COST VOLUME PROFIT ANALYSIS AND MARGINAL COSTING

Meaning of Cost-Volume-Profit Analysis

Cost –Volume-Profit(C-V-P) 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. C-V-P analysis aims at measuring variations of Profits and Costs with Volume, which is significant to business profit planning. This analysis makes use of the Marginal Costing principles for planning and for making short-run decisions.]

Assumption of C-V-P Analysis

The following are the underlying assumptions of C-V-P Analysis:

- Total costs can be easily classified into fixed and variable categories.
- Selling price per unit remains constant, irrespective of quantity sold.
- Variable costs per unit remain constant. However Total variable costs increases with increase in output levels.
- Fixed costs remain the same for a period, irrespective of output.
- Productivity or Efficiency of the factors of production will remain the same.
- The state of technology, process of production and quality of output will remain unchanged.
- There will be no significant change in the level of opening and closing inventory.
- The company manufactures and sells a single product. In the case of a multi-product company, the sales-mix remains unchanged.
- Both revenue and cost functions are linear over the range of activity under consideration.
- All resources required for production are abundantly available.

Break Even Chart

The Break Even Chart is a graphical representation of Cost-Volume-Profit relationship. It depicts the following:

- **Profitability** of the Firm at different levels of output.
- **Break-Even Point**, i.e. No profits No loss situation.
- **Angel of Incidence** (AOI) i.e. the angel at which the Total Sales line cuts the Total Cost ling. It is shown as angle θ (theta). If the angle is large, the firm is said to make profits at a high rate and vice-versa. A high AOI and high margin of safety (MOS) indicate sound business conditions.
- **Relationship** between Variable cost, Fixed expenses and Contribution.
- **Margin of Safety** representing the difference between the total sales and the sales at Break-Even Point.

Break Even Point

Break Even Point (BEP) is the level of Sales at which Total Contribution equals Fixed Costs. Hence, at that level, there is neither a Profit nor a Loss to the Firm (Total Revenue = Total Costs, and Profit/(Loss) = Zero).

Formula for calculating BEP:

(a) Break Even Point (in Rs.) = Fixed Cost ÷ P/V Ratio. This is denoted as Break Even Sales Value.

(b) Break Even Point (in Quantity) = Fixed Cost ÷ Contribution per unit. This is denoted as Break Even Quantity.

Margin of Safety

Margin of Safety (MOS) represents the difference between the Actual Sales and Break-Even Point Sales. It can be expressed as a percentage of Total Sales, or in value, or in terms of quantity.

Formula for calculating Margin of Safety:

(a) Margin of Safety (in Rs.) = Total sales less BEP Sales

Or

Profit ÷ P/v ratio

(b) Margin of Safety (in Quantity) = Total Sales Quantity – BEP Sales Quantity

Or

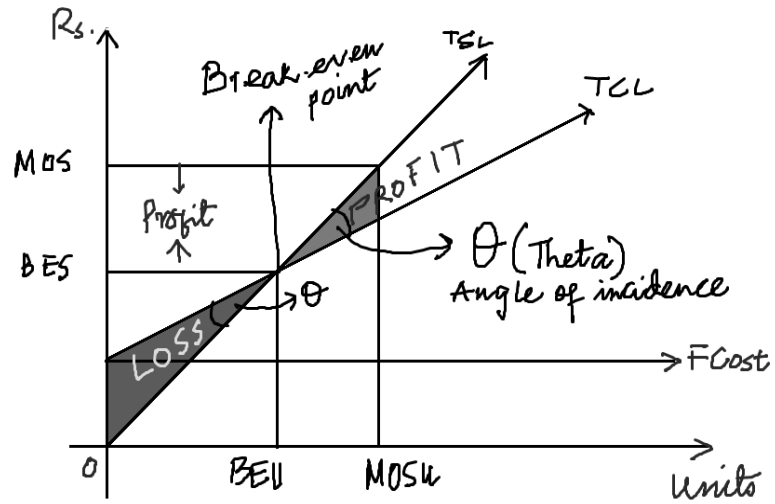
Profit ÷ Contribution per unit

Angle of Incidence

The Angle of Incidence in marginal costing occurs when the total sales line crosses the total cost line from below in the break-even chart. In other words, it is an angle that formed by the intersection of sales line and total cost line at the break-even point. Usually, this angle starts forming at the break-even point, indicating how efficiently the company is making a profit. Further, the angle suggests that the rate at which the company is making profits.

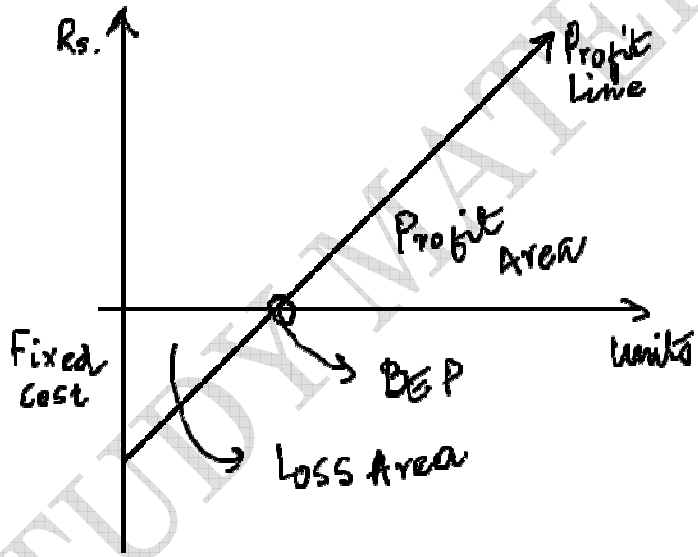
A general rule of thumb is the higher the angle, the more is the profit and vice versa. A large angle of incidence means the company is making profits at a higher rate. Similarly, a small angle suggests the profit is being earned at a lower rate.

Additionally, it gives very significant information. If the angle of incidence is small, it means, the company is incurring more variable costs. Thus, for a business, a desirable situation is a large angle of incidence with a high margin of safety. It could further indicate that the business might have a monopoly status in its industry.



Break-Even Chart

Profit Graph or P/V Chart



This is a graphical presentation of relationship of profit with volume of output. We put profit on vertical axis and output in units on horizontal axis. The profit graph is a straight line, sloping upward from left to right.

Since P = QC – F, where P and Q are two variables, the relationship forms a standard equation of straight line. The slope of the line is C. The line makes a intercept on vertical axis equal to –F. Note, C is constant, because of fundamental assumption of marginal costing that both of S and V are constants and C = (S – V).

Concept of Marginal Cost

Marginal cost as understood in economics is the incremental cost of production which arises due to one unit increase in the production quantity. As we understood, variable costs have direct relationship with volume of output and fixed costs remains constant irrespective of volume of production. Hence, marginal cost is measured by the total variable cost attributable to one unit. For example, the total cost is measured by the total variable cost attributable to one unit. For example, the total cost of producing 10 units and 11 units of a product is Rs.10000 and Rs.10500 respectively. The marginal cost for 11^{th} unit i.e. 1 unit extra from 10^{th} unit is Rs500. Marginal cost can precisely be the sum of prime cost and variable overhead.

Marginal Costing and Contribution

It is a costing system where products or services and inventories are valued at variable costs only. It does not take consideration of fixed costs. This system of costing is also known as direct costing as only direct costs forms the part of product and inventory cost. Costs are classified on the basis of behavior of cost (i.e. fixed and variable) rather functions as done in absorption costing method.

Marginal costing is a technique of decision making, which involves –

a) Ascertainment of Total costs,
b) Classification of costs into Fixed and Variable, and
c) Use of such information for analysis and decision making.

Marginal costing is the ascertainment of Marginal Cost and of the effect on profit of changes in volume or type of output, by differentiating between Fixed Costs and Variable Costs.

Contribution is the excess of Sales Revenue over Variable Cost, i.e. **Contribution = Sales less Variable Costs.**

Contribution is called so, since it initially contributes towards recovery of Fixed Costs and thereafter towards Profit of the business. The Contribution earned by

a business, forms a **fund** for fixed expenses and Profit. The contribution concept is based on the theory that the fixed expenses of a business are joint costs, which cannot be equitably apportioned to different segments of the business. Hence, Contribution serves as a measure of efficiency of operations of various segments of the business.

Advantages and Limitations of Marginal Costing Technique

Advantages

1. Marginal costing is simple to understand.
2. By not charging fixed overhead to cost of production, the effect of varying charges per unit is avoided.
3. It prevents the illogical carry forward in stock valuation of some proportion of current years fixed overhead.
4. The effects of alternative sales or production policies can be more readily available and assessed and decisions taken would yield the maximum return to business.
5. It eliminates large balances left in overhead control accounts which indicate the difficulty of ascertaining an accurate overhead recovery rate.
6. 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. It is useful to various levels of management.
7. It helps in short-term profit planning 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 management for decision making.

Limitations or Disadvantages

1. The separation of costs into fixed and variable is difficult and sometimes gives misleading results.
2. Normal costing system also applies overhead under normal operating volume and this shows that no advantage is gained by marginal costing.

3. Under marginal costing, stocks and work-in-progress are understated. The exclusion of fixed costs forms inventories affect profit and true and fair view of financial affairs of an organization may not be clearly transparent.
4. Volume variance in standard costing also discloses the effect of fluctuating output on fixed overhead. 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 budgetary control is also accepted by many. In order to know the net profit, we should not be satisfied with contribution and hence, fixed overhead is also a valuable item. A system which ignores fixed costs is less effective since a major portion of fixed cost is not taken care of under 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 long term profit planning absorption costing is the only answer.

Distinction between Marginal Costing and Absorption Costing

Marginal Costing	Absorption Costing
1. Only variable costs are considered for product costing and inventory valuation.	1. Both fixed and variable costs are considered for product costing and inventory valuation.
2. Fixed costs are regarded as period costs. The profitability of different products is judged by their P/v ratio.	2. Fixed costs are charged to the cost of production. Each product bears a reasonable share of fixed cost and thus the profitability of a product is influenced by the apportionment of fixed costs.

3. Cost data presented highlight the total contribution of each product.	3. Cost data are presented in conventional pattern. Net profit of each product is determined after subtracting fixed cost along with their variable costs.
4. The difference in the magnitude of opening stock and closing stock does not affect the unit cost of production.	4. The difference in the magnitude of opening stock and closing stock affects the unit cost of production due to the impact of related fixed cost.
5. In case of marginal costing the cost per unit remains the same, irrespective of the production as it is valued at variable cost.	5. In case of absorption costing the cost per unit reduces, as the production increases as it is fixed cost which reduces, whereas, the variable cost remains the same per unit.

Marginal Cost Equation

The contribution theory explains the relationship between the variable cost and selling price. It tells us that selling price minus variable cost of the units sold is the contribution towards fixed expenses and profit. If the contribution is equal to fixed expenses, there will be no profit or loss and if it is less than fixed expenses, loss is incurred. Since the variable cost varies in direct proportion to output, therefore if the firm does not produce any unit, the loss will be there to the extent of fixed expenses. These points can be described with the help of following marginal cost equation:

Marginal Cost Equation = $S - V = C = F \pm P$

Where,

S = Selling price per unit, V = Variable Cost per unit, C = Contribution,

F = Fixed Cost and P = Profit/ Loss.