Managerial Economics

M.Com. IV Sem.
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Cost Analysis

CONTENTS

Objectives

After studying this unit, you will be able to:

- Discuss various types of costs
- Explain the behaviour of short run and long run cost curves
- State the concept of Economies of scales and economies of scope
- Discuss the revenue curves and their applications

Introduction

The cost which a firm incurs in the process of production of its goods and services is an important variable for decision making. Total cost together with total revenue determines the profit level of a business concern. In order to maximise profits a firm endeavours to increase its revenue and lower its costs. To this end, managers try to produce optimum levels of output, use the least cost combination factors of production, increase factor productivities and improve organisational efficiency.

8.1 Cost Concepts

Costs play a very important role in managerial decisions involving a selection between alternative courses of action. It helps in specifying various alternatives in terms of their quantitative values. The kind of cost to be used in a particular situation depends upon the business decisions to be made. Costs enter into almost every business decision and it is important to use the right analysis of cost. Hence, it is important to understand what these various concepts of costs are, how these can be defined and operationalised. This requires the understanding of the two things, namely, (i) that cost estimates produced by conventional financial accounting are not appropriate for all managerial uses, and (ii) that different business problems call for different kinds of costs.

Future and Past Costs

Futurity is an important aspect of all business decisions. Future costs are the estimates of time adjusted past or present costs and are reasonably expected to be incurred in some future period or periods. Their actual incurrence is a forecast and their management is an estimate. Past costs are actual costs incurred in the past and they are always contained in the income statements. Their measurement is essentially a record keeping activity.

Incremental and Sunk Costs

Incremental costs are defined as the change in overall costs that result from particular decisions being made. Incremental costs may include both fixed and variable costs. In the short period, incremental cost will consist of variable cost — costs of additional labour, additional raw materials, power, fuel, etc. — which is the result of a new decision being taken by the firm. Since these costs can be avoided by not bringing about any change in the activity, incremental costs are also called avoidable costs or escapable costs. They are also called differential costs.

Sunk cost is one which is not affected or altered by a change in the level or nature of business activity. It will remain the same whatever the level of activity.


Example: The most important example of sunk cost is the amortisation of past expenses, e.g., depreciation.

Out-of-Pocket and Book Costs

Out-of-pocket costs are those that involve immediate payments to outsiders as opposed to book costs that do not require current cash expenditure.


Example: Wages and salaries paid to the employees are out-of-pocket costs while salary of the owner manager.

If not paid, it is a book cost. The interest cost of owner's own fund and depreciation cost are other examples of book costs. Book costs can be converted into out-of-pocket costs by selling assets and leasing them back from the buyer.

Replacement and Historical Costs

Historical cost of an asset states the cost of plant, equipment and materials at the price paid originally for them, while the replacement cost states the cost that the firm would have to incur if it wants to replace or acquire the same asset now.


Example: If the price of bronze at the time of purchase, say, in 1974, was ₹15 a kg and if the present price is ₹ 18 a kg, the original cost of ₹ 15 is the historical cost while 18 is replacement cost. Replacement cost means the price that would have to be paid currently for acquiring the same plant.

Explicit Costs and Implicit or Imputed Costs (Accounting Concept of Cost and Economic Concept of Cost)

Explicit costs are those expenses which are actually paid by the firm (paid-out-costs). These costs appear in the accounting records of the firm. On the other hand, implicit costs are theoretical costs in the sense that they go unrecognised by the accounting system. These costs may be defined as the earnings of those employed resources which belong to the owner himself.

Actual Costs and Opportunity Costs

Actual costs mean the actual expenditure incurred for acquiring or producing a good or service. These costs are the costs that are generally recorded in books of account, for example, actual wages paid, cost of materials purchased, interest paid, etc.

Direct (or Separable or Traceable) Costs and Indirect (or Common or Non-traceable) Costs

There are some costs which can be directly attributed to the production of a unit of a given product. Such costs are direct costs and can easily be separated, ascertained and imputed to a unit of output. This is because these costs vary with the output units. However, there are other costs which cannot be separated and clearly attributed to individual units of production. These costs are, therefore, classified as indirect costs in the accounting process.

Shut-down and Abandonment Costs

Shut-down costs are required to be incurred when the production operations are suspended and will not be necessary if the production operations continue. When any plant is to be permanently closed down, some costs are to be incurred for disposing off the fixed assets. These costs are called abandonment costs.

Private and Social Costs

Economic costs can be calculated at two levels: micro-level and macro-level. The micro-level economic costs relate to functioning of a firm as a production unit, while the macro-level economic costs are the ones that are generated by the decisions of the firm but are paid by the society and not the firm. Private costs are those which are actually incurred or provided for by an individual or a firm for its business activity. Social cost, on the other hand, is the total cost to the society on account of production of a good. Thus, the economic costs include both private and social costs.

Above are the some concepts of costs. But the important cost concepts which play crucial role in managerial decision-making are as follows:

8.2 Fixed and Variable Costs

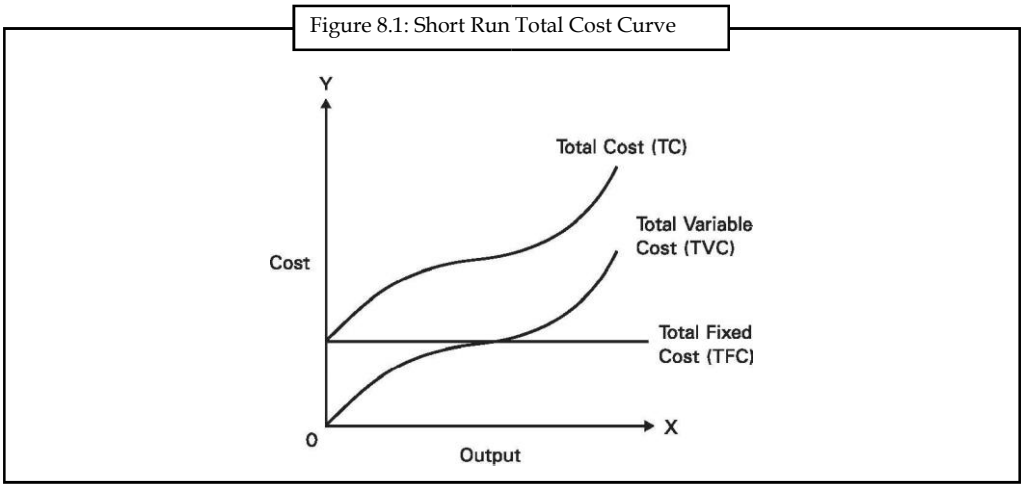
There are some inputs or factors which can be adjusted with the changes in the output level. Thus, a firm can readily employ more workers if it has to increase output. Likewise, it can secure and use more raw materials, more chemicals, without much delay, if it has to expand production. Thus, labour, raw materials, chemicals are the factors which can be readily varied with the change in output. Such factors are called variable factors. On the other hand, there are factors such as capital equipment, building, top management personnel which cannot be readily varied— it requires a comparatively long time to make variations in them. The factors such as capital equipment, building, which cannot be readily varied and require a comparatively long time to make adjustment in them are called fixed factors. Therefore, fixed costs are those which are independent of output, i.e., they do not change with changes in output. These costs are a "fixed" amount which must be incurred by a firm in the short run, whether the output is small or large. Fixed costs are also known as overhead costs and include charges such as contractual rent, insurance fee, maintenance costs, property taxes, interest on the capital invested, minimum administrative expenses such as manager's salary, watchman's wages, etc. Thus, fixed costs are those which are incurred in hiring the fixed factors of production whose amount cannot be altered in the short run.

Variable costs, on the other hand, are those costs which are incurred on the employment of variable factors of production whose amount can be altered in the short run. Thus, the total variable costs change with changes in output in the short run. These costs include payments such as wages of labour employed, the price of the raw material, fuel and power used, the expenses incurred on transporting and the like. Variable costs are also called prime costs. Total cost of a business firm is the sum of its total variable costs and total fixed costs. Thus, TC = TFC+TVC.

In Figure 8.1, output is measured on the X-axis and cost on Y-axis. Since the total fixed cost remains constant whatever the level of output, the total fixed cost curve (TFC) is parallel to the X-axis. This curve starts from a point on the Y-axis meaning thereby that the total fixed cost will be incurred even if the output is zero. On the other hand, the total variable cost curve (TVC) rises upward showing thereby that as the output is increased, the total variable costs also increase. The total variable cost (TVC) starts from the origin which shows that when output is zero the variable costs are also nil. It should be noted that total cost is a function of the total output, the greater the output, the greater will be the total cost. In symbols, we can write:

TC = f(q)

Figure 8.1: Short Run Total Cost Curve



Total cost curve (TC) has been obtained by adding up 'vertically' the total fixed cost curve and total variable cost curve because the total cost is a sum of total fixed cost and total variable cost. The shape of the total cost curve (TC) is exactly the same as that of total variable cost curve (TVC) because the same vertical distance always separates the two curves.

8.3 Short Run and Long Run Costs

The short run is a period of time in which the output can be increased or decreased by changing only the amount of variable factors such as labour, raw materials, chemicals, etc. In the short run the firm cannot build a new plant or abandon an old one. If the firm wants to increase output in the short run, it can only do so by using more labour and more raw materials. It cannot increase output in the short run by expanding the capacity of its existing plant or building a new plant with larger capacity. Long run, on the other hand, is defined as the period of time in which the quantities of all factors may be varied. All factors being variable in the long run, the fixed and variable factors dichotomy holds good only in the short run. In other words, it is that time-span in which all adjustments and changes are possible to realise.

Short run costs are those costs that can vary with the degree of utilisation of plant and other fixed factors. In other words, these costs relate to the variation in output, given plant capacity. Short run costs are therefore, of two types: fixed costs and variable costs. In the short run, fixed costs remain unchanged while variable costs fluctuate with output. Long run costs in contrast are costs that can vary with the size of the plant and with other facilities normally regarded as fixed in the short run. In fact, in the long run there are no fixed inputs and therefore, no fixed costs, i.e., all costs are variable.

8.3.1 Short Run Average Costs and Output

The cost concept is more frequently used both by businessmen and economists in the form of cost per unit or average cost rather than as totals. We, therefore pass on to the study of short run average cost curves.

Short Run Average Fixed Cost (AFC)

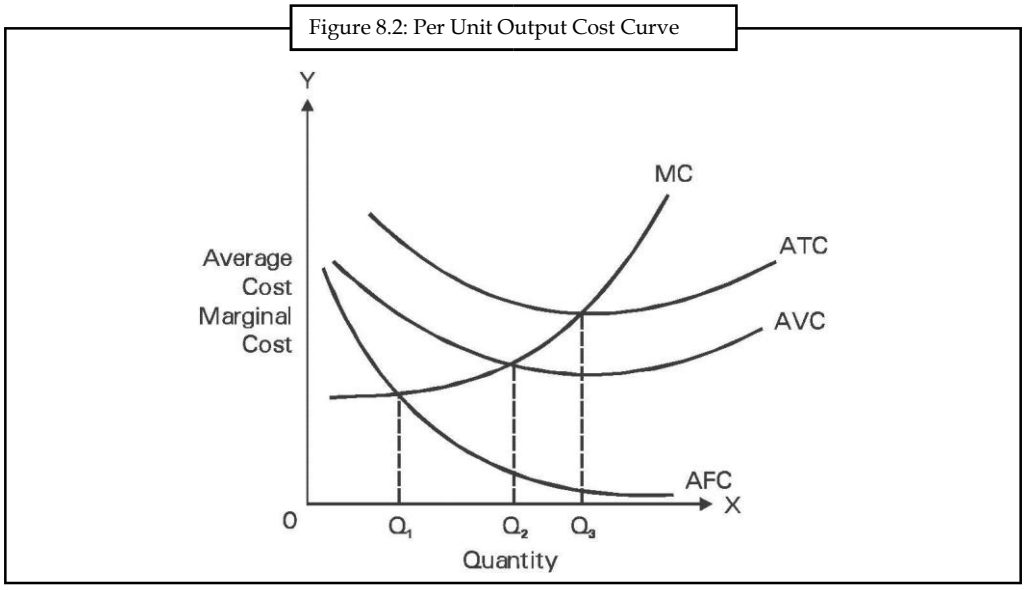
Average fixed cost is the total fixed cost divided by the number of units of output produced. Therefore,

$$\text{AFC} = \frac{TFC}{Q}$$

where Q represents the number of units of output produced.

Thus, average fixed cost is the fixed cost per unit of output. Since total fixed cost is a constant quantity, average fixed cost will steadily fall as output increases. Therefore, average fixed cost curve slopes downward throughout its length. As output increases, the total fixed cost spreads over more and more units and, therefore, average fixed cost becomes less and less.

Figure 8.2: Per Unit Output Cost Curve



Average Variable Cost (AVC)

Average variable cost is the total variable cost divided by the number of units of output produced. Therefore,

$$\text{AVC} = \frac{TVC}{Q}$$

Thus, average variable cost is the variable cost per unit of output.

We know that the total variable cost (TVC) at any output level consists of payments to the variable factors used to produce that output. Therefore TVC= $P_1V_1 + P_2V_2 + \ldots P_n V_n$ where P is the unit price and V is the amount of the variable input. Average variable cost for a level of output (Q), given P is:

$$\text{AVC} = \frac{TVC}{Q} = \frac{PV}{Q} = P\frac{V}{Q}$$

The term V is the number of units of input divided by the number of units of output. Since the average product (AP) of an input is the total output divided by the number of units of input (V),

$$\frac{V}{Q} = \frac{1}{Q/V} = \frac{1}{AP}$$

so we can write,

$$AVC = P\left[\frac{V}{Q}\right] = P\left[\frac{1}{VP}\right]$$

That is, average variable cost is the price of the input multiplied by the reciprocal of the average product of the input. We know that due to first increasing and then decreasing marginal returns to the variable input, average product initially rises, reaches a maximum and then declines. Since average variable cost is 1/AP, the average variable cost normally falls, reaches a minimum and then rises. It first declines and then rises for reasons similar to those operating in case of TVC. This is shown in Figure 8.2.

Average Total Cost (ATC)

The average total cost or what is called simply average cost is the total cost divided by the number of units of output produced. Therefore,

$$ATC = \frac{TC}{Q}$$

Since the total cost is the sum of total variable cost and total fixed cost, the average total cost is also the sum of average variable cost and average fixed cost.

This can be proved as follows:

$$ATC = \frac{TC}{Q}$$

Since TC= TVC+TFC

Therefore, $$ATC = \frac{TVC+TFC}{Q}$$

$$= \frac{TVC}{Q} + \frac{TFC}{Q}$$

$$= AVC + AFC$$

Average total cost is also known as unit cost, since it is cost per unit of output produced.

8.3.2 Short Run Marginal Cost (MC) and Output

Marginal cost is the addition to the total cost caused by producing one more unit of output. In other words, marginal cost is the addition to the total cost of producing n units instead of n-1 units.

$$MC_n = TC_n - TC_{n-1}$$

In symbols, marginal cost is rate of change in total cost with respect to a unit change in output, i.e.,

$$MC = \frac{d(TC)}{dQ}$$

where d in the numerator and denominator indicates the change in TC and Q respectively.

It is worth pointing out that marginal cost is independent of the fixed cost. Since fixed costs do not change with output, there are no marginal fixed costs when output increases in the short run. It is only the variable costs that vary with output in the short run. Therefore, marginal costs are, in fact, due to the changes in variable costs.

$$MC = \frac{d(TVC)}{dQ}$$

The independence of the marginal cost from the fixed cost can be proved algebraically as follows:

$$MC_n = TC_n - TC_{n-1}$$

$$= (TVC_n + TFC) - (TVC_{n-1} + TFC)$$

$$= TVC_n + TFC - TVC_{n-1} - TFC$$

$$= TVC_n - TVC_{n-1}$$

Hence, marginal cost is the addition to the total variable costs when output is increased from n-1 units to n units of output. It follows, therefore, that the marginal cost is independent of the amount of fixed costs.

In Table 8.1, MC is the slope of the TC curve. As TC curve first rises at a decreasing rate and later on at an increasing rate, MC curve will also, therefore, first decline and then rise.

Unit of Goods Produced (1)	Total Cost TC (2)	Average Cost AC=TC/units produced (3 = 2/1)	MC = $[(TC_n) - (TC_{n-1})]$ (4)
10	5000	500	
11	5300	481.82	300
12	5550	462.5	250
13	5700	438.46	150
14	5950	425.0	250
15	6350	423.33	400

Table 8.1: The Relationship between MC, AC and TC

Advantage of TC: break-even analysis profit of firm

Advantage of AC: calculating per unit profit of a firm

Advantage of MC: to decide whether a firm needs to expand or not

Caution The properties of the average costs (AVC, AFC, ATC) and marginal costs can briefly be described as follows:

1. AFC declines continuously, approaching both axes asymptotically.
2. AVC first declines, reaches a minimum and rises thereafter. When AVC attains minimum, MC equals AVC.
3. As AFC approaches asymptotically the horizontal axis, AVC approaches ATC asymptotically.
4. ATC first declines, reaches a minimum and rises thereafter. When ATC attains its minimum, MC equals ATC.
5. MC first declines, reaches a minimum and rises thereafter — MC equals AVC and ATC when these curves attain their minimum values. Furthermore, MC lies below both AVC and ATC when they are declining; it lies above them when they are rising.

The laws governing costs are the same as the laws governing productivity. When output is increased in the short run, it can only be done by increasing the variable input. But as more and more of a variable input is added to a fixed input, the law of diminishing marginal productivity enters in. Marginal and average productivities fall.

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