Class - B. Com. III
Subject - Management Accounting
Topic - Break-Even Analysis

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Reference books - 1. प्रबन्धकीय लेखांकन - डा० एल० के० गर्ग, स्वाति प्रकाशन
2. प्रबन्धकीय लेखांकन - डा० वी. के. अग्रवाल, विकल्प साहित्य भवन

Cost-Volume Profit Analysis

A business man during the process of production bears two types of cost - fixed cost and variable cost. Fixed cost remains fixed at all the levels of production. It does not change with increase/decrease in the production volume, while the variable cost solely depends on the volume of production. It means it increases as production increase and decreases as production decrease. Due to this phenomena of cost, cost per unit remains high at low production and as well as the production increases, the cost per units becomes low. This is because of fixed cost. Increase in production decrease the fixed cost per unit.

To earn profit is the target of a businessman. This profit depends upon cost and volume of the product. The management wants to know how much minimum sales must be there to avoid the losses. Cost-volume profit analysis is a powerful technique for decision-making regarding profit earning capacity evaluation. What will be profit

at the certain production or to achieve a target profit what should be sales volume or how the change in selling price will effect the profit, these can be solved by Cost-volume profit analysis or Break-even analysis. This can be analysed as below –

Total Cost = Fixed Cost + Variable Cost

Sales = Fixed Cost + Variable Cost + Profit

Contribution = Sales – Variable Cost
or
Fixed cost + Profit

Contribution per unit = Selling price per unit – Variable cost per unit
or
SP – MC
MC = Marginal Cost

Break-Even Point

Break-even point is the point where there is no profit or no loss. This is the sales level where total revenues and total cost are equal. If the sales are below Break-even point there will be loss and if sales are above Break-even point there will be profit.

Calculation of Break-Even Point –

If per unit sales and per unit variable cost is given

$$BEP\ (\text{in Quantity}) = \frac{\text{Fixed Cost}}{SP - MC}$$

where SP = Selling price per unit
MC = Marginal cost = Variable cost per unit

$$BEP\ (\text{in value}) = \frac{\text{Fixed cost} \times SP}{SP - MC}$$

If Total sales and total variable cost is given and sales units are not given

$$BEP\ (\text{in value}) = \frac{\text{Fixed cost} \times \text{Sales}}{\text{Sales} - \text{Variable cost}}$$

If ~~margin of~~ Profit/volume ratio is given

$$BEP \text{ (in value)} = \frac{\text{Fixed Cost}}{P/V \text{ Ratio}}$$

Profit-Volume Ratio

This is the ratio of contribution with sales. After covering the fixed cost, this explains that how much profit will change with a certain change in sales.

$$P/V \text{ Ratio} = \frac{\text{Sales} - \text{Variable cost}}{\text{Sales}} \times 100$$

$$= \frac{\text{Contribution}}{\text{Sales}} \times 100$$

$$= \frac{SP - MC}{SP} \times 100$$

$$= \frac{\text{Contribution per unit}}{SP} \times 100$$

$$= \frac{\text{Fixed Cost} + \text{Profit}}{\text{Sales}} \times 100$$

$$= \frac{\text{Change in Profit}}{\text{Change in Sales}} \times 100$$

$$= \frac{\text{Profit}}{\text{Margin of safety}} \times 100$$

$$= 100 - \% \text{ of variable cost to Sales}$$

Margin of Safety

At Break-even point, there is ~~not~~ no profit or no loss. Profit is earned on the sales which is above Break-even point. Hence, the sales above BEP is called margin of safety. We earn profit on margin of safety. More sales above B.E.P. shows more margin of safety.

Margin of Safety = Sales − B.E.P.

$$= \frac{\text{Profit}}{\text{P/V Ratio}} \times 100$$

Profit

Ultimate target of a business is to earn profit. It may be calculated as −

Profit = Sales − [Fixed Cost + Variable Cost]

= Contribution − Fixed cost

= Margin of Safety × P/V Ratio

= (Sales × P/V Ratio) − Fixed cost

= (Sales in units × Contribution per unit) − Fixed cost

Sales for Desired Profit

If a businessman wants to earn a target profit, he would like to forecast the sales to achieve this target profit. Sales to achieve this target profit may be calculated as −

$$\text{Sales (in Quantity)} = \frac{\text{Fixed cost + Desired Profit}}{\text{selling per unit − Marginal cost per unit}}$$

$$\text{Sales (in value)} = \frac{(\text{Fixed Cost + Desired Profit}) \times \text{Selling Price per unit}}{\text{selling price per unit − Marginal cost per unit}}$$

If per unit selling price and Marginal Cost per unit is not given then −

$$\text{Sales (in value)} = \left(\frac{\text{Fixed Cost + Desired Profit}}{\text{sales − variable cost}}\right) \text{Sales}$$

$$\text{Sales (in value)} = \frac{(\text{Fixed cost + Desired Profit})}{\text{P/V Ratio}}$$

If target profit is per unit.

$$\text{Sales (in Quantity)} = \frac{\text{Fixed cost}}{\text{Selling price per unit} - (\text{Marginal Cost per unit} + \text{Desired Profit per unit})}$$

$$\text{Sales (in value)} = \frac{\text{Fixed cost} \times \text{Selling price per unit}}{\text{Selling Price per unit} - (\text{Marginal cost per unit} + \text{Desired Profit per unit})}$$

Other Calculations

$$\text{Cash B.E.P. (in Quantity)} = \frac{\text{Cash Fixed Cost} + \text{Loan Installment}}{\text{Selling price per unit} - \text{Marginal cost per unit}}$$

$$\text{Cash BEP. (in value)} = \frac{\text{Cash fixed cost} + \text{Loan Installments}}{\text{P/V Ratio}}$$

$$\text{Cost B.E.P.} = \frac{\text{Difference in Fixed cost}}{\text{Difference in variable cost per unit}}$$

$$\text{Fixed Cost} = (\text{Sales} \times \text{P/V Ratio}) - \text{Profit}.$$

Additional Sales for increased Expenditure

$$= \frac{\text{Increased Expenditure}}{\text{P/V Ratio}}$$