

JAHANGIRNAGAR UNIVERSITY
INSTITUTE OF INFORMATION TECHNOLOGY



Term Paper

Topic : Managerial Accounting

Course Code: ICT-2209

Course Name: Financial & Managerial Accounting

Submitted to

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Session: 2022-2023

Year and Semester : 2nd Year 2nd Semester

Institute of Information Technology

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Acknowledgement

I am deeply grateful to the many individuals who contributed to the successful completion of this project. First and foremost, I would like to express my sincere gratitude and respect to my honourable teacher, **Md. Shuvo Howlader**, Assistant Professor, Department of Accounting & Information System, Jahangirnagar University, for his invaluable guidance and support in completing this term paper titled "*Financial Accounting*."

I extend my heartfelt thanks for the time and effort you dedicated throughout the semester. Your insightful advice and suggestions were instrumental in shaping the direction and outcomes of this work. I also wish to acknowledge the **Institute of Information Technology (IIT), Jahangirnagar University**, for providing the necessary resources and academic support that facilitated the successful completion of this study.

Abstract

This term paper provides a comprehensive analysis of fundamental concepts in managerial accounting, with a focus on **cost classification, cost-behaviour patterns, and the strategic application of Cost-Volume-Profit (CVP) analysis**. Through a detailed examination of the manufacturing, merchandising, and service sectors, the study illustrates how fixed and variable costs behave differently across various business environments.

The paper further explores the distinction between **prime and conversion costs**, as well as the reporting differences between **gross margin** and **contribution margin**. Key findings emphasize the importance of identifying appropriate cost drivers and understanding **operating leverage** to enhance managerial decision-making and improve organizational profitability.

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Chapter 1: An Introduction to Cost Terms and Purposes

1.1 Overview of Costs and Cost Terminology

In a manufacturing company, a key goal of managerial accounting is to track the costs of units produced. A **cost** is a current or future cash expenditure for something that will ultimately generate revenue. Many costs in manufacturing are directly related to products sold to customers.

Period Costs: Period costs are selling and administrative expenses unrelated to production.

- **Selling Expenses:** Costs incurred to market products and deliver them to customers.
- **Administrative Expenses:** Costs required for support services not directly related to production or sales. Examples include accounting, HR, executive offices, utilities, insurance, property taxes, depreciation, supplies, maintenance, and salaries.

Product Costs: Product costs are incurred when goods are manufactured and can be **direct** or **indirect**.

- **Direct Costs:** Costs that can be specifically traced to a product.
- **Indirect Costs:** Costs incurred in production but not directly attributable to a specific product.

Three Components of Product Costs

1. **Direct Materials** – raw materials used in finished goods.
2. **Direct Labour** – wages of workers assembling the product.
3. **Factory Overhead** – indirect factory costs not directly traceable to products (utilities, insurance, depreciation, supervisor salaries, expired prepaid items, or materials/labour not included in the product).

Cost Categories:

- **Prime Cost** = Direct Labour + Direct Materials
- **Conversion Cost** = Direct Labour + Factory Overhead

Example: A company produces kitchen cabinets:

- Direct materials = \$700
- Direct labour = \$500
- Factory overhead = \$300

Question	Answer / Calculation
1. How much are prime costs?	Prime Costs = Direct Materials + Direct Labor = \$700 + \$500 = \$1,200
2. How much are conversion costs?	Conversion Costs = Direct Labor + Factory Overhead = \$500 + \$300 = \$800
3. What is the total cost of the product?	Total Product Cost = Direct Materials + Direct Labor + Factory Overhead = \$700 + \$500 + \$300 = \$1,500

1.2 Direct Costs vs. Indirect Costs

Every sponsored project has both Direct and Indirect Costs. The direct costs are those that can be specifically and easily identified with a particular project or activity and are allowable under the sponsoring organizations guidelines. Indirect costs, according to the federal Uniform Administrative Requirements, Cost Principles and Audit Requirements for Federal Awards issued by the Office of Management and Budget (Uniform Guidance), are those costs that are incurred for common or joint objectives and cannot be easily and specifically identified with a particular sponsored project, an instructional activity, or any institutional activity. These costs are also sometimes called “facilities and administrative costs (F&A)” or “overhead.” The terms indirect costs, overhead costs, and F&A costs are synonymous. These indirect costs are different than direct costs.

Title	Allowable (Direct) Costs	Unallowable (Indirect / Non-Project) Costs
Salaries, Wages & Fringe Benefits	Faculty, other professionals, technicians, postdoctoral associates, research associates, graduate and undergraduate students	Clerical and administrative assistants, fiscal managers, secretaries, and directors
Materials and Supplies	Project-related research and scientific supplies; equipment or software that does not meet the equipment definition	Office supplies, books and journals such as pens, paper, toner cartridges, printer paper, and general software

Title	Allowable (Direct) Costs	Unallowable (Indirect / Non-Project) Costs
Equipment	Scientific, technical, or research equipment costing more than \$5,000 with a useful life of at least one year	General office equipment such as copiers, printers, office computers, and fax machines
Facilities	Project-specific off-campus space rental; use of specialized equipment with standard usage charges	Utilities, building use, grounds maintenance, renovations, and alterations of university property
Travel	Transportation, lodging, subsistence, and other costs incurred for official project-related business	Entertainment expenses and related costs (tickets, meals, lodging, transportation, gratuities)
Telephone	Long-distance calls, phone surveys, or calls to project participants	Local calls, cell phones, installation, and maintenance
Maintenance & Repairs	Justified costs directly related to and required for the specific award	Maintenance and repairs of general-purpose equipment, buildings, and grounds
Advertising	Recruitment of research subjects or approved project-specific job openings	Public relations activities to promote a unit, department, or college
Publications	Project-specific publications and trackable copying costs	General printing and copying
Memberships, Subscriptions & Professional Activity	Business, technical, and professional memberships and subscriptions that support the project	Civic or community organization memberships; country club or social/dining club memberships
Freight / Express Deliveries & Postage	Justified costs required for timely transportation of project materials	Routine or internal courier services

1.2.1 Challenges in Cost Allocation

Large organizations often allocate **30–50% of total costs**, especially corporate functions (IT, Finance, HR, Risk). Allocations may be **repeated multiple times** before reaching business units, leading to issues:

Common Causes of Allocation Failure:

1. **Excessive effort on “perfect” methods:** Methods may not reflect actual cost drivers.
2. **Too many services:** Maintaining many service records becomes uneconomic.
3. **Fixed vs. variable categorization is misleading:** Costs often exist on a continuum.
4. **Too many exceptions:** Special allocation rules for non-core units complicate the process.
5. **Parallel reporting:** Separate management and statutory reporting creates conflicting “versions of the truth.”

1.2.2 Factors Influencing Cost Classifications

Classification of Cost is the process of arranging costs according to their common characteristics. It is the logical placement of like items together according to their common features.

There are different methods of classifying costs. The methods of classification depending on the purpose to be achieved. The same cost figures are classified according to the different methods depending upon requirements. The important bases of classification are:

1. By nature or element.
2. By function.
3. As direct or indirect.
4. By variability.
5. By controllability.
6. As capital and revenue.
7. By normality.
8. By time.

9. For making managerial decisions.

Cost Classified by Nature or Element

One of the bases of classification is nature or element, i.e., what they are. On this basis, it is classified into three categories:

- a. Material
- a. Labour
- a. Expenses

There can be further sub-classification of these; for example, material into raw material, components, maintenance material, etc.

This classification is important as it serves to find out the different elements of the cost of a product and what is the relative importance of each element in the total cost of a product. This classification helps in the estimation of the work-in-process.

Cost Classified by Function

Here costs are classified according to functions to which they relate. There are three major functional divisions in an organization:

- a. Production
- a. Administration
- a. Selling and Distribution

In the cost sheet or cost statement, the total cost is split up according to the function and element.

Direct and Indirect

Direct cost is the cost that can be conveniently determined with and is paid for a particular unit of cost, i.e., job, product or process. On the other hand, the term indirect cost means that which is of general disposition and that cannot be identified with a particular unit of cost. It has to be distributed or shared.

Cost Classified According to Variability

Variability of cost is estimated in relation to the volume of production. Some costs vary in accordance with production while some remain constant. Under this classification, costs are classified into three groups:

- a. Fixed cost
- a. Variable cost
- a. Semi-variable cost

Costs Classified According to Controllability

Under this basis, costs are classified with respect to the capability of controlling or not. The concept of control of cost is influenced by a specified level of managerial authority and the action of the executive in the undertaking, and if capable of control. Costs are classified as:

- a. Controllable
- a. Non-controllable

Costs Classified as Capital and Revenue

Capital cost is the cost incurred while purchasing some assets to increase the production capacity of the business.

Costs Classified as Normality

There are two types of costs under this classification that display the normality characteristics. They are

- a. Normal Cost
- a. Abnormal Cost

Costs Classified by Time

Under this classification, there are two types of costs:

- a. Historical Cost
- a. Predetermined cost

Costs Classified for Managerial Decisions

Costs under managerial decisions are classified into the following types:

- a. Marginal Costs.
- a. Out of Pocket Costs.
- a. Differential Costs.
- a. Imputed Costs.
- a. Opportunity Costs.
- a. Replacement Costs.
- a. Avoidable and Unavoidable Costs.
- a. Sunk Costs.
- a. Conversion Costs.

1.3 Understanding Cost-Behaviour Patterns

Any discussion of costs begins with the understanding that most costs will be classified in one of three ways: fixed costs, variable costs, or mixed costs. The costs that don't fall into one of these three categories are hybrid costs, which are examined only briefly because they are addressed in more advanced accounting courses. Because fixed and variable costs are the foundation of all other cost classifications, understanding whether a cost is a fixed cost or a variable cost is very important.

1.3.1 Variable Costs and Fixed Costs

Fixed Costs:

A fixed cost is an unavoidable operating expense that does not change in total over the short term, even if a business experiences variation in its level of activity. Table illustrates the types of fixed costs for merchandising, service, and manufacturing organizations.

Type of Business	Examples of Fixed Costs
Merchandising	Rent, insurance, and managers' salaries
Manufacturing	Property taxes, insurance, and equipment leases
Service	Rent, straight-line depreciation, administrative salaries, and insurance

We have established that fixed costs do not change in total as the level of activity changes, but what about fixed costs on a per-unit basis? Let's examine Tony's screen-printing company to illustrate how costs can remain fixed in total but change on a per-unit basis.

Tony operates a screen-printing company, specializing in custom T-shirts. One of his fixed costs is his monthly rent of 1000 dollar . Regardless of whether he produces and sells any T-shirts, he is obligated under his lease to pay 1000 dollar per month. However, he can consider this fixed cost on a per-unit basis, as shown in Figure .

Monthly Rent	Number of T-Shirts Manufactured	Average Rent Cost per T-Shirt
\$1,000	200	\$5.00
\$1,000	400	\$2.50
\$1,000	600	\$1.67

variable costs :

A variable cost is one that varies in direct proportion to the level of activity within the business. Typical costs that are classified as variable costs are the cost of raw materials used to produce a product, labour applied directly to the production of the product, and overhead expenses that change based upon activity. For each variable cost, there is some activity that drives the variable cost up or down. A cost driver is defined as any activity that causes the organization to incur a variable cost. Examples of cost drivers are direct labor hours, machine hours, units produced, and units sold. Table provides examples of variable costs and their associated cost drivers.

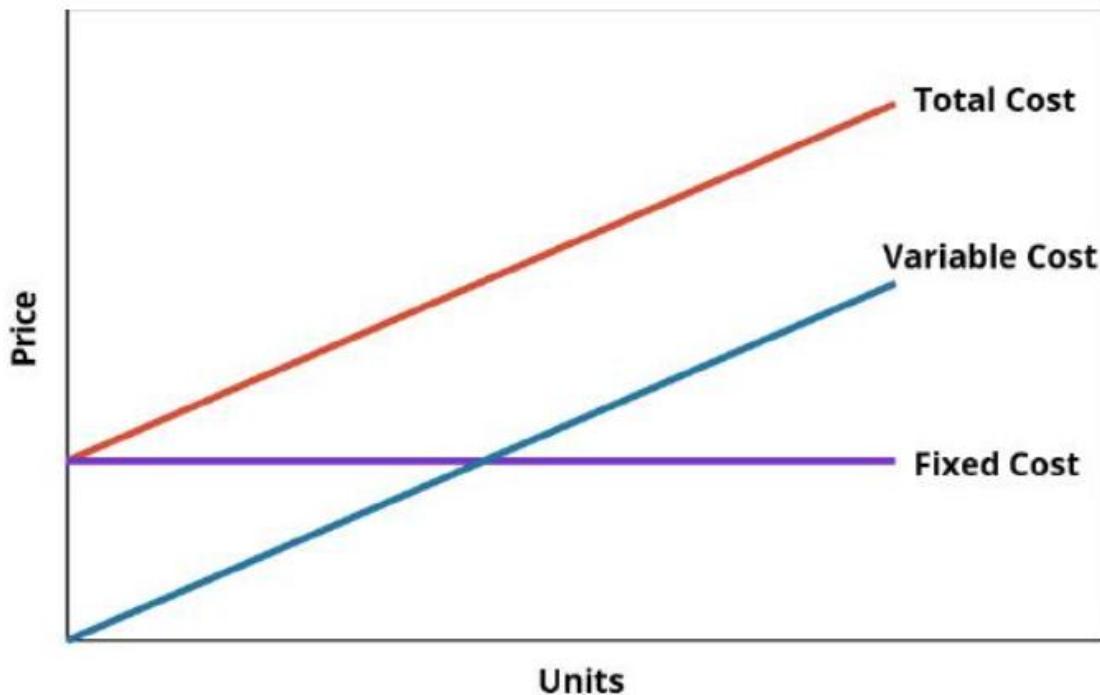
Type of Business	Variable Cost	Cost Driver
Merchandising	Total monthly hourly wages for sales staff	Hours business is open during month
Manufacturing	Direct materials used to produce one unit	Number of units produced
Service	Cost of laundering linens and towels	Number of hotel rooms occupied

Unlike fixed costs that remain fixed in total but change on a per-unit basis, variable costs remain the same per unit but change in total relative to the level of activity in the business. Revisiting Tony's T-Shirts, Figure shows how the variable cost of ink behaves as the level of activity changes.

Cost of Ink per T-Shirt	Number of T-Shirts Produced	Total Variable Cost of Ink
\$0.15	2,000	\$300
0.15	4,000	600

Cost of Ink per T-Shirt	Number of T-Shirts Produced	Total Variable Cost of Ink
0.15	6,000	900

Distinguishing between fixed and variable costs is critical because the total cost is the sum of all fixed costs (the total fixed costs) and all variable costs (the total variable costs). For every unit produced, every customer served, or every hotel room rented, for example, managers can determine their total costs both per unit of activity and in total by combining their fixed and variable costs together. The graphic in Figure illustrates the concept of total costs.



1.3.2 Identifying Primary Cost Drivers

the most common bases for predetermined overhead are direct labour hours, direct labour dollars, or machine hours. Each of these costs is considered a cost driver because of the causal relationship between the base and the related costs: As the cost driver's usage increases, the cost of overhead increases as well. Table shows various costs and potential cost drivers.

Common Expenses	Potential Cost Drivers
Customer Service	Number of product returns from customers
Cleaning Equipment Costs	Number of square feet
Marketing Expenses	Number of customer contacts
Office Supplies	Number of employees
Green Floral Tape (Indirect material)	Number of customer orders
Website Maintenance Expense	Number of customer online orders

1.4 Total Costs , Unit Costs

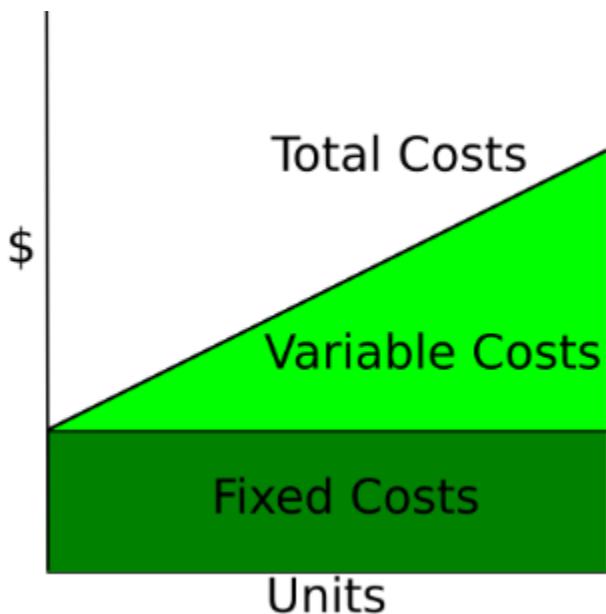
Total Costs :

In economics, total cost (TC) is the minimum financial cost of producing some quantity of output. This is the total economic cost of production and is made up of variable cost, which varies according to the quantity of a good produced and includes inputs such as labor and raw materials, plus fixed cost, which is independent of the quantity of a good produced and includes inputs that cannot be varied in the short term such as buildings and machinery, including possibly sunk costs.

Total cost in economics includes the total opportunity cost (benefits received from the next-best alternative) of each factor of production as part of its fixed or variable costs.

The additional total cost of one additional unit of production is called marginal cost.

The marginal cost can also be calculated by finding the derivative of total cost or variable cost. Either of these derivatives work because the total cost includes variable cost and fixed cost, but fixed cost is a constant with a derivative of 0.



The total cost of producing a specific level of output is the cost of all the factors of production. Often, economists use models with two inputs: physical capital, with quantity K and labor, with quantity L. Capital is assumed to be the fixed input, meaning that the amount of capital used does not vary with the level of production in the short run. The rental price per unit of capital is denoted r . Thus, the total fixed cost equals Kr . Labor is the variable input, meaning that the amount of labor used varies with the level of output. In the short run, the only way to vary output is by varying the amount of the variable input. Labor usage is denoted L and the per unit cost, or wage rate, is denoted w , so the variable cost is

L_w . Consequently, total cost is fixed cost (FC) plus variable cost (VC), or $TC = FC + VC = Kr + Lw$. In the long run, however, both capital usage and labor usage are variable. The long run total cost for a given output will generally be lower than the short run total cost, because the amount of capital can be chosen to be optimal for the amount of output.

Unit Costs :

The unit cost is the price incurred by a company to produce, store and sell one unit of a particular product. Unit costs include all fixed costs and all variable costs involved in production. Cost unit is a form of measurement of volume of production or service.

1.5 Classifying Manufacturing, Merchandising, and Service-Sector Costs

Business Sector	Inventory Type	Typical Fixed Costs	Typical Variable Costs	Primary Cost Driver
Manufacturing	Raw Materials, Work-in- Process, Finished Goods	Property taxes, insurance, and equipment leases	Direct materials used to produce one unit	Number of units produced
Merchandising	Merchandise Inventory	Rent, insurance, and managers' salaries	Total monthly hourly wages for sales staff	Hour's business is open during the month
Service	No Tangible Inventory	Rent, straight-line depreciation, and administrative salaries	Cost of laundering linens and towels	Number of hotel rooms occupied

1.6 Concept of Prime Costs and Conversion Costs

Conversion Cost:

Conversion costs incorporate overhead expenses and direct labour caused because of the change of unrefined components or raw materials into completed items or finished goods. Direct labour costs are equivalent to those utilised in prime expense estimations or prime cost computation. Overhead costs are characterised as the costs that can't be straightforwardly assigned to the producing cycle or manufacturing process however are vital for activities, for example, power or different utilities expected to keep an assembling plant working over the course of the day.

Conversion costs are additionally utilised as an action to check the efficiencies of manufacturing cycles yet consider the overhead costs avoided with regard to prime expense computations. Activities directors or operating managers additionally use conversion expenses or cost to figure out where there might be squandered or waste inside the assembling system.

The formula for calculating conversion cost is:

$$\text{Conversion Cost} = \text{Direct labour} + \text{Manufacturing overhead costs}$$

An example to portray conversion cost:

Think about the case of Company K: The organisation has a total cost of Rs. 50,000 in direct labour and related costs, notwithstanding Rs. 86,000 in production line overhead expenses during the month of May. Assume that Company K produces 20,000 units during the month of May. In this way, the organisation's conversion costs per unit for the month of May is Rs. 6.80 per unit (Rs. 1,36,000 of absolute change costs/by 20,000 units delivered = Rs. 6.80).

Prime Cost:

The estimation for prime expenses or prime cost incorporates the sum spent on both direct materials and direct work or direct labour. Substantial parts and tangible components, for example, unrefined components or raw materials important to make a finished item, are incorporated as a piece of direct materials. For example, the engine of a vehicle and the spok

of a bike are incorporated for direct material expenses since they are very important to finish the creation or manufacturing of that particular product.

Direct work or direct labour costs incorporate the compensation, wages, or benefits paid to a worker or an employee on the fulfilment of every single completed item or product. Salaries and compensation paid to engineers, painters, or welders are normal in computing prime expenses or prime costs. Dissimilar to conversion costs, prime expenses do exclude any indirect expenses.

Prime expenses are checked on by tasks directors or operation managers to guarantee the organisation has an effective manufacturing process. The computation of prime expenses additionally assists associations with setting costs at a level that creates an allowable measure of benefit or profit.

The formula for computing prime cost is:

Prime Cost = Raw materials + Direct labour

An illustration of how prime costs works:

Consider the case of an expert furniture producer who is recruited to develop an office table for a client. The prime expenses for making the table incorporate both the expenses of the furniture creator's work and the unrefined substances or the raw materials expected to develop the table, including the wood, equipment, and paint.

Assume that the expense of the unrefined substances or raw materials timber, equipment, and paint cost Rs. 200. The furniture producer charges Rs. 50/hour for work, and this venture takes them three hours to finish. The prime expense to create the table is Rs. 350 (Rs. 200 for the unrefined components + $(50 \times 3 \text{ hours of work} = \text{Rs. } 150 \text{ in direct work})$). To create a benefit, the table's cost should be set over its superb expense. For the furniture producer to be beneficial, they should charge something like Rs. 351.

Feature	Conversion Cost	Prime Cost
Meaning	Costs incurred to change unrefined substances into completed merchandise.	Immediate costs associated with the assembling system that connect to merchandise made.
Examples	Lease of plant building, indirect plant staff, creation director, and industrial facility power.	Calfskin (leather), elastic, shoestrings, wages of work associated with sequential construction, and pressing.
Influence on Cost	Affected by market property rates, machinery wear and tear, and work adequacy.	Principally affected by material supply chain issues and direct labour adequacy.
Price-Fixing	Complex to assure as it incorporates overheads that must be apportioned across items based on cost drivers.	Genuinely straightforward to compute due to its balanced relationship with finished merchandise.

Chapter 2

4.Cost-Volume-Profit (CVP) Analysis and Decision Making

2.1 Essentials of CVP Analysis

Cost-volume-profit (CVP) analysis evaluates how sales and cost variations affect a company's operating profit. By determining the breakeven point and analysing contribution margin, businesses can make informed decisions to achieve profitability and meet target profit margins.

Cost-volume-profit (CVP) analysis, also referred to as breakeven analysis, can be used to determine the breakeven point for different sales volumes and cost structures. The breakeven point is the number of units that need to be sold—or the amount of sales revenue that has to be generated—to cover the costs required to make the product.

CVP analysis can be useful for companies when making short-term business decisions. Running a CVP analysis involves using several equations for price, cost, and other variables; these equations are plotted on a graph.

2.1.1 Calculating Contribution Margin

The contribution margin can be stated on a gross or per-unit basis. It represents the incremental money generated for each product/unit sold after deducting the variable portion of the firm's costs. The contribution margin is computed as the selling price per unit minus the variable cost per unit. Also known as dollar contribution per unit, the measure indicates how a particular product contributes to the overall profit of the company. It provides one way to show the profit potential of a particular product offered by a company and shows the portion of sales that helps to cover the company's fixed costs. Any remaining revenue left after covering fixed costs is the profit generated.

The contribution margin is computed as the difference between the sale price of a product and the variable costs associated with its production and sales process. This is expressed through the following formula:

$$C = R - V$$

Where C is the contribution margin, R is the total revenue, and V represents variable costs.

It may also be useful to express the contribution margin as a fraction of total revenue. In this case, the contribution margin ratio (CR) is expressed as the contribution margin divided by total revenues in the same time period :

$$CR = \frac{(R - V)}{R}$$

2.1.2 Underlying CVP Assumptions

cost-volume-profit analysis (CVP analysis) helps a business in planning and decision-making. It provides information on how profits and costs are affected by changes in volume or level of activity.

The CVP analysis is subject to the following limiting assumptions.

Costs are classified into variable or fixed

All costs are presumed to be classified as either variable or fixed. In the real business environment however, costs behave differently. Users of CVP analysis need to be able to identify variable costs from fixed costs, and vice versa. Also, different methods are used to segregate mixed costs into purely variable and purely fixed.

Variable costs per unit are constant. Total variable cost changes directly with the volume of activity. On the other hand, total fixed costs remain constant regardless of the level of activity.

Linear relationship within a relevant range

Cost and revenue relationships are linear within a relevant range of activity and over a specified period of time .

Say for example, the fixed costs from 1 to 100,000 units might be different from the fixed costs at 100,001 and above. Variable cost per unit may also be different. Hence, we assume that we are working within one relevant range for which the behavior of fixed and variable costs are applicable.

Inventory level does not change from period to period

It is assumed that all units produced are sold during the period; hence, there is no change in beginning and ending inventory levels.

Volume is the only factor affecting variable costs

As volume (or level of activity) increases, the total variable cost increases directly with the change in volume. If the variable cost per unit is, say \$5 per unit, the total variable costs would be equal to \$5 multiplied by the number of units produced. It is important to take note that volume is the only factor affecting total variable costs. The variable cost per unit is assumed to be constant. Productivity and efficiency are ignored (assumed constant).

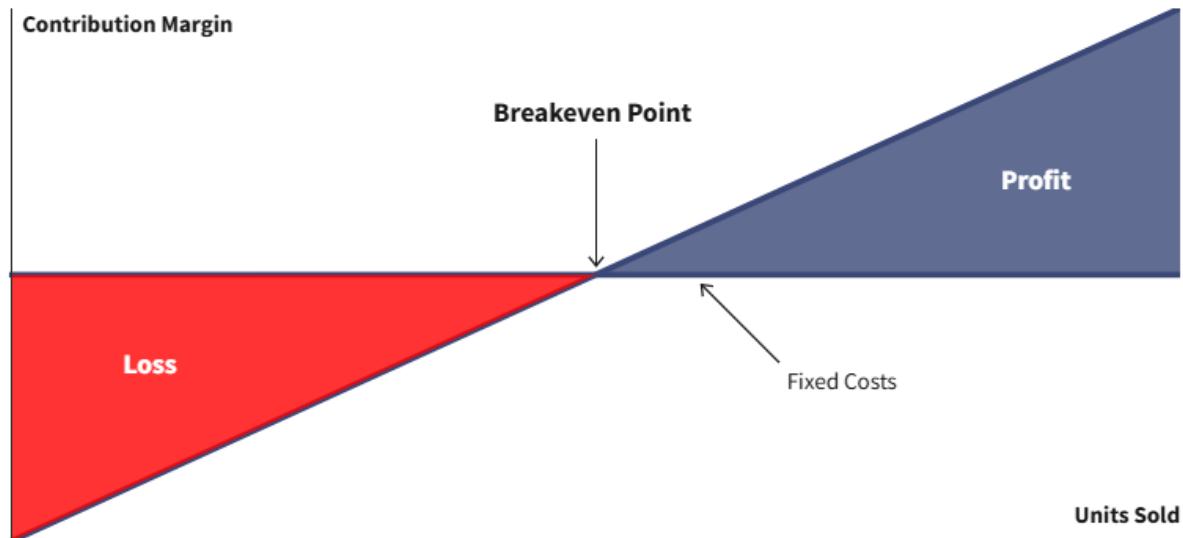
2.2 Determining Breakeven Point and Target Operating Income

Breakeven Point :

Every business faces a critical threshold in its operations—the point at which sales revenue precisely covers all expenses. This pivotal moment, known as the break-even point, separates a time of financial losses from profitability.

Many ventures operate at a loss for extended periods before reaching this milestone. For companies, gauging how and when they will reach the breakeven point is crucial for financial planning and pricing. Below, we explore this essential concept in detail.

Breakeven Point: When Revenues Equal Expenses



The breakeven point is calculated in one of two major ways: by units sold or by sales dollars.

For Units

$$\text{Break-Even Point (Units)} = \text{Fixed Costs} \div (\text{Selling Price per Unit} - \text{Variable Cost per Unit})$$

For sales dollars, the formula is as follows:

$$\text{Break-Even Point (Sales Dollars)} = \text{Fixed Costs} \div \text{Contribution Margin Ratio}$$

Where:

- 1 Fixed Costs are expenses that remain constant regardless of production volume (rent, salaries, insurance)
- 2 Variable Costs are expenses that change directly with production volume (materials, direct labour, commissions)
- 3 Selling Price per Unit is The revenue generated from selling one unit
- 4 Contribution Margin is the amount each unit contributes toward covering fixed costs and generating profit
- 5 Contribution Margin Ratio is the contribution margin expressed as a percentage of the selling price

2.3 Strategic CVP Analysis for Decision Making

The assumptions of the CVP model yield the following linear equations for total costs and total revenue (sales):

$$\text{Total costs} = \text{fixed costs} + (\text{unit variable cost} \times \text{number of units})$$

$$\text{Total revenue} = \text{sales price} \times \text{number of unit}$$

These are linear because of the assumptions of constant costs and prices, and there is no distinction between units produced and units sold, as these are assumed to be equal. Note that when such a chart is drawn, the linear CVP model is assumed, often implicitly.

In symbols:

$$TC = TFC + V \times X \quad \text{Type equation here.}$$

$$TR = P \times X$$

Where

- TC = Total costs
- TFC = Total fixed costs
- V = Unit variable cost (variable cost per unit)
- X = Number of units
- $TR = S$ = Total revenue = Sales
- P = (Unit) sales price

Profit is computed as $TR - TC$; it is a profit if positive, a loss if negative.

Break down

Costs and sales can be broken down, which provide further insight into operations.

One can decompose total costs as fixed costs plus variable costs:

$$TC = TFC + V \times X$$

Following a matching principle of matching a portion of sales against variable costs, one can decompose sales as contribution plus variable costs, where contribution is "what's left after deducting variable costs". One can think of contribution as "the marginal contribution of a unit to the profit", or "contribution towards offsetting fixed costs".

In symbols:

$$\begin{aligned} TR &= P \times X \\ &= ((P - V) + V) \times X \\ &= (C + V) \times X \\ &= C \times X + V \times X \end{aligned}$$

where

- C = Unit Contribution (Margin)

Subtracting variable costs from both costs and sales yields the simplified diagram and equation for profit and loss.

In symbols:

$$\begin{aligned}
 PL &= TR - TC \\
 &= (C + V) \times X - (TFC + V \times X) \\
 &= C \times X - TFC
 \end{aligned}$$

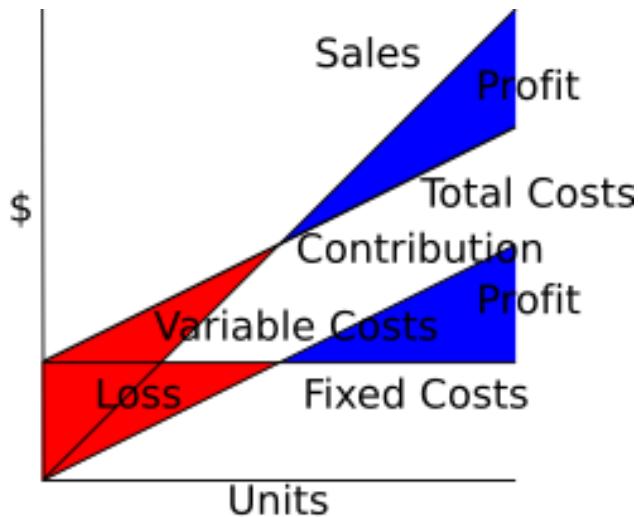


Diagram relating all quantities in CVP.

These diagrams can be related by a rather busy diagram, which demonstrates how if one subtracts variable costs, the sales and total costs lines shift down to become the contribution and fixed costs lines. Note that the profit and loss for any given number of unit sales is the same, and in particular the break-even point is the same, whether one computes by sales = total costs or as contribution = fixed costs. Mathematically, the contribution graph is obtained from the sales

graph by a shear, to be precise $\begin{pmatrix} 1 & 0 \\ -V & 1 \end{pmatrix}$, where V are unit variable costs.

2.3.1 Decisions on Advertising and Pricing

When using cost–volume–profit (CVP) analysis, managers rely on it to make practical decisions about advertising and pricing because both directly influence sales and profit.

Advertising decisions usually involve adding extra cost in hopes of increasing sales. Since advertising is typically a fixed cost in the short term, increasing advertising expenses raises the break-even point. This means the company must sell more units just to cover the added cost. CVP analysis helps managers estimate whether the expected increase in sales from advertising will be enough to justify the expense and improve overall profit.

Pricing decisions are just as important because they affect how much profit is made on each unit sold. Raising prices increases the contribution margin and reduces the number of units needed to break even, but it may also discourage customers and lower sales volume. On the other hand, lowering prices may attract more customers and increase sales volume, but it reduces the profit earned per unit. CVP analysis helps managers understand this trade-off and choose a price that balances sales volume and profitability.

In simple terms, CVP analysis allows managers to see how changes in advertising and pricing impact costs, sales, and profits, making it easier to plan and make informed business decisions.

2.3.2 Sensitivity Analysis and Margin of Safety

In cost–volume–profit (CVP) analysis, sensitivity analysis and the margin of safety are tools that help managers understand risk and uncertainty in a more practical way.

Sensitivity analysis looks at how changes in key factors—such as sales price, variable costs, fixed costs, or sales volume—affect profit. Since business conditions rarely stay the same, this analysis helps managers see how sensitive profits are to changes they may not fully control. For example, it can show how much profit would drop if sales fall slightly or if costs increase unexpectedly. By examining different “what-if” scenarios, managers can better prepare for uncertainty and make more flexible decisions.

The margin of safety measures how much sales can decline before the business reaches its break-even point. It shows the difference between actual or expected sales and the level of sales needed

to cover all costs. A high margin of safety means the company has a comfortable cushion and can withstand a drop in sales without suffering losses. A low margin of safety, on the other hand, signals higher risk and less room for error.

Together, sensitivity analysis and margin of safety help managers evaluate how stable their profits are and how risky their current operations may be. These tools support better planning by highlighting potential weaknesses and helping businesses prepare for changes in the market

2.4 Operating Leverage and Its Effects on Income

Operating leverage describes how a company's cost structure affects its profits. Specifically, it looks at the relationship between fixed costs and variable costs and how changes in sales volume impact operating income.

A business with high operating leverage has a large proportion of fixed costs and relatively low variable costs. In this case, once fixed costs are covered, each additional sale contributes significantly to profit. This means that even a small increase in sales can lead to a large increase in operating income. However, the downside is that if sales decline, operating income can drop quickly because fixed costs must still be paid regardless of sales levels.

On the other hand, a business with low operating leverage relies more on variable costs and has lower fixed costs. Profits increase more gradually as sales rise, but the business is less risky because costs decrease when sales decline.

Overall, operating leverage amplifies the effects of changes in sales on income. While it offers the potential for higher profits during periods of strong sales, it also increases risk during slow periods. Understanding operating leverage helps managers balance risk and return when making decisions about pricing, production, and cost structure.

2.5 Comparing Contribution Margin and Gross Margin

Gross Margin :

Gross margin is synonymous with gross profit margin and includes only revenue and direct production costs. It does not include operating expenses such as sales, marketing costs, taxes, or loan interest. The metric uses direct labour and direct materials costs, not administrative costs for operating the corporate office.

Direct production costs are the cost of goods sold (COGS) and include raw materials, labor, and overhead attributed to each product. The gross margin shows how well a company generates revenue from direct costs such as direct labour and direct materials costs. Gross margin is calculated by deducting COGS from revenue, dividing the result by revenue, and multiplying by 100 to find a percentage.

$$\text{Gross Profit Margin} = \frac{\text{Net Sales} - \text{COGS}}{\text{Net Sales}}$$

where:
COGS = Cost of goods sold

Contribution Margin :

Contribution margin subtracts the variable costs for producing a single product from revenue. It measures the profitability of individual items that a company makes and sells. This margin reviews the variable costs included in the production cost and a per-item profit metric, whereas gross margin is a company's total profit metric.

The contribution margin ratio is expressed as a percentage, but companies may calculate the dollar amount of the contribution margin to understand the per-dollar amount attributable to fixed costs.

$$\text{Contribution Margin} = \text{NSR} - \text{VC}$$

where:
NSR = Net sales revenue
VC = Variable costs

Net sales are the same for contribution margin as for gross margin. However, variable costs differ from COGS. Variable costs are expenses that result from unit production.

Gross Margin	Contribution Margin
Used for company-wide, higher-level reporting.	Used at a product-level, internal analysis.
Fixed overhead is included.	Fixed overhead is excluded.
Used by external parties to measure overall profitability.	Used by internal management to determine operational strategies.
Is included in external reporting.	Strictly an internal reporting metric.
Difficult to exclude costs; all COGS are included.	Easier to exclude costs when shifted between variable and fixed.

Conclusion

In conclusion, the effective management of an organization depends heavily on a precise understanding of cost terms and their purposes. As demonstrated throughout this paper, classifying costs—whether as direct or indirect, or as prime and conversion costs—allows managers to allocate resources more efficiently and set accurate price points for products and services. The analysis of Tony’s screen-printing company and the Not-Flat-Earth telescope models clearly shows that while total fixed costs may remain constant, their per-unit impact varies significantly with production volume, necessitating a cautious approach to unit-cost interpretations.

Furthermore, the application of Cost-Volume-Profit (CVP) analysis serves as a vital tool for strategic planning. By distinguishing between Gross Margin for external reporting and Contribution Margin for internal decision-making, managers can better evaluate sensitivity, determine break-even points, and assess the impact of advertising or pricing changes on net income. Ultimately, mastering these accounting frameworks enables the Institute of Information Technology students and future professionals to provide the analytical insight required to navigate complex financial landscapes and drive sustainable business success.

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