Chapter-6

Cost Accounting

LEARNING OBJECTIVES

In this chapter we will study:

Fundamentals of Cost

Cost Accounting

- Objective of Cost Accounting
- Cost-Volume-Profit (CVP) Analysis/Break-even Analysis

• Advantages and Limitations of CVP Analysis

Absorption Costing and Marginal Costing

Inventory Management

- Inventory/Types of inventory
- Inventory Management
- Need of Inventory Management
- Objective of Inventory Management
- Approach of Inventory Management
- Techniques/Models used for Inventory Control
 EOQ Model
 - □ A-B-C Analysis

6.1 FUNDAMENTALS OF COST

Meaning of Cost

Cost means sacrificing resources to receive benefits. Benefits may be anything tangible or intangible. On the other hand, an expired cost is expense. Depreciation (amortization of asset), maintenance charges, telephone bill etc. are examples of expenses.

Basic Elements of Cost

There are three basic elements of cost of product/services *viz*. material cost, labour cost and overhead cost. Overhead cost includes expenses other than material and labour. It might happen that as compared to one basic element other elements are negligible/insignificant.

Classification of Cost

Classification of cost is done on the basis of purpose of management. Following are some important classification:

• Direct cost and indirect cost

Direct costs are those costs which affects Cost of Goods Sold (COGS) *e.g.* material cost, labour cost, manufacturing expenses are direct costs. Here the purpose of management is to know the gross profit, net profit etc.

• Controllable and uncontrollable cost

Controllable costs are those costs, which remain under jurisdiction of concerned manager. Here the purpose of management is to set accountability. *e.g.* consumption of material is controllable cost for production manager whereas it is uncontrollable cost for purchase manager who is responsible for purchasing of material and hence material prices.

• Shut down cost and sunk cost

Shut down costs are those costs, which incur at the time of shut down of the production e.g. rent, minimum taxes, salaries or permanent labour. Shut down cost are important for continue or shut down decision.

Sunk costs on the other hand are historical or past costs. These costs cannot be altered by later decisions and hence are irrelevant for decision-making.

• Conversion cost

Conversion cost is the cost incurred in converting Raw Material (R/M) into Finished Goods (FG).

• Explicit cost and implicit cost

All those costs, which incur exclusively like material cost, labour cost and overhead costs are explicit costs.

Whereas all the implied costs like opportunity cost, depreciation, loss on sale are implicit costs.

• Out of pocket costs, traceable costs and untraceable costs

All the explicit costs are out of pocket costs whereas implicit costs are not out of pocket costs. Traceable costs are those, which can be traced. Whereas those, which cannot be traceable, *e.g.* scam, suspense account etc. are untraceable costs.

• Fixed cost, semi variable cost and variable cost

- \Box Fixed costs are those costs, which remain unchanged with change in level of activity up to the capacity level *e.g.* interest cost, fixed salary, depreciation etc. are fixed costs.
- □ Semi variable costs are those costs part of which changes with change in level of activity *e.g.* telephone bill is semi variable cost as after free calls every additional call increases bill amount.
- □ Variable costs are those costs which changes with change in level of activity *e.g.* material cost, labour cost etc. are variable costs.



Remark: Total fixed cost remains fixed whereas fixed cost per unit changes with change in level of activity. Similarly, total variable cost changes whereas variable cost per unit remains fixed with change in level of activity.

6.2 COST ACCOUNTING

Cost accounting is the process of maintaining cost records and controlling cost. Cost accounting process includes:

- 1. Cost determination/costing
- 2. Cost analysis
- 3. Cost control

Cost Determination/Costing

- Costing is a technique used to determine cost of product/services at different levels of ongoing operation.
- Costing is done through process of accumulation.
- Preparation of cost sheet is a method of costing.
- Cost sheet helps in knowing unit cost at different levels (known as cost centres) of ongoing operation.
- Costing helps in cost control because costing estimates cost incurred at departments/sub-departments level and cost can be controlled only at the point of incurrence *i.e.* at department/sub-department levels popularly known as cost centers.

Cost analysis

- Cost analysis means analyzing cost.
- The most popular technique used for cost analysis is Cost-Volume-Profit analysis (CVP analysis).
- CVP analysis refers to study of behaviour of profit with respect to cost and volume.
- CVP analysis is also referred as Break-Even Analysis (BE-Analysis)
- CVP analysis helps in profit planning and therefore recognized as important tool of management accounting.

Cost control

- Cost control means comparison of actual cost with predetermined cost (known as standard cost) and if there is deviation, taking corrective action.
- The most popular technique for cost control is standard costing.
- Standard costing leads to variance analysis.
- Variance exists when there is deviation between actual cost and standard cost. Variance may be favourable (when Actual Cost is less than Standard Cost) or Unfavourable/Adverse (when Actual Cost is more than Standard Cost).

6.2.1 Objective of Cost Accounting

The objective of cost accounting is to maintain cost records and to control cost in order to accomplish ultimate goal of an organization *i.e.* wealth maximization.

6.2.2 Cost-Volume-Profit (CVP) Analysis

- CVP analysis is study of behaviour of profit with respect to cost and volume *i.e.* level of activity.
- CVP analysis is also referred as Break-Even Analysis (BE-Analysis).
- Thus under CVP analysis we try to find out Break-Even Point (BEP).
- BEP is that level of activity at which there is no profit no loss.
- For the purpose of CVP analysis cost is divided into two parts—Fixed cost and Variable cost.
- Fixed cost is that cost which remains unchanged with change in level of activity *e.g.* depreciation, interest cost, fixed salary, monthly rent etc.
- Variable costs are those cost which changes with change in level of activity *e.g.* raw material cost, productive labour, manufacturing expenses etc.

Thus at BEP,

Profit/Loss = 0 Revenue - Cost = 0 Revenue = Fixed cost + Variable cost ...(i) is the level of activity. Let S P is the selling price per unit and VC is the

Let at BEP, 'n' units is the level of activity. Let S.P. is the selling price per unit and V.C. is the variable cost per unit.

Then,

According to equation (i), $n \times S.P. = Fixed cost + n \times V.C.$ n (S.P. - V.C.) = Fixed cost

$$n = BEP (Units) = \frac{Fixed cost}{(S.P.-V.C.)}$$

	BEP (units) = $\frac{\text{Fixed cost (FC)}}{\text{Contribution Margin per unit (CM)}}$
Again,	BEP (Sales or Rs.) = BEP (units) \times S.P. = $\frac{\text{Fixed Cost (FC)}}{\text{Contribution Margin per unit (CM)}} \times$ S.P.
Or,	BEP (Sales or Rs.) = $\frac{\text{Fixed Cost (FC)}}{(\text{CM}) \text{ per unit/SP per unit}}$
Or,	BEP (Sales or Rs.) = $\frac{\text{Fixed Cost (FC)}}{P/V \text{ ratio}}$
Where P/V ratio	is also referred as Profit-Volume ratio and P/V ratio = (CM per unit/SP per unit)
	P/V ratio = (Civi per unit/SP per unit)
	$P/V \text{ ratio} = \frac{CM \text{ per unit } \times n}{SP \text{ per unit } \times n}$
	$P/V \text{ ratio} = \frac{\text{Total Contribution}}{\text{Total Sales Revenue}}$
	$P/V ratio = \frac{(Total Sales Revenue - Total Variable Cost)}{Total Sales Revenue}$
	$P/V \text{ ratio} = \frac{(S-V)}{S}$
	$P/V \text{ ratio} = 1 - \frac{V}{S}$

Thus,

P/V ratio = f (V, S)

P/V ratio is function of variable cost and selling price. It is independent of fixed cost.

- P/V ratio is very important ratio for multi-product organization.
- Multi-product organizations choose that product for maximum operation whose P/V ratio is maximum because this will lower the BEP as, BEP α 1/PV ratio

Relationship between Actual units/Target units and Actual profit/Desired profit

Actual units or Target units = BEP (units) + $\frac{1}{2}$	Acutal profit or Desired profit
	Contribution Margin per unit (CM)

Or,

Actual units or Target units = $\frac{\text{(Fixed cost + Acutal profit or Desired profit)}}{\text{Contribution Margin per unit (CM)}}$

Relationship between Actual Sales/Target Sales and Actual profit/Desired profit

Actual profit or Desired profit Actual sales or Target sales = BEP (sales) P/V ratio

Actual sales or Targ	Farget sales -	(Fixed cost + Actual)	profit or	Desired profit)
	alget sales –	P/	V ratio	

Margin of safety

Or,

It measures the extent up to which the level of operation may go down for no profit, no loss. Thus,

Margin of safety in Rs. = Actual sales - BEP (sales) Or, Margin of safety in units = Actual units - BEP (units) Actual profit or Desired profit Or,

Margin of safety in units = Contribution Margin per unit (CM)

Break-Even (BE) Chart



- BE chart depicts graphical presentation of BEP (Break-even point).
- As shown in above chart, at P = BEP there is no profit no loss *i.e.*, Sales revenue = Total cost.
- Beyond BEP *i.e.*, at P2 there is profit region, means sales revenue > total cost.
- Before BEP *i.e.*, at P1 there is loss region, means sales revenue < total cost.

6.2.3 Advantages and Limitations of CVP Analysis/Break-Even Analysis Limitations

1. For the purpose of break-even analysis, cost is divided into fixed cost and variable cost. It becomes difficult to separate fixed cost and variable cost because most costs remain semi variable in nature. This leads to difficulty in break-even analysis.

- 2. Break-even analysis do not incorporate those costs which are semi variable in nature.
- 3. In break-even analysis total sales revenue and total variable cost increase in rigid proportion with the increase in level of activity whereas practically total sales revenue and total variable cost do not increase in rigid proportion. At higher level of activity they are less proportionate than what they should be. This is due to trade discounts, economies of bulk buying, concession for higher sales etc.
- 4. In controlling costs, marginal costing is not useful in concerns where fixed costs are huge as compared to variable costs.
- 5. Since variable overheads are apportioned on estimated basis, problem of under or over recovery cannot be eliminated.

Advantages

- 1. It is an important tool of profit planning as it refers to analyzing the behaviour of profit with respect to cost and volume.
- 2. It is simple to calculate and understand.
- 3. It helps in calculation of profits for different sales volume.
- 4. It helps in fixing selling price for a particular break-even point.
- 5. It helps in determination of BEP. The level of activity at which there is no profit no loss.
- 6. It helps in calculation of additional sales volume to offset price reduction.
- 7. It helps in calculation of sales volume required to meet proposed expenditure (Additional sales volume required = Proposed expenditure/contribution margin per unit).

6.3 ABSORPTION COSTING AND MARGINAL COSTING

- Absorption costing and marginal costing are the techniques used to ascertain cost of product or services.
- In absorption costing, both fixed cost as well as variable cost are taken into consideration in ascertaining cost of product.
 - *i.e.* Cost of product per unit = Fixed Cost (FC) per unit + Variable Cost (VC) per unit
- Absorption costing is also termed as traditional or full cost method.
- In marginal costing, only variable costs are taken into consideration in ascertaining cost of product while fixed costs are charged against total contribution.
- Marginal costing, has emerged from break-even analysis because like break-even analysis marginal costing is also based on contribution margin and helps in finding Break-Even Point (BEP). The income statement under marginal costing is as follows:

Income statement under marginal costing

Selling price per unit			
Less Variable cost per unit			
Contribution margin per unit			
Let, the level of activity is 'n' units,			
Then, Total contribution = n × CM per unit			
('n' units at CM per unit)			
Less Total Fixed Assets			
Profit/Loss			

At BEP,

Profit/Loss = 0 Total contribution = Total fixed assets $n \times CM$ per unit = Total fixed assets n = BEP (units) = $\frac{\text{Total fixed assets}}{CM \text{ per unit}}$

Thus, we can conclude that marginal costing is a part of break-even analysis.

Why only variable cost is taken into consideration in marginal costing?

Actually marginal costing is concerned with marginal cost where marginal cost refers to cost of producing one additional unit.

Thus,

Marginal Cost (MC) per unit = Cost of
$$(n + 1)$$
 units – Cost of n units
= [FC + $(n + 1) \times VC/unit$] – [FC + $n \times VC/unit$]
= FC + $n \times VC/unit$ + VC/unit – $n \times VC/unit$ – FC
MC per unit = VC per unit

This is the reason why marginal costing considers only variable cost and that is why marginal costing is also termed as **variable costing**.

Note:

Marginal costing is a better technique than absorption costing as it helps in short-term decision-making. This can be seen from the following illustration.

Illustration:

You are the CEO of Anuja Automobiles Ltd. and have received a special offer for the supply of 200 components at Rs. 60 per piece from a motor manufacturer. Your company has a capacity to produce 1000 components. You are at present working at 80% capacity. The present selling price per component is Rs. 100. The cost details as supplied by your cost accountant, are as follows:

Variable cost per unit	Rs. 40
Fixed overhead cost per unit	Rs. 30
(Total fixed cost is Rs. 24000)	
Total cost per unit	Rs. 70

Your cost accountant advises you to reject the order since you will be getting less than the total cost of the component. How would you react?

Solution:

The advice given by the cost accountant is not correct since it is based on absorption costing.

On the basis of marginal costing we see that by accepting additional (special) offer the profit increases by Rs. 4000, therefore we will accept the proposal. The profit under marginal costing is as follows:

In existing case:	
Selling price per unit	Rs. 100
Less Variable cost per unit	Rs. 40
Contribution margin per unit	Rs. 60
Then, Total contribution = 800 units @ Rs. 60 per ('n' units @ CM per unit)	r unit Rs. 48000
Less Total Fixed Assets	Rs. 24000
Profit	Rs. 24000
For additional offer:	
Selling price per unit	Rs. 60
Less Variable cost per unit	Rs. 40
Contribution margin per unit	Rs. 20
Then, Total contribution = 200 units @ Rs. 20 per ('n' units @ CM per unit)	r unit Rs. 4000
Less Increase in Fixed Assets NIL (As	additional production is within capacity)
Additional Profit	Rs. 4000

Total Profit = 24000 + 4000 =Rs. 28000

6.4 INVENTORY MANAGEMENT

- Inventory/types of inventory
- Inventory management
- Need of inventory management
- Objective of inventory management
- Approach of inventory management
- Techniques/models used for inventory control
 EOQ Model
 - □ A-B-C analysis

6.4.1 Inventory/Types of Inventory

Inventory is list of items (materials), which an organization needs to maintain. There are 3 types of inventory:

- 1. Raw material is the input materials. It is maintained to carry on the production.
- 2. Work in progress/semi-finished goods.
- 3. Finished goods: It is maintained to meet the demand whenever it arises.
- 4. Spare parts/consumable stores.
- *Note:* The finished good of one organization may act as raw material for another organization. Raw materials are the integral part of finished goods.

6.4.2 Inventory Management

Inventory management is a process of procuring, holding, and distributing the inventories at minimum cost.

6.4.3 Need for Inventory Management

Maintaining various components of current asset are essential for smooth operation of the organization and inventory being an essential component of current asset (generally 50% of the current assets remain in the form of inventory) is required to be maintained. Since, holding inventory involves substantial cost and there is time lag between ordering and receiving inventory a proper inventory management system is needed.

6.4.4 Objective of Inventory Management

The objective of inventory management system is to find out the trade-off between cost of having inventory and cost of not having inventory. Cost of having inventory includes item cost, ordering cost, holding cost and distribution cost etc.

Cost of not having inventory includes—(1) Monetary cost e.g. additional labor cost, higher material cost due to scarcity of material. (2) Non-monetary cost e.g. goodwill loss due to delay in supply.

6.4.5 Approach of Inventory Management

The approach of inventory management lies in developing proper inventory control system *i.e.* to assess what and how much inventory is to be maintained.

Again, the basic purpose of inventory control is to reduce the investment in inventory in such a way that it does not affect the production process at any time. In other words, inventory control is concerned with finding out the solution of:

- 1. What quantity of inventory is required?
- 2. When to place the order for inventory?
- 3. What quantity should be ordered?

6.4.6 Techniques/Models used for Inventory Control

For the efficient inventory control system, different models and techniques were proposed from time to time. They are Economic Order Quantity model (EOQ model) and Always Better Control (ABC) analysis.

6.4.6.1 EOQ Model

- EOQ is that optimum size at which total inventory cost is minimum.
- Total inventory cost is equal to total ordering cost + total carrying (holding) cost.
- Ordering cost is associated with placement of an order for the procurement of inventories. It includes:
 - 1. Cost related to finalizing orders and placing orders.
 - 2. Manpower cost.
 - 3. Money spent in sending enquiries, receiving quotations, inspection cost and cost of settlement.
- Carrying cost is associated with the level of inventories. It includes storage space cost including rent, electricity etc., handling cost, insurance cost, cost of maintaining inventory records etc.

6.4.6.1.1 EOQ model without inventory shortage

According to this model:

1. Q*= EOQ =
$$\sqrt{\frac{2DC_0}{C_h}}$$

Where: D = Annual demand (units).

 $C_0 =$ Ordering cost per order.

 $C_{h} = Carrying cost per unit.$

- 2. Optimal number of orders placed per year (N*) = $\frac{D}{Q^*}$
- 3. Optimal time between orders (T*) = $\frac{\text{No. of working days in a year}}{N^*}$

(T* is also known as inventory cycle time.)

4. Total annual variable cost TC (Q*) = $\sqrt{2DC_0C_h}$

6.4.6.1.2 EOQ model with inventory shortage

According to this model:

1. Optimal or economic order quantity

$$Q^* = \sqrt{\frac{2DC_0(C_h + C_0)}{C_h(C_b)}}$$

Where C_{b} = shortage cost/stock out cost per unit per period

D = Annual demand

 $C_0 = Ordering \ cost \ per \ order \ per \ time$

 C_{h} = Holding cost per order per time

Q*= Economic number of units per order

2. Maximum number of back orders/planned shortages

$$S^* = Q^* \frac{(C_h)}{(C_h + C_b)}$$

3. Number of order per year

$$D^* = \frac{D}{Q^*}$$
 units

4. Time between orders

$$\Gamma^* = \frac{Q^*}{D}$$
 years

5. Maximum inventory level

$$I_{Max} = Q^* \frac{C_b}{(C_b + C_b)}$$

6. Total annual variable cost

TC (Q*) =
$$\sqrt{2DC_0C_h} \sqrt{\frac{C_b}{C_h + C_b}}$$

6.4.6.2 A-B-C Analysis

Under this technique, material are divided into different categories on the basis of value to control it. Generally in manufacturing concern a small percentage of items contribute a large percentage of value of consumption and a large percentage of items of materials contribute a small percentage of value. In between these two limits there are some items, which have almost equal percentage of value of materials.

Under A-B-C analysis, the materials are divided into three categories *viz*. A, B and C. Past experience has shown that almost 10% of the items contribute 70% of value consumption and this category is called

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'A' category. About 20% of the items contribute about 20% of value of consumption and this is known as category 'B' materials. Category 'C' covers about 70% of items of materials, which contribute only 10% of value of consumption. There may be some variations in different organizations and an adjustment can be made in these percentages.

Class	No. of items (%)	Value of items (%)
A	10	70
В	20	20
С	70	10

The information is shown in following diagram:

A-B-C analysis helps to concentrate more efforts on category A since greatest monetary advantage will come by controlling these items. Attention should be paid in estimating requirements, purchasing and maintaining safety stocks and properly storing of 'A' category materials. These items are kept under a constant review so that a substantial material cost may be controlled. The control of 'C' items may be relaxed and these stocks may be purchased for the year. A little more attention should be given towards 'B' category items and their purchase should be undertaken at quarterly or half yearly intervals.

Exercises

- Q. 1. What is cost and what are basic elements of cost? Also describe different classification of cost.
- Q. 2. Briefly describe different steps involved in cost accounting process.
- Q. 3. Write short note on Cost-Volume-Profit (CVP) analysis and explain how CVP analysis helps in profit planning.
- Q. 4. Break-even-analysis is a tool for profit planning. Discuss.
- Q. 5. What do you mean by margin of safety?
- Q. 6. Briefly describe limitations and advantages of Break-Even analysis.
- Q. 7. Differentiate between absorption costing and marginal costing.
- Q. 8. Through illustration, show how break-even analysis helps in short-term decision-making.
- Q. 9. Define inventory and types of inventory.
- Q. 10. Write short note on Inventory management.
- Q. 11. Describe Economic Order Quantity (EOQ) and its usefulness in the context of Inventory Management.
- Q. 12. X Ltd. and Y Ltd. manufacture and sell the same type of product in the same market. The following figures have been obtained from their account for the year ending 31st Dec. 2005.

	X Ltd. Rs.	Y Ltd. Rs.
Sales	1,50,000	1,50,000
Variables costs	1,20,000	1,00,000
Fixed costs	15,000	35,000

Calculate

- 1. Contribution
- 2. P/V Ratio
- 3. Break-Even Point
- 4. Margin of Safety
- Q. 13. The Rashu & Co.'s income statement for the preceding year is presented below. Except as noted, the cost–revenue relationship for the coming year is expected to follow the same pattern as in the preceding year.

Income Statement for the year 31 st Dec.2005	Rs.
Sales (20,00,000 bottles @ 25 Paise)	5,00,000
Variable Costs	3,00,000
Fixed Costs	1,00,000
Total	4,00,000
Pre-tax profit	Rs. 1,00,000
Income Tax	50,000
Profit after Income Tax	Rs. 50,000

You are required to calculate:

- (i) What is the break-even point in sales and units?
- (*ii*) Suppose that a plant expansion will add Rs. 50,000 to fixed costs and increase capacity by 60%, how many bottles would have to be sold after the addition, to break-even?
- (*iii*) At what level of sales, will the company be able to maintain its present pre-tax profit position even after expansion?
- (*iv*) The company's management feels that it should earn at least Rs. 10,000 (pre-tax per annum) on the new investment. What sales volume is required to enable the company to maintain existing profits and earn the minimum required on the new investment?
- (v) Suppose the plant operates at full capacity after the expansion, what profit will be earned?

Q. 14. The ABC Ltd. furnishes you the following income information:

	Year 1976	
	First half Rs.	Second half Rs.
Sales Profit earned	 8,10,000 21,600	10,26,000 64,800

From the above you are required to compute the following, assuming that the fixed cost remains the same in both periods:

1. Profit/Volume ratio.

2. Sales at break-even point.

3. Fixed cost.

- 4. The amount of profit or loss where sales are Rs. 6,48,000.
- 5. The amount of sales required to earn a profit of Rs. 1,08,000.
- 6. Variable expenses during the second half.
- Q. 15. A firm sells 7000 units at Rs. 2 per unit. Its fixed cost amounts to Rs. 44,000 and variable cost to Rs. 16 per unit. Calculate margin of safety.
- Q. 16. The fixed cost of stock hold company for the year 1999 are Rs. 80000. Variable cost per unit for the single product being made is Rs. 4. Estimated sales for the period are valued at Rs. 2,00,000. The number of units invoked coincides with the expected volume of output. Units are sold at Rs. 20 each. You are required to calculate the break-even point.
- Q. 17. Total fixed cost of a firm are Rs. 9,000, total variable cost are Rs. 15,000, total sales are Rs. 30,000 and units sold are 10,000. The margin of safety is
 - (a) 5,000 units
 - (b) 8,000 units
 - (c) 4,000 units
 - (d) 6,500 units
 - (e) None of the above.
- Q. 18. If the variable cost per unit is Rs. 10, fixed costs are Rs. 1,00,000 and selling price per unit is Rs. 20 and if the break-even point is lowered to 8,000 units, the selling price would be
 - (a) Rs. 25.00
 - (b) Rs. 30.00
 - (c) Rs. 27.50
 - (d) Rs. 22.50
 - (e) None of the above
- Q. 19. Where total costs are Rs. 60,000, fixed costs are Rs. 30,000 and sales are Rs. 1,00,000, the break-even point in rupees would be
 - (a) Rs. 50,450
 - (b) Rs. 42,857
 - (c) Rs. 45,332
 - (d) Rs. 60,000
 - (e) None of the above
- Q. 20. Total fixed costs remain constant but per unit fixed costs decline with increase in volume of activity. Explain with the help of suitable diagrams. Also give five examples of fixed costs.
- Q. 21. "Break-even analysis considers variable costs while fixed costs are adjusted against the revenue from the period." Discuss
- Q. 22. 'Profit will occur only once break-even point is reached. Therefore, it is desirable to reduce the break-even level'. Discuss and suggest three ways of reducing break-even level.
- Q. 23. Explain the calculation of break-even point in terms of rupees and also in units. Also draw the profit graph to show break-even point.