
UNIT 17 RELEVANT COSTS FOR DECISION MAKING

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17.0 OBJECTIVES

After studying this unit, you should be able to:

- distinguish between the different types of costs;
- distinguish between the nature of costs;
- present different alternatives before the decision making; and
- selection out of different alternatives.

17.1 INTRODUCTION

The analysis of costs plays a vital role in selecting the alternatives available before the management. Costs could shape alternative opportunities and therefore, it influences and shapes future profits. Management is not only interested in the historical cost analysis but it is also interested to study those costs, which are influencing the future

operations. After analyzing different types of costs according to their nature, one can be able to select one out of the various optimal alternatives. When costs are future oriented then only they remain important for the decision maker. In this unit you will study the importance of relevant costs for decision making.

17.2 RELEVANT COSTS FOR DECISION MAKING

With different objectives the different costs concept is always there. It is pertinent to use the word relevant while providing the information about costs. When the costs are not changing with the different alternatives and remain fixed in nature then they become irrelevant or sunk costs. When management wants to select any of the alternatives available before them and take decision then the relevant costs become very important.

17.2.1 Concept of Relevant Costs

Relevant cost is a cost of decision. You may call it decision cost, as it is always relevant with the selection of one out of different alternatives. If decision is being taken and any cost is increased because of the change in decision, that particular cost becomes relevant cost. Relevant cost is always for future and not for the analysis of the past decisions. These costs are 'Future Costs' and they differ to different alternatives. We focus on the future whether it may be 10 seconds after or it may be 10 years later.

Relevant costs are also known as differential costs. Relevant costs differ among the different alternatives. For example, if an engineering graduate wants to start his own work shop and he has a choice to complete his post-graduation. Relevant costs to continue his studies are fees and books. Irrelevant costs are clothes and his residential arrangements, which will incur under both the circumstances.

17.2.2 Concept of Differential Costs

Differential cost is the difference between the costs of alternatives. Difference in total cost between the two alternatives available. It is also known as net relevant cost. Differential cost is not calculated per unit. It is calculated as total cost and then the difference is being calculated between the two levels of production or is being calculated between the two alternatives. Both variable costs and fixed costs may be differential cost when there is a change in both these costs in response to alternative course of action. When a decision does not affect either the variable or fixed costs then there is no differential costs. It is a technique of costing and not a method. Only relevant costs of the option are being considered. It is normally calculated on sales basis, which gives revenue. Decision cannot be taken only on the basis of differential cost analysis as other factors like government policies, social and financial causes, investment and the behaviour of the workers are also the influential part of the decision-making process. Conditions and costs of different alternatives always differ, so the differential costs once calculated cannot be used without adjustments for the other decisions. As differential costs are relevant costs for future, so irrelevant costs should be known. The costs which do not change as a result of decision are irrelevant costs. Fixed costs are irrelevant costs as they do not change if production is expanded upto certain level.

17.2.3 Decision-Making Process

Decision-making is a process of selecting any of the alternatives available after evaluation of all the options. Selection of one alternative out of two or more should maximize the profits of the concern. Decision-making is very much related with

future planning with a particular goal. In this process, available information regarding the options should be analyzed properly to make a beneficial decision for the benefit of the organization. Before taking decision firstly one should recognise the problem, secondly identify the various alternatives, thirdly evaluate different alternatives with helps of cost benefit analysis and finally adopt the most profitable course of action.

Differential cost analysis is a very useful technique to the management in formulating policies and making the following decisions:

- 1) Selling Price Decisions
- 2) Exploring New Markets
- 3) Make or Buy Decisions
- 4) Expand and Contract
- 5) Sales Mix Decisions
- 6) Alternative Methods of Production
- 7) Plant Shut Down Decisions
- 8) Acceptance of Special Order
- 9) Adding or Dropping a Product Line
10. Replacement of Machinery

Let us study each one of these in detail.

17.2.4 Selling Price Decisions

Pricing process is different in different industries. It differs according to the nature, cost and demand of the product. Every producer accepts the different criterion for pricing his product. Effect of changes in selling price can easily be understood with the help of the following illustration.

Illustration 1

X Ltd. produces and markets ballpoint pens. Due to competition, the company proposes to reduce the selling price. From the following information, examine the effects of reduction in selling price by (a) 5%, (b) 10% and (c) 15%

	Rs.	Rs.
Present Sales 3,000 units	—	3,00,000
Variable Costs	1,80,000	
Fixed Costs	<u>70,000</u>	<u>2,50,000</u>
Net Profit		<u>50,000</u>

Indicate the number of units to be sold if the company wants to maintain the same profits in each of the above cases.

Solution

Statement of Cost and Profit

Particulars	Present price	Price Reduction by 5%	Price Reduction by 10%	Price Reduction by 15%
Selling price per unit (Rs.)	100	95	90	85
Less: Variable cost (Rs.)	60	60	60	60
Contribution (Rs.)	40	35	30	25
Contribution for 3,000 units (Rs.)	1,20,000	—	—	—
Contribution required to maintain same profit (Rs.)	—	1,20,000	1,20,000	1,20,000
Required units to be sold	—	3,429	4,000	4,800
Less: Units sold at present price	—	3,000	3,000	3,000
Additional Units required to be sold to earn the same amount of Profit	—	429	1,000	1,800

Decision: If company reduces the selling price by 5% then it requires 429 pens more to sell to earn the same amount of profit. If it accepts the second option to reduce the price by 10% then it requires 1,000 pens more to sell to earn the same amount, and if it accepts the third alternate to reduce the price by 15% then it require 1,800 pens more to sell to earn the same amount.

Working Notes:

- 1) It has been assumed that in all the options, fixed costs remain unchanged and to earn the same amount of profit the contribution should remain the same.
- 2) Calculation of Required Units to be sold to earn the same amount has been mentioned with the use of the following formulae:

$$\text{Required Sales} = \frac{\text{Required Contribution}}{\text{Contribution per Unit}} = \frac{\text{Rs. 1,20,000}}{\text{Rs. 35}} = 3,429 \text{ units required to be sold if selling price is being reduced by 5\%}$$

17.2.5 Exploring New Markets

Decisions regarding new market can be taken if the home market is not affected. If we sell the commodity to the foreign market at lower price and they re-export to our existing customers at lesser price what we charge to our customers, then there cannot be a decision in favour of new market even if profit or contribution is increased. It is advisable only when other things being remain same in the home or present market. To make use of the existing capacity, export and new market is the best alternate. With the following illustration, one can understand about the new market decision.

Illustration 2

X Ltd. manufactures 1,000 units p.a. at a cost of Rs. 40 per unit and there is a demand of the whole production at a price of Rs. 42.5 per unit in the home market. There is a fall in the demand in the home market in the year 2003 and the whole production can be sold in the home market at a selling price of Rs. 37.2 per unit. The cost analysis for 1,000 units is as follows:

	Rs.
Materials	15,000
Wages	11,000
Variable Expenses	6,000
Fixed Expenses	10,000

**Relevant Costs for
Decision Making**

2,000 Units can be sold in the foreign market at a explored price of Rs. 35.5 per unit. It is also estimated that for additional 1,000 units of the product the fixed cost will increase by 10%. Advise the management.

Solution

Statement showing the Effects of Selling Goods in the Foreign Market

Particulars	Year 2002	Year 2003		
	Home market 1,000 units Rs.	Home market 1,000 units Rs.	Foreign market 2,000 units Rs.	Total 3,000 units Rs.
Materials	15,000	15,000	30,000	45,000
Wages	11,000	11,000	22,000	33,000
Variable expenses	6,000	6,000	12,000	18,000
Marginal cost	32,000	32,000	64,000	96,000
Sales	42,500	37,200	71,000	1,08,200
Contribution (Sales – Marginal Cost)	10,500	5,200	7,000	12,200
Less : Fixed cost	10,000	10,000	2,000	12,000
Profit / (Loss)	500	(4,800) Loss	5,000	200

It is advisable to accept the proposal for sale in the foreign market as it converts loss of Rs. 4,800 of home market into a net profit of Rs. 200.

17.2.6 Make or Buy Decisions

Decisions about, whether a manufacturer of goods or services should produce goods or services within the factory or purchase them from the market. This type of decision is needed when the concern organization is producing the item, which is also available in the market at cheaper rate. If, purchased from the open market, retrenchment of workers becomes inevitable or may not be able to reduce the fixed costs of the factory. During the processing of the alternatives available other than cost factor should also be considered. Some of these are quality of the product available in the market, regularity of the supply, expected fluctuations in the demand and reliability of the supplier. The processing and designing of the item of a product should be kept as a secret, then this cannot be purchased from the market and it should be produced at the floor of the factory. The following example makes this concept easy to understand:

Illustration 3

With the help of the following data, a manufacturer seeks your advice whether to buy an item from the market or to produce it at the floor of the factory:

Cost Volume Profit Analysis

Particulars	Present (Buy)	Proposed (Make)
	Rs.	Rs.
Sales	16,00,000	16,00,000
Costs: Variable	11,20,000	10,24,000
Fixed	3,60,000	4,00,000
Capital required	8,00,000	9,00,000

Advise the management.

Solution

Statement of Cost and Profitability

Particulars	Buy Rs.	Make Rs.
Sales (S)	16,00,000	16,00,000
Less : Variable Costs	11,20,000	10,24,000
Contribution (C)	4,80,000	5,76,000
Less : Fixed Costs	3,60,000	4,00,000
Profit (P)	1,20,000	1,76,000
P/V Ratio (C/ S multiplied by 100)	30%	36%
Percentage of profit on sales (P/S multiplied by 100)	7.5 %	11 %
Return on capital employed (P/Capital multiplied by 100)	15 %	19.6 %

Decision: By describing the above statement making of the item at the floor is better than to buy.

Working Note: Total costs would be reduced by Rs. 56,000 and by the same amount the profit would also increase. P/V Ratio and profit on sale increase by 6 % and 3.5% respectively. Return on capital employed will also increase by 4.6 %.

17.2.7 Expand and Contract

In any factory, if there is scope of expansion and there is a possibility to purchase the same item on contract basis from the market then we would look at the total cost of both the alternate. It can be understood easily with the following example:

Illustration 4

X Ltd. has two factories – A and B. A is running at 70% of installed capacity (Installed capacity is 12,000 units) and B Factory supplies its requirements by working at 80% of its installed capacity. The cost structure of the B factory is given below:

Materials	Rs. 16,800
Labour	Rs. 6,000
Apportioned Fixed Overheads	Rs. 7,500
Variable Overheads	Rs. 4,200
Total	<u>Rs. 34,500</u>

**Relevant Costs for
Decision Making**

The production of A factory is to be increased to 80% capacity. The component produced in B factory can be purchased from the market at Rs. 4.00 per unit. As the cost of B factory exceeds Rs. 4 per unit, it is proposed to obtain the additional requirement from the market instead of getting it from B factory. Advise the management.

Solution

A factory can produce 12,000 units at 100% capacity and is working at 70% capacity means it is producing 8,400 units. B factory is working at 80% capacity to fulfill the needs of A factory. B factory when working at 100% capacity can produce $84,000/80\% = 10,500$ units, so if A factory is working at 100% capacity B factory cannot fulfill the requirement of A factory. If A factory is working at 80% capacity that is 9,600 units (80% of 12,000). B factory will be required to produce 1,200 units more (9,600 – 8,400). For this analysis, the following statement is required:

Statement showing costs of buying and manufacturing for 1200 units

Component	Cost of Manufacturing 1,200 units Rs.	Cost of Buying 1,200 units Rs.
Material (16,800 / 8,400) 1,200	2,400	—
Labour (1,200 multiplied by 0.50)	600	—
Variable overhead (4,200 / 8,400) 1,200	600	—
Costs of buying @ Rs. 4.00 per unit	—	4,800
Total Costs (Rs.)	3600	4,800

Decision: B factory will continue supply to A factory as manufacturing cost of Rs. 1,200 (Rs. 4800 – Rs. 3600) less than the cost of buying. So it is advisable to expand B factory. It is presumed that fixed cost will not change after the expansion.

17.2.8 Sales Mix Decisions

The relative contribution of quantities of products or services constitutes total revenues. It becomes difficult to analyze the profitability of the product when more than one product is produced. To establish most profitable sales mix it becomes necessary to get the most profitable sales mix by considering all the alternatives. Look at following example.

Illustration 5

X Ltd. produces and sells four products A, B, C and D. The analysis of income from each product has been shown in the following statement. Which of these product lines would you like to continue and which would you like to drop?

Income Statement					
Particulars	Products				Total Rs.
	A Rs.	B Rs.	C Rs.	D Rs.	
Sales	6,80,000	29,20,000	8,00,000	6,00,000	50,00,000
Less Variable Cost	4,00,000	5,70,000	5,50,000	5,80,000	21,00,000
Gross Contribution	2,80,000	23,50,000	2,50,000	20,000	29,00,000
Less : Variable Selling Costs:					
Salesmen	50,000	7,00,000	70,000	20,000	8,40,000
Warehouse	40,000	7,00,000	60,000	10,000	8,10,000
Packing	30,000	2,00,000	50,000	2,000	2,82,000
Delivery	30,000	3,00,000	40,000	8,000	3,78,000
Total Variable Selling Costs:	1,50,000	19,00,000	2,20,000	40,000	23,10,000
Net Contribution	1,30,000	4,50,000	30,000	–20,000	5,90,000
Less: Fixed Selling Cost	–	–	–	–	1,10,000
Contribution for Fixed Administrative Cost & Profit					4,80,000
Less: Fixed Administration Costs					1,88,000
Net Profit					2,92,000

Solution

By looking at the above statement it is concluded that selling price of the product D is not able to recover its variable costs even, so, the production of product D should be stopped immediately. It shows the loss of Rs. 20,000 in net contribution.

Gross contribution of product Y is also not satisfactory so management can reconsider about the use of resources engaged in the production of Y.

17.2.9 Alternative Methods of Production

The decision to be taken is of the nature of selecting one machine out of one or more available in the market for production or to purchase the ready goods for further processing from the market. In these cases, cost is considered and the decision is taken in favour of the lowest cost occurring sector. Look at illustration 6 and see how a decision will be taken out of alternative methods of production.

Illustraton 6

X Ltd. has to install a machine for the production of a part of a new product to be launched by them. Two machines B and C are being considered. Their details are given below:

Details	Machine B	Machine C	Relevant Costs for Decision Making
Cost in Rs.	2,00,000	4,40,000	
Annual Capacity in units	4,000	10,000	
Life in Years	10	10	
Salvage value in Rs.	Nil	40,000	
Material per unit in Rs.	30.00	30.00	
Production cost per unit (other than depreciation)	45.00	45.00	
Apportioned overheads	2,000	2,000	

Interest is @ 10% per annum. The part is available in the market @ Rs. 90 per unit and can be sold at a net price of Rs. 85 per unit. The company requires 6,000 units per annum. Advise the management.

Solution

Statement of cost of Depreciation and Interest per annum

Particulars	Cost of Machine B Rs.	Cost of Machine C Rs.
Initial Investment needed	2,00,000	4,40,000
Less Salvage Value	Nil	40,000
Net Value of Machine to be depreciated	2,00,000	4,00,000
Depreciation p.a. for 10 years	20,000	40,000
Interest on initial investment @ 10% p.a.	20,000	44,000

Statement showing Comparative Costs in Different Alternatives

Particulars	Cost, if purchased Rs.	Cost of Machine B Rs.	Cost of Machine C Rs.
Units purchased	6,000	2,000	–
Units produced	–	4,000	10,000
Surplus units to be sold in the open market	–	–	4,000
Annual requirement (units)	6,000	6,000	6,000
	Rs.	Rs.	Rs.
Cost of material @ Rs. 30 per unit	–	1,20,000	3,00,000
Production cost @ Rs. 45 per unit	–	1,80,000	4,50,000
Cost of Depreciation p.a.	–	20,000	40,000
Cost of interest @ 10% per annum	–	20,000	44,000
Total Cost of production		3,40,000	8,34,000
Add : Cost of purchases @ Rs. 90 per unit	5,40,000	1,80,000	–
Less : Sale proceeds of surplus production @ Rs. 85 per unit		–	3,40,000
Net Cost of 6,000 units	Rs. 5,40,000	Rs. 5,20,000	Rs. 4,94,000

Decision: In all the above three alternatives the last alternate that is to purchase machine C is the cheapest and so company should purchase in the machine C and install it.

17.2.10 Plant Shut Down Decisions

This type of decision is being taken when the nature of business is seasonal, cut-throat competition and other un-favourable conditions of the market are there. While taking the decision of 'Shut Down' of the going concern the behaviour of costs should be considered.

When one shuts down his plant, there are some avoidable, traceable or escapable fixed costs such as salaries of temporary workers and salary of sales man, which can be stopped by this decision. Some unavoidable or un-escapable cost are : depreciation on fixed assets, rent of office and factory, insurance, interest and salaries of permanent staff. These can not be stopped by shutting down the plant temporarily.

Some additional cost of Shut Down or Reopening Costs should be considered as the part of the unavoidable costs. Normal decisions are for maximizing the profits; but Shut Down decision is for reducing the loss as it always considers the savings under loss. Calculation of net avoidable costs can be made through the following formulae:

$$\text{Net Avoidable FC} = \text{Total FC} - (\text{Un-avoidable FC} + \text{Re-opening Costs})$$

If the loss by taking the decision of 'Shut Down' is less than the continuity of the business then the decision of 'Shut Down' may be considered as favourable in short term. Some aspects other than costs should also be considered, such as utility of the goods by the consumers, benefits of the employees, obsolescence of machinery, goodwill of the concern, objection by the labour unions and the government interference. 'Shut Down Point' can be calculated by marginal cost method by the following formulae:

$$\text{Shut Down Point (in Units)} = \frac{\text{Net Avoidable Fixed Cost}}{\text{Contribution per Unit}}$$

$$\text{Shut Down Point (in Value)} = \frac{\text{Net Avoidable Fixed Cost}}{\text{P/V Ratio}}$$

There is a great difference between the 'Shut Down' of a business and stopping the production of one type of product. If production of any type of product is stopped then the fixed cost of that product can be allocated to the remaining products; but when the plant is being 'Shut Down', the remaining fixed costs are the loss for the concern. You may have already learnt it in Unit 15 under the head 15.7. Managerial uses of Marginal cost.

17.2.11 Acceptance of Special Order

If any producer is not utilizing plant's full installed capacity and he receives special order for the product and that will not make any adverse impact on our present sale then the offer will be accepted if it increases contribution. This can be illustrated by the following illustration:

Illustration 7

Y Ltd. is working on 80% capacity and its Flexible Budget is as follows:

Output 60,000 units, sales value Rs. 12,00,000, material cost Rs. 30,000, wages Rs. 2,10,000, variable expenses Rs. 1,20,000, Semi-variable expenses Rs. 70,000 and fixed costs Rs. 2,00,000.

A proposal for additional sale of 7,500 units is available, if it is accepted and supplied at Rs. 14.00 each. The semi-variable overheads increases by Rs. 2,500 for the additional production. Advise the management.

**Relevant Costs for
Decision Making**

Solution

Statement of Marginal Cost and Profitability

Particulars	Production of 60,000 units Rs.	Production of Additional 7,500 units Rs.	Total Units: 67,500 Rs.
Material @ Rs. 0.50	30,000	3,750	33,750
Wages @ Rs. 3.5	2,10,000	26,250	2,36,250
Variable Expenses @ Rs. 2	1,20,000	15,000	1,35,000
Semi-variable expenses	70,000	2,500	72,500
Marginal cost	4,30,000	47,500	4,77,500
Sales	12,00,000	1,05,000	13,05,000
Contribution = (S-V)	7,70,000	57,500	8,27,500
Less Fixed Costs	70,000	—	70,000
Profit	7,00,000	57,500	7,57,500

Decision: If the proposal for additional supply of 7,500 units is accepted then contribution increases by Rs. 57,500 and profit also increases by the same amount. So it is advisable to accept the offer for additional supply. It is assumed that this supply will not affect the present market for its product.

17.2.12 Adding or Dropping a Product Line

It is obvious to add or drop a product line to increase the profitability of the business. For this purpose it is needed to analyze all the details available. Profitability should be assessed in the existing framework and then the profitability of all the alternatives should be compared and then the decision should be taken.

Look at the following illustration :

Illustration 8

A factory manager seeks your advice whether he should drop one item from his product line and replace it with another. Present cost and production data per unit are as follows:

Product	Price (Rs.)	Variable Costs (Rs.)	% Sales in Total Sales
Tables	60	40	50
Chairs	100	60	10
Book Stands	200	120	40
Total Fixed cost per annum			Rs. 7,500
Current Sales of the year			Rs. 25,000

The change under consideration consists in dropping the line of chairs and replacing it with a line of Sofa. If this drop and add change is made the manager forecasts the following data regarding cost and output:

**Cost Volume Profit
Analysis**

Product	Price (Rs.)	Variable Costs (Rs.)	% Sales in Total Sales
Tables	60	40	30
Sofa	160	60	20
Book Stands	200	120	50
Total Fixed cost per annum			Rs. 7,500
Projected Sales of the year			Rs. 26,500

Is this proposal feasible? Advise the management.

Solution

Statement of profitability for current production

Particulars	Tables Rs.	Chairs Rs.	Book Stands Rs.	Total Rs.
Selling Price	60	100	200	—
Less Variable Cost %	40	60	120	—
Contribution	20	40	80	—
P/V Ratio	33.33%	40%	40%	—
Sales of Rs. 25,000 in the ratio of 50%, 10% & 40%	12,500	2,500	10,000	25,000
Contribution (P/V multiplied by Sales)	4,167	1,000	4,000	9,167
Less Fixed Costs	—	—	—	7,500
Profit	—	—	—	1,667

Statement of profitability for projected production

Particulars	Tables Rs.	Sofa Rs.	Book Stands Rs.	Total Rs.
Selling Price	60	160	200	—
Less Variable Cost	40	60	120	—
Contribution	20	100	80	—
P/V Ratio	33.33% or 1/3	62 ½%	40 %	—
Sales of Rs. 26,500 in the ratio of 30%, 20% & 50%	7950	5300	13250	26,500
Contribution (P/V multiplied by Sales)	2650	3313	5300	11,263
Less Fixed Costs	—	—	—	7,500
Profit	—	—	—	3,763

Decision: After analyzing the above statements it is observed that if the proposal is accepted then the profit will increase by Rs. 2,096 (i.e., Rs. 3,763 – Rs. 1,667). It is presumed that the demand of the proposed products will remain in the market. Therefore the proposed is to be accepted.

17.2.13 Replacement of Machinery

Relevant Costs for Decision Making

It becomes necessary to replace the old machinery by a new because of the obsolescence of the old one or the renovation of the old one. Objective of replacing the old machinery by a new machine is to reduce the cost of production and to increase the revenue. While deciding the replacement of machinery factors like operating cost, technological development, return on capital, demand for the product, opportunity cost of the capital, availability of raw material, labour etc, should be taken into consideration. The replacement of machinery is assessed either by marginal cost analysis or differential cost analysis but the later is more appropriate and is much in use. Let us study in brief the factors to be considered for the replacement of machinery

- i) **Operating Cost:** Comparative study of the operating cost of the old and the new machinery should be done. Per unit cost of production by old machinery and the new one can be analyzed by the comparative statement.
- ii) **Technological Development:** New inventions are taking place every day. The chances of new inventions should be taken into consideration before the decision of replacement.
- iii) **Return On Capital:** Return on capital on the new investment should be feasible. What will be the amount of loss while selling the old?

Demand for the Product: Production will be increased by the use of the new machine and the demand for the increased production should be estimated. If the production at full capacity cannot be sold, then what percentage of the capacity can be sold and at this point of utilization of the capacity would it be possible to keep the price competitive. Market trend of the product should also be analyzed. If the nature of the product is not going to last for a greater period then the decision regarding change of machinery is not required.

- v) **Assessment of the Opportunity Cost of the Capital:** If the capital needed for the replacement is being used for any other alternative would the capital yield more. If it is so then the decision of replacement should be dropped.
- vi) **Availability of Raw Material and Skilled Labour:** Availability of raw material and skilled labour to run the machinery should be studied before replacing the machine.

Illustration 9

The following facts relate to two machines:

	Existing Machine	New Machine
Capital cost (Rs.)	10,00,000	40,00,000
Marginal cost per unit (Rs.)	60	52
Selling price per unit (Rs.)	120	120
Fixed expenses (Rs.)	1,00,000	4,00,000
Annual output (units)	20,000	40,000
Life of machines (years)	10	10

The existing machine has worked for 5 years. Its present resale value is Rs. 4,00,000. The scrap value of the machine may be taken as nil, Advise whether new machine should be installed if rate of interest is 10 %.

Solution

Statement of Differential Cost And Incremental Revenue

Particulars	Existing Machine		New Machine		Incremental	
	Cost Rs.	Revenue Rs.	Cost Rs.	Revenue Rs.	Cost Rs.	Revenue Rs.
Sales		24,00,000		48,00,000		24,00,000
Total Marginal Cost	12,00,000		20,80,000			
Total Fixed Cost	1,00,000		4,00,000			
Interest on additional capital outlay on 36,00,000 @ 10 % (Rs. 40,00,000 — Rs. 4,00,000)			3,60,000			
Depreciation on original cost	1,00,000		4,00,000			
Loss on sale of machinery		14,00,000	1,00,000	33,40,000	19,40,000	
Profit		10,00,000		14,60,000		4,60,000

Decision: It is clear from the above statement that installation of new machinery is beneficial as incremental revenue is Rs 24,00,000 where as the differential cost is Rs. 19,40,000. After installing the new machine the total increase in the revenue will be Rs. 4,60,000.

Working Note:

- 1) Total cost of the machine is Rs. 10,00,000 and life is for 10 years and it has been used for 5 years. The present book value of existing machine is Rs. 5,00,000. So, the loss on sale of old machine is = Rs. 1,00,000. (Rs. 5,00,000-4,00,000)
- 2) The net amount required to install new machine is Rs. 3,60,000 i.e., after deducting the amount of Rs. 4,00,000 received on sale of existing machinery.
- 3) Loss on sale of existing machinery is to be included in the total cost of new machinery for evaluation of new proposal.
- 4) Opportunity cost of the capital has not been considered.

Check Your Progress

- 1) What do you understand about relevant cost and irrelevant costs ? Give one example.

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2) Explain the concept of differential cost.

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3) What is decision making process ?

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4) List out four managerial applications of differential cost analysis .

1 3.

2. 4.

5) State whether the following statements are True or False:

- i) Relevant cost analysis is used for future decision making and not for past decisions
- ii) Relevant costs are also known as differential costs
- iii) Differential cost is always calculated per unit and not on total cost of two alternatives
- iv) Differential costs and marginal costs are the same
- v) Fixed costs are not taken into account for differential cost analysis.

6) X Ltd. produces 1,000 articles at the following costs:

Components	Rs.	Rs.
Materials	—	4,00,000
Wages	—	3,60,000
Factory Overheads: Fixed	1,20,000	
Variable	2,00,000	3,20,000
Fixed Administrative Overhead	—	1,80,000
Selling Overheads: Fixed	1,00,000	
Variable	1,60,000	2,60,000
Total	—	15,20,000

1,000 units @ Rs. 1,550 can be consumed in home market. Foreign market can consume 4,000 articles of this product if rate can be reduced to Rs. 1,250 per article. Is the foreign market worth trying?

7) The present volume of sales in a factory is 30,000 units and the management has installed modern machinery to increase the production to 6 times. The present selling price is Rs. 24 per unit. Six successive levels with equal increments

reaching up to 1,80,000 units are contemplated sales. The reduction in selling price is expected to be Rs. 2 at each higher level of sales. Fixed cost of Rs. 1,32,000 will not change Other costs at different levels are given below:

Production (units in '000)	30	60	90	120	150	180
Variable cost (in Rs. '000)	4.18	8.18	12.78	15.78	17.78	19.02
Semi Variable Cost (in Rs. '000)	1.50	1.50	1.70	1.70	2.00	2.00

Prepare a statement of differential cost and incremental revenue and give your advice as to which level of production should be adopted to gain maximum

17.3 LET US SUM UP

Before taking a decision, one must analyze the alternatives available before him and then one should take a decision, which is beneficial to the management. The decision should be in such a way that it increases the profit of the company. When we take a decision for a short period, normally we look at the contribution we receive in all the available alternatives and compare them and one should accept the alternate, which provides more contribution, as in shorter period it is presumed that fixed costs will not change. If a decision is to be taken for a long period when the fixed costs will also change then one should take the decision through differential cost system. So, costs become relevant when decisions are being taken. In long-run variable and fixed costs normally change. Total differential cost and incremental revenue is considered in this method of analyzing for longer period.

17.4 KEY WORDS

Alternative: Options

Administrative Cost : A cost which relates to the enterprise as a whole

Book Value : The amount shown in books of account for an asset

Contribution Margin : Excess of sales revenue over all variable expenses

Differential analysis : Process of estimating the consequence of alternative actions while taking a decision by decision-makers

Differential cost : The costs which will change in response to a particular course of action.

Interest : The cost for using money.

Make or buy decision : A managerial decision about whether the firm should produce internally or purchase it from outside

Opportunity Cost : The present value of income/costs that could be earned from using an asset in its best alternative uses.

Residual value : The estimated realisable value of an asset after use.

Relevant costs : Costs that are different under different alternatives

Short run : Period of time over which capacity will not be changed.

Decision: Deciding one out of the many options

Differential Cost: Change in the cost

Incremental revenue: Increase in the revenue

Semi variable costs: A cost, which has both variable and fixed elements.

Sunk Costs: Past costs which are unavoidable because they cannot be changed

17.5 ANSWERS TO CHECK YOUR PROGRESS

Relevant Costs for
Decision Making

5) i) True ii) true iii) False iv) False v) False

6) Statement Showing Differential Cost And Incremental Revenue

Components	Rs.	Rs.
Sales of 4,000 units @ Rs.1250 (incremental revenue)	—	50,00,000
Differential costs:		
Materials (4,00,000/1,000)4,000	16,00,000	—
Labour (3,60,000/1,000)4,000	14,40,000	—
Factory O.H. (2,00,000/1,000)4,000	8,00,000	—
Selling O.H. (1,60,000/1,000)4,000	6,40,000	44,80,000
Net profit or incremental profit		5,20,000

Decision: It is better to accept the foreign proposal, as it will increase the profit by Rs. 5,20,000. It is assumed that this acceptance will not affect the home market and the fixed cost will remain same.

7) Statement of Differential Cost And Incremental Revenue

Production in Units ('000)	Selling Price per Unit	Sales Revenue (Rs. '000)	Variable Cost (Rs. '000)	Semi-Variable Cost (Rs. '000)	Fixed Cost (Rs. '000)	Total Cost (Rs. '000)	Differential Cost (Rs. '000)	Incremental Revenue (Rs. '000)
30	24	720	4.18	1.50	132	137.68	—	—
60	22	1320	8.18	1.50	132	141.68	4.00	600
90	20	1800	12.78	1.70	132	146.48	4.80	480
120	18	2160	15.78	1.70	132	149.48	3.00	360
150	16	2400	17.78	2.00	132	151.78	2.30	240
180	14	2520	19.02	2.00	132	153.02	1.24	120

Decision: Production level can be increased up to the equalization of incremental revenue and the differential cost. In this case both of these are equal at the level of 90,000 units but the incremental revenue increases till the production level is achieved at 1,50,000 units. After this level incremental revenue is decreases so the production fixed at 1,50,000 units will provide the optimum level of profit.

17.6 TERMINAL QUESTIONS

Questions

- 1) What do you understand by differential costing ? How does it differ from managerial costing?
- 2) Explain the practical applications of differential costing.
- 3) X Company Ltd. manufactures a product. You are required to prepare a statement showing differential cost and incremental revenue. At what volume the company should set its level of production ?

Cost Volume Profit Analysis

Output (in '000 units)	Selling price Per unit	Total semi-fixed cost per unit	Total variable Cost per unit	Total fixed cost per unit
30	24	1.50	4.18	1.32
60	22	1.50	8.18	1.32
90	20	1.70	12.78	1.32
120	18	1.70	15.78	1.32
150	16	2.00	17.78	1.32
180	14	2.00	19.02	1.32

(Ans : Production at 1,50,000 units will provide optimum level of profit)

- 4) What considerations are involved in taking decision of the following :
- Make or buy decisions
 - Dropping a product or adding a new product
 - Shut-down of plant
- 5) Golden company Ltd produces a product which is yielding a profit of Rs. 14,00,000 after charging fixed costs of Rs. 10,00,000 per annum. The selling price of the product is Rs. 50 per unit and has a variable cost of Rs. 20 per unit. The management wants to make changes in the selling price of the product. The following options are open to the management.

Alternatives	Reduction in Selling Price	Increase in quantity to be sold
1	5 %	10%
2	7 %	20%
3	10%	25%

Evaluate the above alternatives and advise the management which alternative yields maximum profit ?

**(Ans : Contribution : 1. Rs. 24,20,000 2. Rs. 25,44,000 and
3. Rs. 25,00,000)**

Decision : Alternative 2 gives maximum profit.

- 6) X Company Ltd is producing 10,000 articles and its cost data is given below :
- | | | |
|------------------------|---|--------|
| Variable Cost per unit | : | Rs. 26 |
| Fixed overheads | : | Rs. 10 |
| Total Cost | : | Rs. 36 |

A manufacturer offers the same commodity for Rs. 32 per unit. The analysis of the cost data shows that Rs. 60,000 of fixed overheads will be incurred regardless of production.

You are requested to suggest that should company X make or buy the article ?

(Ans : Cost of making product Rs. 30, Difference of Rs. 2. is in favour of making the product)

- 7) The total fixed cost of a company for producing a product price is Rs. 15 lakhs, the selling price per unit is Rs. 50 and the variable cost per unit is Rs. 40. The company is incurring losses for the past several years due to lack of demand. The company wants to shut down the plant till the demand picks up. The

avoidable costs are estimated at Rs. 4,00,000. Should the company discontinue production till the demand picks up? Advise the management.

**Relevant Costs for
Decision Making**

(Ans. If the company's sales are at least Rs. 55,00,000, it should not be shut down)

$$\left[\text{Hint : Shut down sales} = \frac{\text{Fixed Cost} - \text{Avoidable cost}}{\text{P/V ratio}} \right]$$

- 8) A firm manufactures and sells three products – X, Y and Z. Their cost data is given below:

Product :	A	B	C
Production (Units) :	5,000	12,500	17,500
Selling Price (Rs.)	9	5	15
Variable Cost (Rs.)	8	3	11
Fixed Cost	Rs. 1,05,000		

There is no under utilisation of production capacity. Fixed costs are allocated on the basis of units produced. There is no difference in the manufacturing time of each product. The management proposes to drop product A as it contributes a loss of Rs. 2 per unit as calculated below :

Selling price		Rs. 9
Variable cost	Rs. 8	
Fixed cost (Rs. 105000 ÷ 35000 units)	<u>Rs. 3</u>	<u>Rs. 11</u>
	Loss per unit	<u>Rs. 2</u>

The management proposes to add product S in place of product A as more units of product S can be produced and sold in the market whose selling price and variable cost per units is Rs. 8 and Rs. 7.75 respectively. It is estimated that 12,000 units of product S can be sold if product A is dropped. You are requested to advise the management.

(Ans : Contribution : Product A : Rs. 1. Profit would decrease by Rs. 5000 if the product A is dropped.

Product S : Rs. 0.25 p. If product S is added in place of product A profit will decrease by Rs. 2000)

Note : These questions will help you to understand the unit better. Try to write answers for them but do not submit your answers to the University. These are for your practice.