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# Cost and Costing Techniques in Managerial Economics

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## Abstract

Cost, price and profit constitute building blocks of costing and pricing process. Accordingly various costing techniques have been devised and adopted for industrial applications. Cost-volume-profit analysis involves the study of revenues and costs of a firm in relation to its volume of sales. Similarly, firms develop an understanding of cost-volume-price-profit abbreviated as "CVPP analysis by supplementary and additional dimension namely 'price'.

This analysis mainly deals with cost-output relationship. Cost calculation precedes price fixation and it is based on composition of cost of product and service. The businessman is interested in the cost that will be incurred in producing a product. Customers do not decide to buy a commodity without having some idea of its making-up of or characteristics. This article highlights different costs for different purposes. It does not cover entire gamut of costs and cost accounting, but uses underlying cost concepts and costing techniques by managerial economists or business managers.

***Key words:*** *Prime cost; Fixed cost; Variables cost; Marginal cost; Overhead cost; Cost unit.*

## Introduction

The kind of cost concept to be adopted in a particular situation depends on the business decisions to be made. Cost consideration enters into almost every business decision and it is significant to use the right kind of cost. Therefore, an understanding of the meaning of various concepts is essential for clear business thinking and decision making. Defining and distinguishing concepts are necessary to emphasize (1) that cost estimates produced by traditional financial accounting are not appropriate for all managerial uses and (iii) that different business problems call for different kinds of costs. Different combinations of cost ingredients are appropriate for various kinds of managerial problems.

## Objective of the Study

Basic concept of cost and costing process are fundamental to business entities – be it manufacturing and service industries, trading houses or any other organisation engaged in any kind of productive and service activities including public utilities such as Communication, Roadways, Railways etc. This article deals with the composition of cost, cost building process and classification and techniques. Also the article brings out the principle and application of managerial costing in industrial enterprises. The article highlights the difference between traditional costing system and marginal costing. Further, it is of interesting

and importance to note that various costs have been illustrated with graphic presentation step by step to enable the readers to understand the features each type of cost with least difficulty.

The primary objective is to study the nature and behavior of costing techniques comprehensively to enable the managers for decision-making and forward planning in various organisations such as manufacturing companies, retail companies, and service industries and so on.

**Review of Literature**

Cost Accountants usually define costs as resources sacrificed or foregone to obtain benefit in any form – goods or services. Cost is measured in monetary units (rupees). Cost of a product can be understood as "aggregate price of various inputs or factors of production used in manufacturing a product".

Cost is determined by various factors and each of these has significant implications for cost decisions. The most significant determinant is prices of factors of production (we would use factors of production and inputs interchangeably). The price of inputs is incontrollable, as they are largely determined by the external environment of any industry. Cost means the price paid for something; economic sacrifice measured in terms of standard monetary unit incurred as a consequence of a business decision to achieve a specific objective. Moreover the managerial efficiency and productivity of these factors is highly related to their cost. Higher the productivity or efficiency, lower will be the cost of production.

Technology is the third important determinant and has the same relationship with cost on the efficiency of inputs. Other things being equal, better technology improves productivity and reduces cost of production. Lastly level of output also affects cost, especially direct cost which varies with level of output, mathematically we can express the cost function as

$$c = f(Q, T, p_r)$$

where c = cost, Q = output, T = technology, $p_r$ = price. Hence determinants of cost comprises of

- prices of inputs
- technology
- productivity of inputs
- level of output

**Kinds of Costs**

There may be different types of costs incurred by a firm under different circumstances. Costs are considered to be a function of output in economic theory. A managerial economist's concept of cost does not necessarily coincide with that of accountant.

Let us explore various types of costs.

**Accounting Costs**

Financial management including accounting, auditing and costing recognizes only money costs or nominal costs that can be recorded in the books of accounts. Hence, they are also referred to as accounting costs. For purpose of accounting only, such costs are considered which can be identified, measured and accounted for.

*Example:* Cost of raw materials, wages and salary, interest on loans and capital costs like cost of the factory building and equipments and overheads like electricity, telephone calls etc. All these costs are termed as explicit costs.

**Implicit Costs**

Implicit costs do not involve actual payment or cash outflow or reduction in assets.

**Sunk cost**

A sunk cost is an expenditure made in the past that cannot be changed and over which management has no control.

**Historical cost**

Those are the costs which are ascertained after these have been incurred. Historical costs are thus nothing but actual costs. These costs are not available until the completion of the manufacturing operations.

**Classification of Costs**

The subject matter of this article deals predominantly with the various types of costs and classification, their

behaviour, uses and application in decision-making and future planning by business managers.

### Direct Costs

Costs are classified into direct costs and indirect costs on the basis their identifiability with cost units. Direct costs are those that can be attributed to any particular product or activity or jobs or process cost or cost centres. Direct costs are associated with (a) Direct materials (b) Direct labour and (c) Direct expenses.

### Examples of Direct materials:

i) Steel in machines
ii) Clay in bricks
iii) Cloth in garments
iv) Timber in furniture
v) Lime-stone in cement
vi) Paper in books etc.

### Direct Labour

Labour is the cost of remuneration (wages, salaries, commissions, bonuses) of the employees of an undertaking. That is, direct labour cost consists of wages paid to workers, directly engaged in converting raw materials into finished products. These wages can be conveniently identified with a particular product, job or process.

### Examples for Direct Labour

i) Machine operator
ii) Shoe maker
iii) Carpenter
iv) Weaver
v) Tailor
vi) Assembly operator and so on

### Indirect Materials

Indirect materials are those materials which cannot be conveniently identified with individual cost units. These are less important and inexpensive materials. These items do not physically become a part of the finished product.

### Examples

i) Lubricating oils
ii) Sand paper
iii) Nuts and bolts
iv) Small tools
v) Office stationery
vi) Cotton waste and so on

**Indirect material costs** are the costs associated with such items mentioned above (2.2.1).

### Indirect Labour

It is of general character and cannot be conveniently identified with a particular cost unit. Simply put, indirect labour is not directly engaged in the production operations but only to assist or help in production operations.

*Examples:* Supervisor, Inspector, Cleaner, Clerk, Peon and Watchman.

### Indirect Labour Cost

Indirect labour costs are those costs that are associated with indirect workers mentioned above.

### Expenses

Expenses are classified as 'direct expenses' and indirect expenses.

### Direct Expenses

Direct expenses are those expenses which can be identified with and allocated to cost centres or units. Direct expenses are also known as chargeable expenses.

*Examples:*

i) hiring of special plant for particular job;
ii) travelling expenses in securing particular contract;
iii) cost of patent rights;
iv) experimental costs;
v) cost of drawings, designs and layout;
vi) royalty paid in mining;
vii) depreciation

### Indirect Expenses

All indirect costs other than indirect materials and indirect labour costs are termed as indirect expenses. These cannot be directly identified with a particular job,

process or work order is common to cost units or cost centres.

*Examples:* Rent and rates, depreciation, lighting and power, advertising, insurance and repairs, internal transport.

We shall now proceed to the next level of costing process in an undertaking. Briefly stated are the various terminologies and description thereof.

**Prime cost**

This is the aggregate of direct material cost, direct labour cost and direct expenses.

**Prime cost = Direct material cost + Direct labour cost + Director expenses**

**Overhead Cost**

This is the aggregate of indirect material cost, indirect labour cost and indirect expenses.

**Overhead cost=Indirect material cost+Indirect labour + Indirect expenses**

**Production overhead**

This is also termed as factory overhead, works-overhead or manufacturing overhead; these are those overheads which are concerned with the production function. It includes indirect materials, indirect wages and indirect expenses in producing goods or services.

**Office and Administration Overhead**

This is the indirect expenditure incurred in general administration function. These overheads are of general character and have no direct connection with production or sales activities, office administration overhead comprises of:

a) Indirect material: stationery, postage, brush etc.

b) Indirect labour: salary of office staff, salary of managing director, remuneration of Directors of the company.

c) Indirect expenses: Rent of office building, legal expenses, office lighting and power, telephone expenses, depreciation of office furniture and equipment, office air-conditioning, sundry office expenses.

**Selling and Distribution Overhead**

Selling overhead is the cost of promoting sales and retaining customers. Example: Advertisement, samples and freegifts, salaries of salesmen etc.

Distribution cost includes all expenditure incurred from the time the product is completed until it reaches its destination/customers. Further S & D overhead comprises of

a) Indirect materials : packing materials, stationery, cost of samples, price list, catalogues, oil and grease for delivery van etc.

b) Indirect labour: Salary of sales manager, salary of sales office staff, salary of warehouse staff, salary of drivers of delivery vans etc.

c) Indirect expenses: Advertising, travelling expenses, showroom expenses, carriage outward, rent of warehouses, bad debts, insurance of goods in transit etc.

**Cost Classification from Managerial Economist's Perspective**

Basic types of costs discussed above and their understanding find universal application in business function. Managerial economist's point of view, these costs are categorized as:

1) Fixed cost and
2) Variable costs

Further, marginal cost and its principle finds application in the study of marginal costing techniques.

We shall study these costs composition, behavior with respect to total cost and average cost with the help of graphic presentation. Costs behave differently when level of production rises or falls or exhibits upward trend or downward trend. Certain costs change with production level while other costs remain unchanged regardless of volume of production. Thus, on the basis of behavior (variability), costs are classified into Fixed and Variable costs. These costs are studied under total costs and average cost concepts.

### Fixed Costs

These costs do not change with the change in level of production, that is, these do not increase or decrease when the volume of production changes; it can be stated numerically that fixed costs amount say ₹ 10,000 remains constant whether firm produces 10,000 number of products, 20,000 or 50,000 numbers (in the case of short-run production function, or up to a certain limit of production capacity).

### Variable Costs

These costs tend to change in direct proportion to the volume of output. Simply put, when volume of output decreases, total variable costs also decrease and vice versa.

### Marginal Cost

Marginal cost is the change in total cost due to a unit change in output. Simply put, it is the cost of an additional unit of production. Having recourse to differential calculus, it can be expressed as the rate of change of total cost with respect to unit change in volume of output. M.C. is one of the most useful techniques available to the management. It guides the management in pricing, decision making and assessment of profitability. It reveals the interrelationship between cost, volume of sales and profit. It classifies costs into fixed and variable and only variable costs are charged to products. It does not include fixed expenses. Marginal costs are also known as direct costing or variable costing or incremental costing (according to some authors).

### Total Cost

Total cost is the aggregate cost of fixed costs and variable costs.

### Average Cost Concept

Average cost is cost per unit of output. We can derive Average Fixed Cost (AFC), Average Variable Cost and Average Total Cost (ATC or AC) from Total Fixed Cost, Total Variable Cost and total Costs, respectively.

AFC is fixed cost per unit of output; it is equal to TFC divided by total units of output at each level of production output.

AVC is variable cost per unit of output and it is equal to TVC divided by total units of output. AC is total cost per unit of output and is equal to Total Cost divided to total units of output at each level of production schedule.

### Graphic Presentation of Cost and Output Relationship

Scope of business economics covers a number of concepts and principles relating to cost, demand, pricing, profit, production, competition, business cycles etc. Among these factors, cost concept occupies the foremost place. Typically managers are interested in the cost analysis in relation to output. The following cost-output relationships in managerial economics are studied in terms of (1) AFC (2) AVC (3) ATC and (4) M.C. All these are average costs except M.C. are derived from the total cost in each category.

Cost output relationship is studied in three stages viz.,

i) Derivation of Average costs, mathematically

ii) Graphic presentation and

iii) Interpretation and inference

The relationship between cost and output, which is shown graphically, is known as 'Graphic presentation'. It facilitates study of how costs are behaving in relation to volume of output and enables to draw inferences and decision making.

### Derivation of Average Costs mathematically

To begin with, let us understand nomenclatures and their abbreviations used in managerial economics:

| | | |
|---|---|---|
| Total Cost | - | TC |
| Total Fixed Cost | - | TFC |
| Total Variable Cost | - | TVC |
| marginal Cost | - | MC |
| Average Total Cost | - | ATC or AC |
| Average Fixed Cost | - | AFC |
| Average Variable Cost | - | AVC |
| Total quantity output | - | Q |

1. $TC = TFC + TVC$ ... (1)

2. $AFC = \frac{TFC}{Q}$ ... (2)

3. $AVC = \frac{TVC}{Q}$ ... (3)

4. $AC = \frac{TC}{Q} = \frac{TFC+TVC}{Q}$ ... (4)

5. $MC_n = TC_n - TC_{n-1}$ ... (5)

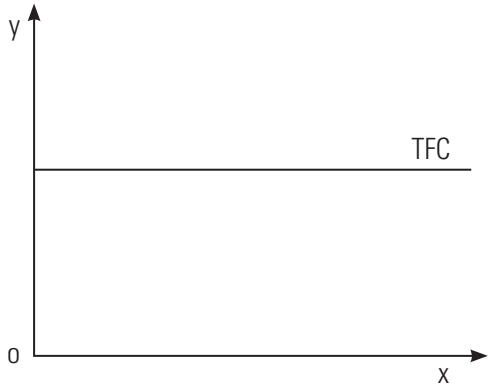
where 'n' is the number of units of output.

**Note:** [According to definition, MC is the change in total cost per unit change in output. Alternatively it can be expressed as MC is the rate of change of TC with reference to unit change in total output. Applying differential calculus,

$$MC = \frac{Change\ in\ Total\ Cost}{Change\ in\ total\ output} = \frac{d(TC)}{dq}$$

Following are the Graphic presentation of cost curves:

**Fig. 1 : Total Fixed Cost Curve**




TFC is parallel to X-axis, that is, TFC remains constant (amount is the same) irrespective of increase in volume of output.

**Fig. 2 : Average Fixed Cost Curve**

Average fixed cost gets diminished as volume of output increase or vice versa. Hence, curve assumes rectangular hyperbola. Mass production and technology together could contribute to this phenomenon.

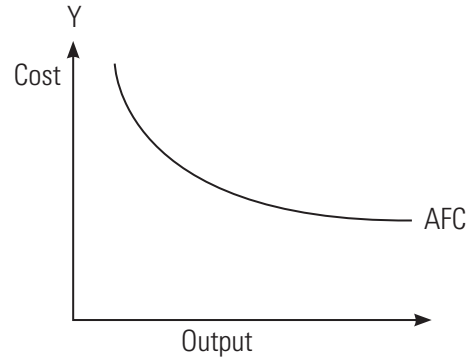
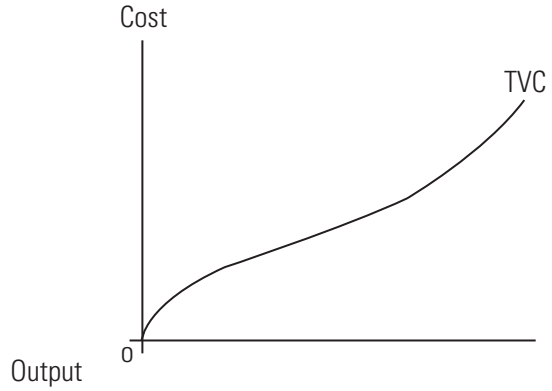
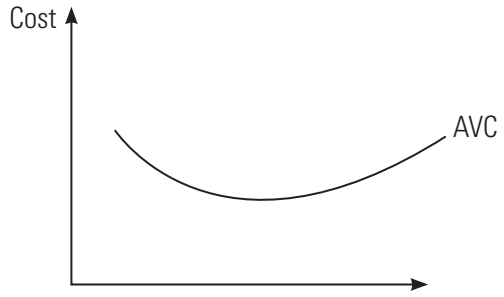



**Fig. 3 : Total Variable Cost**




Total variable cost comprises of material cost, labour cost and direct expenses. As could be seen, initially TVC rises and then increase at decreasing rate and thereafter rises at increasing rate. This phenomenon is due to the law of variable proportion or diminishing marginal return.

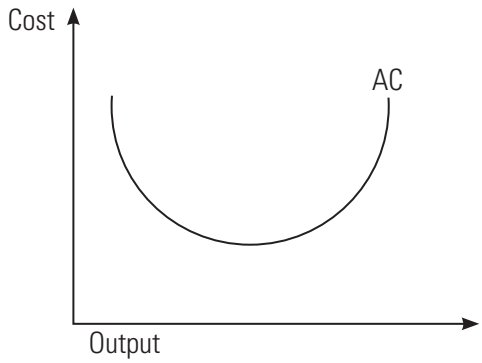
**Fig. 4 : Average Variable Cost Curve**




The shape of the curve is as a result of law of variable proportion of inputs. In the beginning, both the shapes

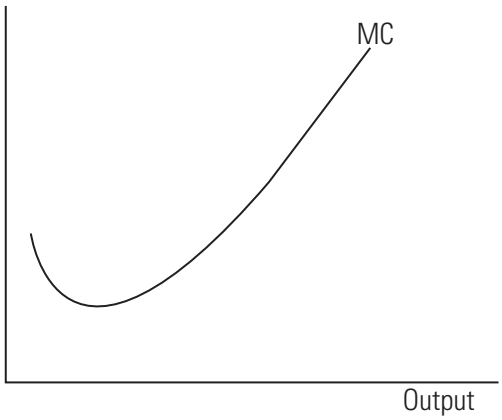
of AC and AVC are the same, whereas, as the output increases, AFC curve slopes downward and AVC increases at increasing rate and its curve slopes upward.

**Fig. 5 : Average Cost Curve**




We know Average cost is cost per unit of output. Average cost is the vertical summation of AFC and AVC Curves, assumes 'U' shape. It is derived from the aggregate of AFC + AVC measurements. It is a 'U' shape curve due to the principle of law of variable proportion or law of diminishing marginal returns.

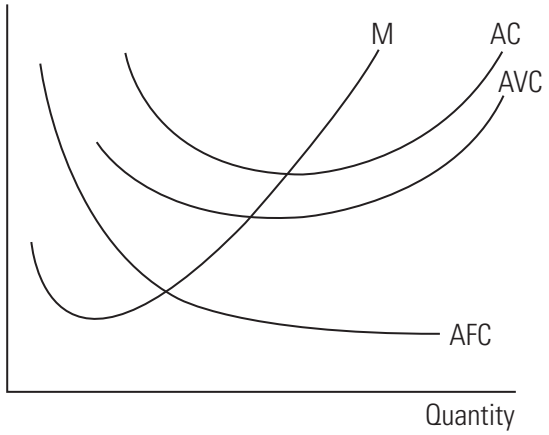
**Fig. 6 : Marginal Cost Curve**




**Drawn below is the joint figure comprising AFC, AVC, AC and MC.**

**Fig. 7 : Average Cost and MC Cost Curves**

Having understood the behavior of the components of the cost and respective curves, let us know how these




costs behave jointly and exhibit relationship with each other. From the figure, we can see that AFC can be plotted as a rectangular hyperbola, asymptotic to the axis. AFC falls steeply at first and then progressively diminishes sloping further downwards, but does not either meet or cuts x-axis.

AVC and AC curves are both U-shaped, reasons for which already explained. Costs decline when there are increasing returns, stabilize with constant return and increase with diminishing returns (output) AC being the sum of AFC and AVC at each level of output, it (AC) lies above both AFC and AVC curves vide F 7 above.

The magnitude of marginal cost is interlinked with changes in average costs. When average costs decline, MC lies below AC, when average costs are at the minimum MC = AC; in other words MC passes through the minimum points of Average cost curves. Finally when AC and MC rise, MC lies above them.

**Application of Costing Techniques in Various Business Organisations**

Having understood various types of costs and concepts, we shall extend our discussion into the utility of these costs by various business organizations. It can be stated that basic concepts and principles remain the same in all these cases. Option and selection of costing techniques are left to the individual company's policy. Executives have to keep in mind several aspects and parameters based on demand for the product, competition, product substitutes prevailing product's life cycle stage and soon.

**Manufacturing Companies**

Managers use estimates of product to develop budget for production, materials, labour and overhead. Determines the selling price or sales level required to cover all costs.

**Retail Companies**

Managers use the estimated cost of merchandise purchases to:

- Predict the gross margin, operating income and the value of the merchandise sold.
- Make decisions about matters such as
    - bidding on future business
    - lowering or negotiating fees\
    - dropping a service
    - estimate revenue
    - manage the organisation's work force

**Executives of the organisations**

Executives use estimated product cost to:

- predict the gross margin and operating income on sales
- Make decisions about matters such as
    - Dropping of a product line
    - Outsourcing the manufacture of a part
    - Bidding on a special order
    - Negotiating a selling price

Other costs these organizations incur include the costs of

- Marketing
- Distribution
- Installing and repairing
- Supporting delivery of services

Ultimately a company is profitable only when its resources from sales or services rendered exceeds all costs.

**Conclusion**

The ambit of cost and costing techniques is a wide domain in cost accounting and managerial economics. This article discussed the basic concepts and their behavior with respect to the volume of production; cost and volume of output analysis are essential for profit planning and cost fixation.

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