

## A COMPREHENSIVE EXAMINATION OF COST-VOLUME-PROFIT ANALYSIS IN BUSINESS PROFIT

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### ABSTRACT

*The CVP Analysis technique is employed by strategic planners and policymakers to conduct research on business planning issues. With its assistance, a business can determine the break-even point at which it will begin to generate profits and the highest sales volume at which it will achieve its profit objective. CVP Analysis is an indispensable tool for management to optimise profits by determining the ideal cost and sales volume. It predicts and evaluates the effects of short-term decisions concerning volume, selling prices, fixed costs, and variable costs on profit plans. CVP Analysis can be highly beneficial to management, as it clarifies the relationships and impacts of various factors that affect firm profits. The finance executive can provide management with factual reports and quickly interpretable graphs that include the findings of the CVP Analysis, enabling management to make appropriate decisions. The article concludes that CVP Analysis simplifies a company's operating environment, despite its numerous questionable assumptions and strict limitations. Under the right circumstances, it can be a powerful tool for decision-making. Furthermore, it has been observed that it can be used as a diagnostic tool for comprehending financial data, increasing profits, and assessing risks. The theoretical underpinnings of utilising CVP Analysis in business are presented in this article.*

**Key words:** CVPA, CVP Analysis, BEP, Break Even Point, Cost Volume Profit Analysis.

### 1. Introduction

Profit maximisation is the ultimate goal of all commercial enterprises. Profit, in turn, is influenced by many internal and external factors. One such factor is the company's sales revenue. Profits will rise in response to an increase in sales revenue. However, sales are determined by other factors such as product demand, competition, the fixed selling price, and management's marketing strategies.

The cost of production is another critical factor in determining the profit amount. A lower cost of production means a higher profit while keeping the selling price constant. However, many factors influence production costs, including production volume, product mix, capacity utilisation, production efficiency, etc.

Sales revenue and costs influence a company's ability to generate profits, and the output

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volume is another factor that deserves special attention. This is because output volume changes more frequently and rapidly and is not subject to management control. Furthermore, profit is more closely related to output volume than to cost. This is because costs rarely vary in direct proportion to output volume.

As a result, even minor changes in output volume significantly impact profit. A change in other factors, such as order or lot size, will have little effect on profit. However, management must consider cost and output volume when planning the business's profit-earning capacity.

The Cost-Volume-Profit analysis, as the name implies, investigates the relationship between costs and profit concerning the output volume of a business to maximise profit (Thukaram, 2004). The Cost-Volume-Profit (CVP) Analysis is a simple concept that can be used to understand and interpret accounting data. Many business executives are confused by accounting data in financial statements and reports. Data is much easier to know when it is prepared using break-even charts. This research analyses the independent and interrelated factors that affect a business's profit strategies. Also explored are how variations in factors have affected financial outcomes. It achieves this by developing a conceptual basis for how managers can integrate CVP practices into bottom-line strategies.

## **LITERATURE REVIEW AND DATA ANALYSIS**

### *The Concept of Cost-Volume-Profit Analysis*

Profit maximisation is one of the most important goals of most businesses, and it is influenced by internal and external factors. This profit is the most crucial indicator of a company's performance. Profit is a guide for allocating resources efficiently in a free-market economy. Examining the effects of various variables on profits is a necessary step in financial planning and decision-making.

The Cost-Volume-Profit (CVP) analysis is used to study profit behaviour in response to volume, cost, and price changes. It is a device used to assess the usefulness of the firm's profit planning process. In fact, the CVP inter-relationships have become synonymous with the entire field of profit planning. It should be noted, however, that formal profit planning and control also involve using budgets and other forecasts (Pandey, 2004).



**Figure: 01 Interrelationship Among Determinants of Profit.**

The CVP Analysis predicts what will happen to financial results if a specified activity level or volume changes. This information is critical for management because output or volume is one of the most significant variables influencing total sales revenue, costs, and profits. As a result, the output is granted special attention because understanding this relationship will allow organisation to discover considerable output levels, such as the level at which neither a profit nor a loss occurs. It is based on the relationship between volume and sales revenue, costs and profits in the short run, usually one year or less, and a firm's output is limited to that available from current operating capacity. Some inputs can be increased in the short run, but others cannot. For example, additional materials and unskilled labour supplies can be obtained quickly, but expanding plant and machinery capacity takes time. As a result, because plant facilities cannot be extended, the output is limited in the short run. It also takes time to reduce capacity, so a firm must operate on a relatively constant stock of production resources in the short run. Furthermore, most of a company's costs and prices will be determined by sales volume. Thus, CVP Analysis underscores the special effects of changes in sales volume on profit levels in the short run (Drury, 2000).

The subject of cost-volume-profit analysis, also known as CVP Analysis, is the study of the effects of changes in price, sales volume, output, costs (both variable and fixed), and so on profit and other aspects (Madegowda, 2009). A firm can earn a sufficient profit by maintaining a proper relationship between output or sales volume, revenue earned from sales, and costs. Thus, the interdependence of cost, volume, and profit (CVP) ultimately determine a company's profit structure (Agarwal and Kiradoo, 2009). CVP analysis is an essential tool for management to gain insight into the effects on profit of changes in costs (both fixed and variable) and sales (both volume and value) and make appropriate decisions (Maheshwari, 2005). Management is always interested in knowing which product or product mix is the most profitable, what effect a change in output volume will have on production costs and profit, and so on. These issues are resolved using CVP Analysis (Pillai and Bagavathi, 2003). Profitseeking organisations'

managers typically investigate the effects of output volume on revenue (sales), expenses (costs), and net income (net profit). This research is known as cost-volume-profit analysis (Horngren et al., 2004).

Kohler defines the cost-volume-profit relationship in his Dictionary for Accountants as the area of interest within a management and accounting organisation in observing and controlling the relationships between prospective and actual manufacturing costs (fixed and variable), production rates, and gross profit.

#### *CVP Analysis and Break-Even Analysis*

CVP Analysis is a mature model for studying a company's interrelated costs, price, and profit structure. It is a formal profit planning approach based on an established relationship between various profit-influencing factors. Determining the company's break-even point is the first step in such an analysis. Thus, breakeven analysis is only one component of the overall CVP analysis system (Sahaf, 2006). It should be noted that CVP analysis is also popularly, but incorrectly, referred to as 'Break-Even Analysis'. The distinction between the two terms is subtle; CVP analysis encompasses the entire scope of profit planning, whereas break-even analysis is one of the techniques employed in this process. The breakeven analysis technique is so well-known for studying CVPs that the two terms are interchangeable (Maheshwari, 2005).

Break-even analysis is the study of cost-volume-profit relationships. This term is deceptive because determining the break-even point is frequently only the first step in a planning decision (Horngren et al., 2004). Because the break-even analysis is the most well-known type of CVP analysis, many people use the two terms interchangeably (Pandey, 2004). The break-even analysis and its extension beyond the break-even point are only relevant to cost-volume-profit analysis (Thukaram Rao, 2004). Break-Even Analysis is the study of cost-volume-profit relationships. The latter is a misnomer because the Break-Even Point—the point at which no net income is generated—is frequently only incidental to the planning decision (Madegowda, 2009).

The break-even analysis emphasises the break-even point, and all other calculations revolve around it. Of course, break-even analysis considers the impact of changes in profit determinants, but the focus is on the effects of changes on the break-even point, which affects the margin of safety. As a result, the impact on profit is being investigated. However, in the case of CVP analysis, the focus is on profit, specifically, the impact of changes in cost, price, volume, and the effects of alternative courses of action on the company's profit.

Furthermore, it appears that the Break-Even analysis is static. Break-Even Analysis considers the costs (variable and fixed), price, and so on at a specific output level. On the other hand, CVP Analysis incorporates the static Break-Even Analysis, changes in the profit determinants, and studies the effects of these changes on profit. CVP Analysis, on the other hand, examines the Break-Even Analysis because it provides greater insight into the pros and cons of different courses of action.

#### *The Concept of Break-Even Analysis*

Break-Even Analysis produces two byproducts: the Break-Even Point and the Break-Even

Chart. It is considered with the Break-Even Point in a narrow perspective, and in a broad view, it is regarded with the Break-Even Chart and analysing several other things such as Contribution, Profit-Volume Ratio, Angle of Incidence, Margin of Safety, Profit or Loss, absorbed and unabsorbed fixed costs, and so on. To fully grasp the concept, it is helpful to be familiar with the following basic terms:

**Contribution**

**Profit Volume Ratio(PV Ratio)**

This is the difference between the selling price and the variable cost. It is also referred to as "Gross-Margin". Deducting the fixed cost from the contribution yields the profit/loss figure. In other words, contribution equals fixed cost plus profit. It can be expressed using the formula:

$$\text{Contribution} = \text{Selling Price} - \text{Variable Cost}$$

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

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

**Break-Even Point**

This idea is crucial for determining whether a business is profitable. This term is important when studying the profitability of a company's operations. The profit volume ratio establishes a link between contribution and sale value. The ratio can also be conveyed as a percentage. This ratio is also known as the 'Contribution/Sales' Ratio. This ratio can also be calculated by comparing the change in contribution to the change in sales. Alternatively, PV Ratio may be the change in profit due to the change in sales. Because fixed costs are assumed to be constant at all production levels, any increase in contribution would result in an increase in profit. Because variable costs as a proportion of sales remain consistent at different production levels, this ratio would remain stable. It remains constant as long as the selling price and variable cost per unit fluctuate similarly. It is unaffected by any change in activity level. The ratio is also unaffected by changes in fixed costs because they are not considered when calculating the PV Ratio. In the case of a multiproduct organisation, the PV Ratio is critical for management to determine which product is more profitable. Administration attempts to boost the value of this ratio by lowering variable costs or raising the selling price. The formula can be expressed as follows:

$$\text{P/V Ratio} = (\text{Sales} - \text{Variable Cost}) / \text{Sales}$$

$$\text{P/V Ratio} = \text{Change in Contribution} / \text{Change in Sales}$$

$$= \text{Change in Profit} / \text{Change in Sales}$$

The volume of activity at which total sales revenue exactly equals the total costs of the output produced or sold is defined as the Break-Even Point. Because at this level of operation, sales revenue is sufficient to cover all costs of manufacturing and selling the product, leaving no profit; this level is also known as the no profit, no loss level. Thus, if the total costs of the output are only variable costs, the Break-Even Point would be at the zero level of operation. Profits cannot be expected when total costs consist solely of fixed costs until contribution exceeds such costs. The discussion demonstrates that determining the Break-Even Point necessitates separating total costs into variable and fixed costs. It is critical to understand that once a company has reached the Break-Even Point, the difference between sales above the Break-Even Point and variable costs is the company's profit. Because the total fixed costs have already been covered at the Break-Even Point, additional sales will add to the profit (after deducting variable costs). The contribution ratio will equal the profit rate on sales more significantly than the Break-Even sales.

The formula can be expressed as follows:

$$\text{BEP (in units)} = \text{Fixed Cost} / \text{Contribution per unit}$$

$$\text{BEP (in amount)} = (\text{Fixed Cost} \times 100) / \text{PV Ratio}$$

The desired profit is zero at the Break-Even Point. If the output or sales volume is calculated for a 'desired profit,' the desired profit amount should be added to the

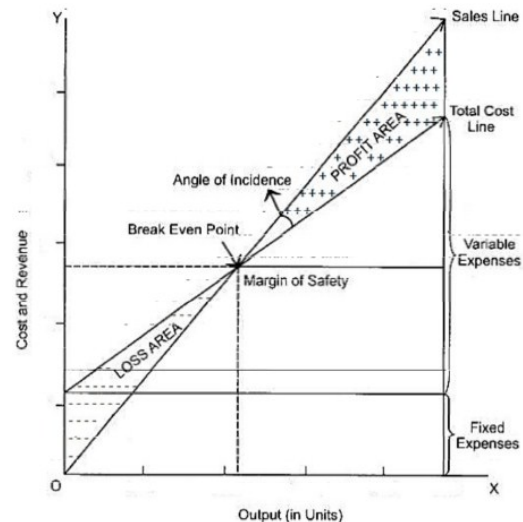
fixed cost in the above formula. As an example:

**Units for a Desired Profit = (Fixed Cost + Desired Profit) / Contribution**

**Sales for a Desired Profit = (Fixed Cost + Desired Profit) x 100 / PV Ratio**

### Break-Even Chart

BEP Chart can depict the relationship between costs, sales, and profits. It describes the activity level at which there will be no loss or profit and shows the profit or loss at different activity levels. This could also take the form of a chart showing the relationship between the total cost of sales and sales or fixed costs and contributions. Thus, it is a graphical representation of cost and revenue data to demonstrate their interdependence at various activity levels. Rather than the algebraic approach, the graphic method is frequently used because it is more easily understood by people with limited mathematical knowledge and provides a quick view of variable costs, fixed costs, and profit at any activity level. The company's income statement can provide information for creating a Break-Even chart. However, the total cost, which includes fixed, variable, and semi-variable, must be divided into fixed and variable costs.



**Figure: 02 Detailed BEP Chart**

### Margin of Safety

The margin of safety (MS) distinguishes between actual and break-even sales.

The following is the formula:

**MS = Sales Volume – Break-Even Sales Volume**

If the margin of safety is substantial, it indicates that the business is sound because profit will be earned even if sales are reduced significantly.

If the margin is small, even a slight decrease in sales can substantially impact the profit position, and a more significant reduction in sales value can result in losses. As a result, the margin of safety serves as an indicator of the business's strength. To correct the unsatisfactory margin of safety, management can either raise selling prices, lower variable or fixed costs, increase production, or replace unprofitable products with profitable ones.

### Angle of Incidence

An angle of incidence is formed at the intersection of the overall cost line and sales line. In reality, there are two angles of incidence: (A) The angle created just to the right of the Break-Even Point. (B) The angle created just to the left of the

Break-Even Point. The angle on the right side of the break-even point represents the profit area, whereas the angle on the left represents the loss area. The magnitude of the angle of incidence indicates the amount of profit or loss made by the firm at various output/ sales levels. If the angle of incidence is narrow to the right side of the BEP, it indicates that the firm's profits are also modest. Similarly, the firm's loss is slight if it narrows to the left side of the BEP. In other words, a narrow-angle of incidence indicates a firm's slow rate of profit earning capacity, whereas a wider angle of incidence indicates a firm's rapid rate of profit earning capacity. A narrow-angle also shows that the variable cost as a percentage of sales is relatively high; thus, minimal contribution has been left. A study of the angle of incidence, break-even point, and margin of safety can help management better understand the firm's profitability, stability, and the impact of fixed and variable costs on its performance.

**Key Factor**

The Key-Factor is the factor that limits the volume of output or the level of activities at a specific point for a temporary period. To maximise profits, the extent of its influence must first be assessed. In general, product mix decisions are made based on contribution. The contribution is the key factor to be compared for relative profitability, not the contribution in terms of the total contribution. As a result, it is the limiting factor, governing factor, or primary budget factor. If sales cannot exceed a certain threshold, sales are regarded as the most critical factor; if production capacity is limited, contribution per unit, i.e., output, must be calculated. If raw materials are in short supply, contributions must be expressed in terms of raw material required per unit. There may be a labour shortage, wherein the contribution per labour hour must be known. If machine capacity is a constraint, contribution per machine hour must be considered for appropriate decision-making. Profitability can thus be measured by:

- = **Contribution per unit / Key factor**
- = **Contribution per unit / Quantity of Raw material in one unit**
- = **Contribution per unit / Hours used in one unit**
- = **Contribution per unit / Machine hours in one unit**

**RESEARCH FINDINGS:**

*The Influence of Changing Factors on Profit Analysis*

Profit is affected by changes in volume, variable cost, fixed cost, selling price, and a combination of all or any of these factors. The traditional Break-Even chart depicts the effects of changes in volume on profits while all other variables remain constant. The dynamic CVP Analysis shows how changes in one or more factors affect profits. The selling price may change due to economic factors, or management may initiate a difference due to an increase or decrease in costs, competition, or other factors. Most costs are under the firm's control and are influenced by volume changes, technological advancement, efficient resource utilisation, or changes in raw material or wage rate prices. The ultimate impact of changing factors is on the profits of the company. As a result, management must assess the effects of these changes on profits.

**Effects of Price Changes**

A higher selling price raises the P/V Ratio and, as a result, lowers the Break-Even Point. On the other hand, a decrease in selling price will reduce the P/V Ratio and, as a result, result in a higher Break-Even Point.

**Effects of Volume Changes**

A change in volume that is not accompanied by a difference in the selling price and/or costs has no effect on the P/V Ratio. As a result, the Break-Even Point

	does not change. Profit increases with increasing volume and decreases with decreasing volume.
<b>Effects of Changes on Variable Costs</b>	If there is no change in selling price or volume, the impact of a change in variable costs on profits is straightforward. An increase in variable costs reduces the P/V Ratio, raises the Break-Even Point, and reduces profits. On the other hand, if variable costs fall, the P/V Ratio rises, the Break-Even Point Falls, and profits rise.
<b>Effects of Changes in Fixed Costs</b>	A shift in fixed costs has no effect on the PV Ratio. Other factors remaining constant, a decrease in fixed costs, will lower the Break-Even Point and increase profits.
<b>Effect of Changes in Combination of Factors</b>	Increased fixed costs raise the Break-Even Point and reduce profits. When evaluating profit plans or budgets, the financial manager or management accountant must recognise that a change in one factor can lead to a change in another factor or factors. As a result, all such changes must be carefully visualised, and the net impact on profits must be determined.

### **THE SIGNIFICANCE OF CVP ANALYSIS**

The most helpful profit planning and control technique are CVP Analysis. It's a tool for explaining the relationship between price, volume, and profit. The CVP Analysis is helpful because of the following benefits:

#### ***CVP Analysis Acts as a Diagnostic Tool:***

CVP/ Break-Even Analysis is an effective diagnostic tool. It helps the management identify the source of rising Break-Even Points and declining profits. Management will learn what actions to take after analysing these causes. In practice, knowing where the break-even point is can be very helpful to management in determining the need for action. On the other hand, an increasing break-even point should not forever be cause for concern among management. The most essential data to examine is break-even as a percentage of capacity. If the Break-Even Point increases as a percentage of capacity, it indicates unfavourable conditions. This is the type of situation that necessitates immediate action. As the plant expands, the absolute break-even point may rise, but overall capacity will also increase. This situation is not unfavourable because the break-even point as a percentage of capacity remains constant.

#### ***CVP Analysis Improves Profit:***

We compute the break-even point and PV ratio, create break-even charts and PV graphs and analyse and report the effect of changing factors on profits in the break-even analysis. This entire data set is necessary to assess the reasonableness and utility of profit projections and other budgets and forecasts prepared by management. Thus, the break-even analysis provides essential information for profit improvement studies and a good starting point for further investigation.

#### ***CVP Analysis Evaluates Risk:***

The desirability of action should be evaluated in terms of profit and risk. If only profit is considered, a company may take a risky move. To some extent, the breakeven analysis helps



consider alternative actions' risk implications. The risk evaluation problem can be approached by considering the alternative action's effects on the break-even point. A firm may expect a higher profit and a higher break-even point from one alternative, while another may produce a lower profit but a lower break-even point. When making a decision, the firm should consider the expected profits from the alternative and the likelihood of reaching the breakeven point. If the possibility of breaking-even sales is low, the firm should choose the second option, where the break-even point will be reached sooner.

***CVP Analysis helps in Understanding Accounting Data:***

The cost-volume-profit analysis is a simple concept that can be used to understand and interpret accounting data. Many business executives and others are confused by accounting data in financial statements and reports. When data is prepared using break-even charts, it is much easier to understand and interpret. However, the executive using break-even analysis should keep the device's limitations in mind and not place too much value on it.

**LIMITATION OF CVP ANALYSIS:**

The break-even point, known as the cost-volume-profit analysis, is a straightforward and valuable concept. However, it is predicated on certain assumptions. These assumptions limit the CVP Analysis's utility and general applicability. As a result, the analysis should recognise these limitations and, where possible, adjust data to produce meaningful results. CVP Analysis faces several significant challenges, including splitting costs into fixed and variable costs, break-even analysis for a multi-product firm, and the assumption that other factors remain constant.

**CONCLUSIONS:**

This comprehensive examination concludes that the cost-volume-profit analysis, as the name implies, examines three variables: cost, volume, and profit. CVP analysis attempts to quantify the variation of costs and profits with volume. Profit as a variable reflects various internal and external conditions that influence sales revenue and costs.

The CVP analysis aids or helps management in profit planning. To increase profits, a company must increase output. When the output is at its peak, within the installed capacity, it contributes to the total. When the volume of output increases, so does the unit cost of production, and vice versa, because the fixed cost remains constant. The fixed cost per unit decreases as output increases. As a result, profit will be greater when the sales price remains constant. In general, costs may not vary in direct proportion to volume. As a result, even minor changes in volume have an impact on profit.

CVP Analysis faces several significant challenges, including splitting costs into fixed and variable costs. The desirability of action should be evaluated in terms of profit and risk. A firm may expect a higher profit and a higher breakeven point from one alternative, while another may produce a lower profit but a lower break-even point. When making a decision, the firm should consider the expected profits from the alternative.

Break-Even analysis is a method of presenting and studying the interdependence of costs, volume, and profits. It conveys information to management in the most straightforward and precise manner possible. It is a financial reporting system that is both effective and efficient. The break-even point, or cost-volume-profit analysis, is a valuable concept predicated on certain assumptions.

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