carter*, while in the presidential chair of the USA, issued an official order in 1979 for using the technique by all federal government agencies throughout the United States. The technique was then gradually adopted by various countries all over the world.

16.1 | ZBB Concept

Traditionally budgeting is done on the basis of the targets set in the last year. Certain additions and deductions are made in the last year's budget figures to arrive at the figures for the current budget. Thus, in traditional budget making we depend on the last year's targets and on the principle of incrementalism or decrementalism to decide upon the additions and deletions required to the incorporated in the previous budget figures to arrive at the current budget figures.

In case of ZBB it is assumed that there was no previous year's budget and the current budget proposals are independently evaluated in the light of expected benefits and costs involved. ZBB, therefore, refers to formulating a budget without making any reference to previous plans and achievements, but making particular reference to the justification of the proposed allocation of resources. This is not once. Every time a budget is to be prepared, the process of budgeting should start from zero and the proposed allocation of resources should be justified in terms of cost-benefit analysis.

16.2 | ZBB Defined

ICMA, London, defined ZBB as "a method of budgeting whereby all activities are reevaluated each time a budget is formulated. Each functional budget starts with the assumption that the function does not exist and is at zero cost. Increments of cost are compared with increments of benefits culminating in the planned maximum benefit given by budgeted cost."

Peter A. Pyhrr, the father of ZBB, defined ZBB as "an operating planning and budgeting process which requires each manager to justify his entire budget request in detail from scratch. Each manager states why he should spend any money at all. This approach requires that all activities be identified as decision packages which would be evaluated by systematic analysis and ranked in order of importance."

Introduction

Standard costing is not a distinct system of costing, but it is a technique applicable in all types of costing such as job costing or process costing.

The technique of standard costing consists in : (a) Predetermination of standard costs, elementwise ; (b) Comparison of standard costs with actual costs ; and (c) Measurement of variances and analysis thereof with reference to causes and points of incidence.

Thus, standard cost is a predetermined cost calculated by taking into consideration the relevant necessary expenditure on the basis of management's standards of efficient operation.

Why a separate technique, in the name of standard costing, was considered necessary, is a possible question that may crop up in mind.

Possibly, to eliminate the shortcomings of historical costing the technique of standard costing was evolved. What, then, are the shortcomings of historical costing that standard costing technique aims to eliminate ? The shortcomings of historical costing may be summarised as below :

1. Historical costing claims its validity only in the accounting period in which the particular manufacturing operation is done. The information obtained from cost records much after the period is over cannot be utilised for the purpose of controlling costs, although such information may guide the future operations.

2. There may be much variation in historical costs of different batches of production depending on a variety of factors. So it is not often possible to fix price for the output of a particular batch on the basis of the historical cost of the output of the previous batch. Even the average historical cost is not dependable in this respect owing to wide variation of costs from batch to batch.

3. Price quotation and production planning for a particular period are to be done much before the actual manufacturing operation. Since the cost information relating to the current period is obtained much after the close of the period, they cannot be often utilised for price quotation or production planning for the ensuing period.

4. Historical costs cannot be used as a proper yardstick for measuring efficiency of performance, because costs may vary not only due to change in efficiency of performance but also due to change in rates of materials, labour and overhead during the current period.

5. Historical costing requires a large volume of forms and records and hence becomes expensive.

The techniques of standard costing facilitates cost estimation, price quotation, production planning and control of costs.

1 | The Techniques of Standard Costing

The techniques of standard costing may be reproduced, in a nutshell, in the following few lines :

1. Data relating to production are predetermined. This includes predetermination, in detail, of materials and labour operations necessary for each product ; predetermination of unavoidable losses, level of activity, level of efficiency expected etc.
2. Setting up of standard costs, in detail, for each element i.e., material, labour and overhead.
3. The differences between the actual costs and corresponding standard costs in detail and elementwise, called variances, are ascertained by comparing the actual performance and costs with corresponding standards.
4. Variances are then analysed with a view to determining the causes for the differences between the actual costs and standard costs.
5. Information available from the above analysis is presented in most suitable manner to the appropriate management so that remedial measures can be taken or the standards can be revised, if necessary.

It will not be out of scope to mention in this connection that, standard costing technique can be most suitably applied in concerns manufacturing standard products repeatedly, because realistic and attainable standards in those concerns can be easily set. It does not mean that, industries doing jobs of non-repetitive nature e.g., manufacture of boilers, ships, automobiles etc. can not get benefit from standard costing technique, because there are many operations or processes (undertaken by these industries) for which standard can be set and standard costing technique can be applied.

2 | Distinction between Standard Costing and Budgetary Control

The systems of standard costing and budgetary control have the common objective of controlling business operations. Both the techniques involve accounting for variances between actual results and a predetermined plan. In both cases, variances are investigated and corrective action taken.

The two systems are interrelated and complementary to each other but they are not interdependent. It is possible to operate one without the other. However, the control system of an organisation would be most effective if the two systems are operated together.

Although the two systems are similar in principle, they differ in scope and technique of operation. The important points of difference are :

Standard Costing	Budgetary Control
1. Standard costing involves estimating the costs of products and services. Its scope is limited to costs only.	1. Budgetary control is concerned with all functional areas of the business and includes estimates of revenues as well as expenditure. Thus, budgets are prepared for activities such as production, purchase, sale and distribution, capital expansion, cash flows, research and development, etc. It is much wider in scope.
2. Control is exercised by comparing actual costs with standard costs of actual output.	2. Control is exercised by comparing actual figures with those budgeted.

(Contd.)

Standard Costing	Budgetary Control
3. Standard costing is more intensive in nature.	3. Budgetary control is more extensive in nature.
4. Standard costing is a projection of cost accounts.	4. Budgetary control is a projection of financial accounts.
5. Standard costing requires standardisation of products.	5. Budgetary control does not necessarily involve standardisation of products.
6. Standard costing cannot be operated in parts or elements. All items of expenditure included in cost units are to be accounted for.	6. Budgetary control can be operated in parts, sections or departments, depending upon the attitude of the management. It is possible to prepare budgets only for certain key areas of the business.
7. Standard costing is a far more technically improved system by which causes of variances can be analysed in minute detail and control can be exercised in a more specific and effective manner.	7. Budgeting and control of expenses are more broad and elementary in nature.
8. Standard cost is a unit concept.	8. Budgeted cost is a total concept.
9. Under the standard costing system, standards and the resulting variances are usually revealed through double·entry accounts.	9. Budgets are memorandum figures and do not form part of double entry accounting system.
10. Standards are revised only when they are inappropriate for current operating conditions. Such revisions may take place more or less frequently than budget revisions.	10. Budgets are periodically revised, normally annually.

3 Advantages of Standard Costing

The main advantages of standard costing are :

1. Actual performance may be compared with a predetermined standard revealing favourable or adverse variances. It is possible to establish which variances are due to external influences (for instance, a price increase over which management has little control) and which are caused by internal influences. Hence, it is possible to indicate the places where remedial action is necessary and how it is to be done.

2. Standard costing is an example of 'management by exception', in that by studying variances management's attention is directed towards those items that are not performing according to plan. By confining its attention to deviations from plan, management can use its energies in the most profitable directions.

3. Cost control is more effective under standard costing system as variances will be reported. The whole procedure of setting, revising and monitoring standards will tend to encourage a reappraisal of working methods, materials used, etc., so leading to cost reductions.

4. Standard costs represent what the parts and products should cost, as opposed to average of past performances, and as such, are a better guide to pricing than historical costs.

5. Standard costs, being predetermined costs, are particularly useful in planning and budgeting. A more accurate and effective budget can be prepared for the coming years since information of deviations of actual costs from standard costs is continuously provided.

6. Standard costs provide a simple basis for stock valuations.

7. Standard costing enables responsibilities for performance to be identified.

8. A properly developed standard costing system with full participation and involvement will tend to create a positive, cost-effective attitude through all levels of management.

4   Limitations of Standard Costing

The limitations of standard costing are :

1. A standard costing system may be expensive and time-consuming to install and maintain. It requires a high level of skill and expertise. Hence, small concerns may find it difficult to establish the system.

2. In situations where rates, prices and methods change quickly, standards rapidly become out of date, thus, losing their control and motivational effects.

3. For fixing responsibilities, it is essential to segregate variances into two categories — controllable (i.e., caused by internal factors) and uncontrollable (i.e., caused by external factors). Such segregation is not always an easy task.

4. Standard costing system is not suitable for all industries. Industries which produce non-standardised products or jobs (which are made according to customer's specifications) may find the system unsuitable and costly.

5. If standards are set at too high a level, they will be unattainable. Standard costing in such a situation will adversely affect the morale and motivation of the employees and lead to resistance.

5   Variance Analysis

Variances in standard costing refer to differences between actual and standard costs for specified areas of operational activity. One of the most important features of standard costing is the calculation and classification of variances. Variances must be classified so that their cause is disclosed to management to enable remedial action to be taken and responsibility allocated.

Variance analysis, therefore, constitutes the examination of all those influences which may have caused the variances to occur and the identification of the management action necessary to rectify matters.

It is essential to appreciate that the identification of a variance is of no value in itself — the value lies in ascertaining the cause of the variance and acting to correct it. The cause of variances can be personalised, so variance analysis operates in accordance with the principles of responsibility accounting : production foremen will be responsible for labour efficiency variance ; marketing management for sales price and sales mix variances ; the purchasing department for material price variance, and so on.

Variances may be either favourable (F) or adverse (A), depending upon the circumstances. It is logical to view the variance as favourable when actual costs are less than standard costs, and to view the variance as adverse when actual costs exceed the standard. But it does not follow automatically that these terms should be equated with good and bad. Such an appraisal should be made only after the causes of the variance are known.