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HIGHLIGHTED HANDOUT

MGT605

Advanced Cost and Management Accounting

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MGT705 – Advanced Cost and Management Accounting

Lecture 1 – 45 Slides

Lecture 1

Introduction to Management Accounting

- “Definition”: process of identifying, measuring and communicating economic information to permit informed judgments and decisions.
- Provide information to decision makers to make good decisions.

Users of Accounting Information

- Managers – decision making and control
- Shareholders – value and income from investments
- Employees – ability to pay salaries and avoid redundancies
- Creditors – ability to meet financial obligations
- Government – statistical information, taxes
- Others – potential investors/ research

Users ...

- Users can be divided into 2 categories:
 - Internal users within the organization
 - External users i.e. shareholders, creditors
- Management accounting is for internal users
- Financial accounting information is for external users

Decision-making process



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Identifying objectives

- Economic theory : firms seek to maximize profits (too simplistic)
- Firm is a coalition of various groups: shareholders, employees, customers, suppliers
- Broadly- firms seek to maximize future cash flows

Search for Alternatives

- Possible courses of action to achieve objective
- Essential to identify potential opportunities and treats. i.e. 
 - Developing new products in existing markets
 - Developing new products for new markets
 - Developing new markets for existing products
- Search for alternatives involves acquiring information concerning future opportunities

Gather data

- When potential areas of activity are identified, management should assess:
 - Potential growth rate
 - Ability to establish adequate market share
 - Cash flow for each alternative activity
- Uncontrollable factors:
 - Economic boom / recession
 - Inflation
 - Strength of competition

Select appropriate alternative

- In practice decision making involves choosing between competing alternatives and selecting the one that best meets the organizations objectives.
- Assuming objective to be to maximize future net cash flows, alternative selected will be based on comparison of the different cash flows.

Implementation of Decisions

- The budget is the financial plan for implementing management decisions.
- Expressed in terms of cash inflows and outflows, sales revenues and expenses.
- The master budget consists of a budgeted profit and loss account, balance sheet and a cashflow statement.

Comparing actual vs plan

- The managerial function of control consists of measurement, reporting and subsequent correction of performance to ensure firms objectives are achieved.
- Performance reports of actual costs and revenues in comparison with budget, should be prepared at regular intervals.
- These reports highlight activities that do not conform to plan

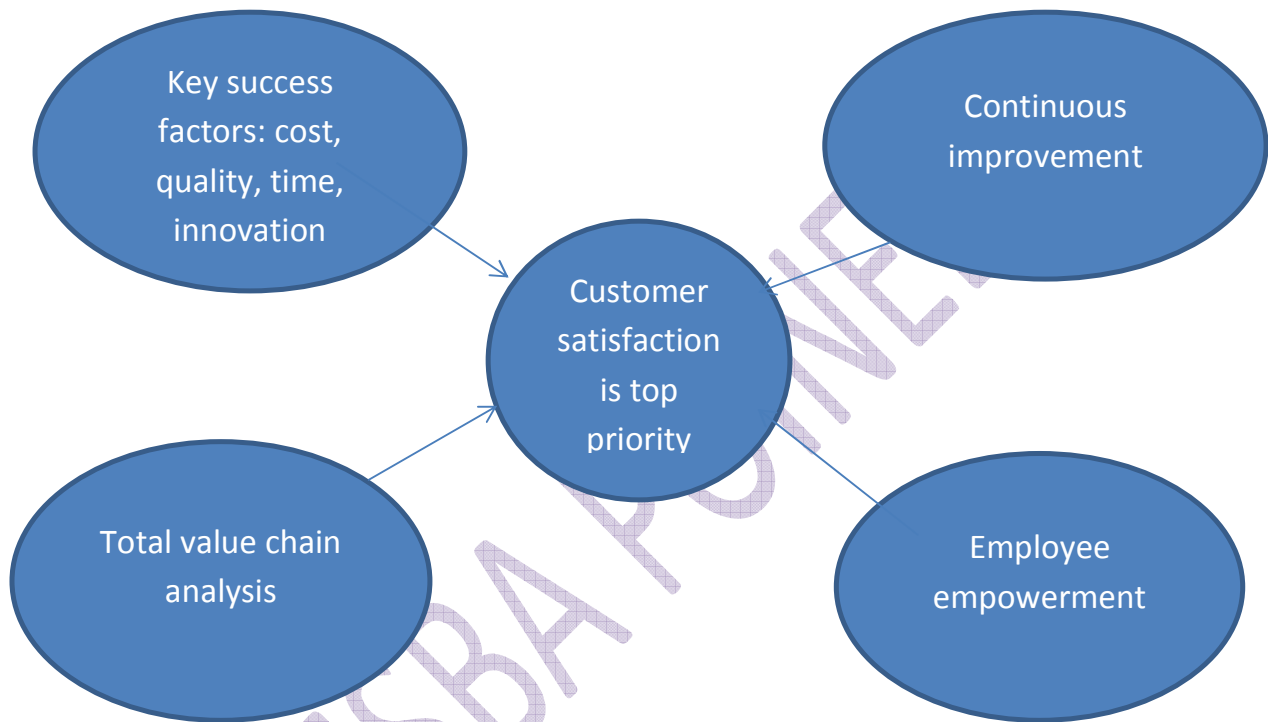
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Responding to divergence

- Effective control requires that corrective action is taken for diverging activities.
- This may require modification in plan if the plan (budget) is inappropriate and not attainable

New management approaches



Cost efficiency and quality

- Keeping costs low and being cost efficient provides an organization with a strong competitive advantage. Accuracy and reliability in costing systems has gained importance.
- Companies are focusing on Total Quality Management (TQM) in response to customer demands for high quality.
- The goal of TQM is customer satisfaction.

Continuous improvement

- Continuous improvement is a process that focuses on delivery of products or services of consistently high quality in a timely fashion.
- It is cheaper to produce items correctly the first time rather than to waste resources making sub-standard items that had to be detected, reworked, scrapped or returned by customers.

Cycle time

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- Cycle time is a measure that management accounting systems have begun to focus on, it is the length of time from start to completion of a product or service.
- Cycle time is minimized by reducing time spent on transfer of product during production, wait time, inspection time, re-working time and holding period of inventory. These are referred to as non-value added activities, as against processing time which adds value to the product.

Benchmarking

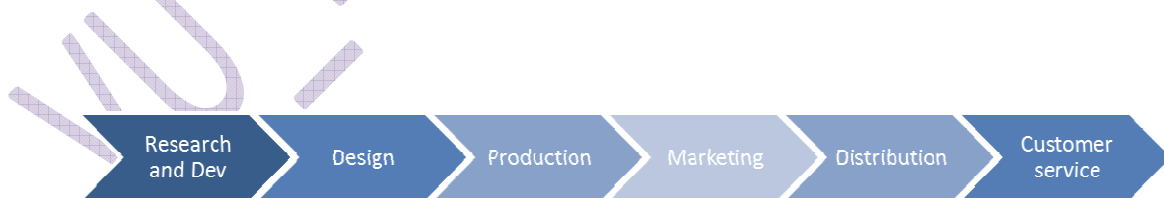
- Benchmarking is a technique that is increasingly being adopted as a mechanism achieving continuous improvement.
- It is a process of measuring a firm's product, service or activity against the other best performing organizations.
- Benchmarking involves a focus on latest developments and best practices that can be incorporated in various business operations.

Employee empowerment

- In their quest for continuous improvement managers have found they have to rely increasingly on the people closest to the operating processes and customers, to develop new approaches to improve performance.
- This has led to employees being provided with relevant information to enable them to make continuous improvements in processes.

The value chain

- The value chain is the linked set of value creating activities all the way from the basic raw material suppliers to the ultimate end-use product delivered to customers.



The value chain can also be viewed from the customer's perspective, with each link being seen as the customer of the previous link. If each link in the value chain is designed to meet the needs of its customer, then end customer satisfaction should ensue.

Impact of I.T. - ERP

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- One advanced IT application that has considerable impact on business information systems is Enterprise Resource Planning (ERP) system .
- ERP comprises a set of integrated software application modules that aim to control all information flows within a company. A major feature of ERP systems is that all data are entered only once, typically where the data originates.

Lecture 2

Introduction to Management Accounting

Cost Terms and Concepts

- **Cost** reflects a monetary measure of resources sacrificed / foregone to achieve a specific objective i.e. acquiring of goods and services.
- Accounting systems measure costs which are used for profit measurement, inventory valuation, decision making, performance measurement and controlling business activities.

Cost Objects

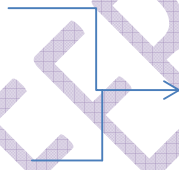
- A cost object is any activity for which a separate measurement of cost is desired. Examples of cost object include: cost of a product, cost of rendering a service and cost of operating a particular department.
- A costing system will typically:
 - Accumulate costs by classifying them into certain categories such as labor, materials and overheads.
 - Then assign these costs to cost objects.

Some cost terms

- Direct and Indirect costs
- Product and Period costs
- Cost behavior in relation to volume of activity
- Relevant and Irrelevant costs
- Avoidable and Unavoidable costs
- Sunk costs
- Opportunity costs
- Incremental and Marginal costs.

Direct and Indirect Costs

In manufacturing organizations one cost object is usually the product. Categories of costs are:

— Direct material	X	
— Direct labor	<u>X</u>	
— Prime cost	X	
— Production overhead	<u>X</u>	
— Production cost	<u>X</u>	

Direct cost can be specifically and exclusively identified with a particular cost object. Indirect

Product and Period Costs

- Product costs are those that are identified with the goods being produced for resale. These include direct material, direct labor and production overheads.
- Period costs are treated as expense in the period in which they are incurred. They are not included in inventory valuation. Non-manufacturing overheads e.g. admin, sales & distribution, are regarded as period costs.

Example

- Fancy Fans Company of Gujranwala produces 100,000 identical units of product during January. Costs for January are :

Manufacturing costs:

Direct labor	400,000
Direct material	200,000
Manufacturing overhead	<u>200,000</u>
	800,000

<u>Non-manufacturing costs</u>	300,000
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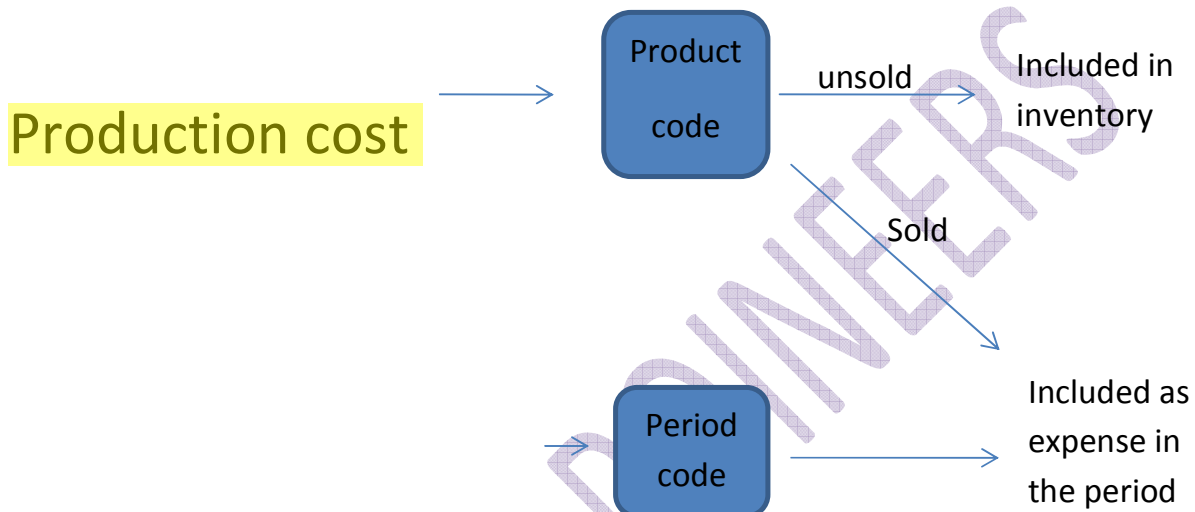
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In January the company sold 50,000 units for Rs 750,000 and remaining 50,000 were unsold. Profit and loss account will be:

	Rs	Rs
Sales (50,000 units)		750,000
Direct labor		400,000
Direct materials	200,000	
Production Overheads	<u>200,000</u>	
Production cost (product costs)	800,000	
Less closing stock (50,000 units)	<u>400,000</u>	
Cost of goods sold		<u>400,000</u>
Gross Profit		350,000
Less Non production costs (period costs)		<u>300,000</u>
Net profit		<u>50,000</u>

Treatment of product and period costs



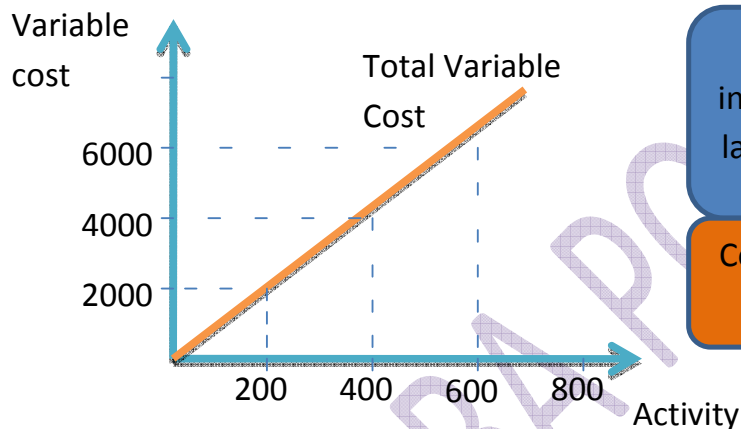
Cost in relation to volume

- Decisions which require information on how cost will vary in relation to volume are:
 - Volume of production for the next year
 - Reduce selling price to sell more units
 - Sales staff should be paid salary, commission, both
 - Change in costs and revenues of hospital, if one more patient is admitted for seven days
 - Change in costs and revenues of hotel, if a room and meals are provided for 2 for a 7 days stay.

Variable, Fixed and Semi-Variable

Costs

- Variable costs vary in direct proportion to volume of activity i.e. if volume is doubled, the cost will also double. Total variable cost is linear and variable cost per unit is constant.



Examples of variable costs include direct material, direct labor, energy cost to operate a machine

Cost variation will remain true for a range of activity level

Fixed Costs

- Fixed costs remain constant over a wide range of activity. Examples of fixed costs include depreciation of factory building, supervisor salary, leasing charges.
- While total fixed cost remains constant, fixed cost per unit decrease proportionally.
- Step fixed costs: beyond a certain range of activity fixed costs will change. Senior managers may be added, new machinery may be acquired.

Semi-variable costs

- These costs include a fixed component and a variable component. Examples include payment to sales staff of salary as well as commission, line rent paid on telephone together with charges for calls made.

Relevant and Irrelevant costs

- Costs can be relevant or irrelevant in respect of a particular decision or project.
- All costs which change in response to a decision will be regarded as relevant to the decision. E.g. use of car vs public transport, road tax and insurance paid on car is irrelevant. Petrol cost of car will depend on the alternative chosen.
- In the short-term all costs and revenues are not relevant for decisions being made.

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Avoidable and Unavoidable Costs:

- Avoidable costs are those that may be saved when a given alternative is not adopted.
- Unavoidable costs cannot be saved.
- Hence only avoidable costs are relevant in decision-making.
- Decision rule is to accept the alternatives that generate revenue in excess of avoidable costs.

Sunk Costs

- These are costs of resources already acquired and will be unaffected by the choice between various alternatives. Example:

- Machine purchased 4 yrs ago Rs 100,000
- Expected life (scrap value is Nil) 5 years
- WDV under st. line method Rs 20,000

The WDV will have to be written off no matter what future action is chosen. If machine is scrapped and new one purchased, 20,000 will be written off. If machine is used in production, 20,000 will still be written off. This is classified as sunk cost.

Sunk costs are irrelevant for decision making, but they are distinguished from irrelevant costs because not all irrelevant costs are sunk costs. E.g. a comparison of two alternative production methods may result in identical direct material expenditure for both alternatives, so direct material cost would be irrelevant, but the material cost is not sunk since it will be incurred in the future.

Opportunity cost

- Opportunity cost is the cost that measures the alternative sacrificed or lost when one course of action is adopted.
- Opportunity cost applies only to use of scarce resources. When resources are not scarce there is no sacrifice in the use of these resources.
- When no alternative use of resources exists, the opportunity cost is zero.

Example: Sunk and Opportunity Costs

- Mr. Jahangir has taken out a lease on a shop for a down payment of Rs 5000. Additionally the rent under the lease amounts to Rs 5000 per annum. If the lease is cancelled, the initial payment of Rs 5000 is forfeited. Mr. Jahangir plans to use the shop for the sale of clothing, and has estimated operations for the next 12 months as follows:

Sales	100,000
Cost of goods sold	50,000
Wages & related costs	12,000
Rent incl. down payment	10,000
Heat, light, insurance	13,000
Audit, legal expenses	<u>2,000</u>
	<u>87,000</u>
Net Profit before tax	13000

Mr. Jahangir can sublet the shop to a friend for Rs 550 per month, if he does not use it himself.

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Sunk and Opportunity Cost example...

The down payment of Rs 5000 represents a sunk cost.

The lost profit from subletting of Rs 1600 calculated as :

– Income	(Rs 550x 12)	6600
– Less annual rent		<u>5000</u>
		1600

It is an example of opportunity cost. Note only rental is included in opportunity cost calculation. Rs 5000 sunk cost is excluded.

Relevant information for shop

- The relevant information for running the shop is:
- Net sales 100,000
- Costs (87000- 5000 sunk cost) 82,000
- 18,000
- Less opportunity cost (sublet) 1,600
- Profit 16,400

Incremental and Marginal costs

- Incremental (differential) costs and revenues represent the difference in cost under each alternative being considered. For example, the incremental cost of increasing output from 1000 to 1100 units per week is the additional cost of producing extra 100 units per week.
- Marginal cost/revenue represents the additional cost / revenue of one extra unit of output.

Lecture 3

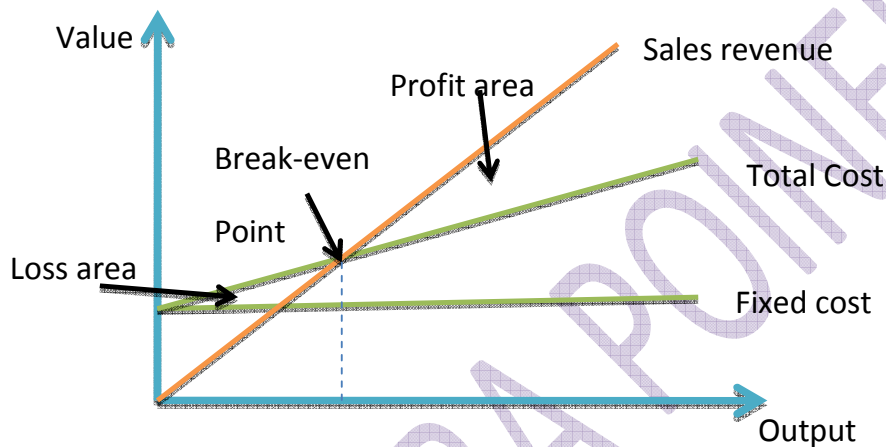
Cost Volume Profit Analysis

Cost Volume Profit model (CVP)

- This is a systematic method of examining the relationship between changes in activity (output) and changes in sales revenue, expenses and profit.
- It is a useful tool for decision making in setting selling prices and output levels.
- This model also helps to identify the output level at which neither profit nor loss will occur i.e. break-even point.

The Basic Model

- The analysis is based on relationship between volume, sales revenue and costs in the short-run, where certain factors such as plant capacities cannot be expanded.



Example – City Enterprise

- City enterprises operate in the entertainment industry and one of its activities is to promote cricket matches throughout the country. The company is examining the viability of a cricket match in Sialkot:
- Estimated fixed costs Rs 60,000
- (includes amounts paid to cricketers, hire of ground and advertising cost).
- Variable costs (pre-packed lunch box) Rs 10 per ticket sold.
- Proposed selling price Rs 20 per ticket
- Management have requested the following information:
 - The number of tickets that must be sold to break-even
 - How many tickets must be sold to earn a target profit of Rs 30,000
 - What profit would result if 8000 tickets were sold
 - What selling price must be charged to give a profit of Rs 30,000 on sale of 8000 tickets
 - How many additional tickets must be sold to cover extra cost of television advertising of Rs 8000.

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Break-even point in units

- Contribution Margin approach:
Contribution = Sales Revenue - variable expenses.
- As variable cost per unit and selling price per unit are assumed to be constant, the contribution margin per unit is also assumed to be constant.
- Sales price per ticket Rs 20
- Variable cost per ticket Rs 10
- Contribution margin per ticket Rs 10

Break-even...

- The break-even point will occur when fixed costs will be covered by contribution
i.e. Fixed Cost = Contribution
- Break-even point in units can be calculated as:
 $B/E(units) = \text{Fixed cost} / \text{contribution per unit}$
i.e. $60000 / 10 = 6000$ tickets.

Tickets required for profit of Rs 30000

- Here the contribution margin must equal the fixed costs as well as the desired profit, hence:
Tickets required for 30000 profit = $\text{fixed cost} + 30000 / \text{contribution per ticket}$
 $= 60000 + 30000 / 10$
 $= 9000$ tickets

Profit from sale of 8000 tickets

Contribution margin on 8000 tickets: $8000 \times \text{Rs } 10$	= 80000
Fixed costs	= <u>60000</u>
Profit	= <u>20000</u>

Profit Rs 30000 from 8000 tickets

- Contribution required for profit of Rs 30000: $\text{fixed cost} + \text{profit} = 60000 + 30000 = \text{Rs } 90000$
- If number of tickets sold is 8000, contribution per ticket should be: $90000 / 8000 = 11.25$
- Existing contribution = Rs 10
- Additional contribution = Rs 1.25
- New selling price is $\text{Rs } 20 + 1.25 = \text{Rs } 21.25$

Television advertising cost

- Additional tickets that must be sold to meet television advertising costs of Rs 8000:
- fixed costs will now increase by Rs 8000
- extra tickets required to cover fixed cost at the contribution margin rate of Rs 10
 $= 8000 / 10 = 800$ tickets

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Contribution Margin Ratio

- Also known as the profit – volume ratio, it is : Contribution / Sales revenue
- It represents the proportion of sales available to cover fixed costs and provide for profit.
 - In the above example the contribution margin is Rs 10 and selling price is Rs 20, hence the contribution margin ratio is 0.5
 - If sales revenue = 200000,
 - contribution will be 100000 (200000 x .5)
 - deduct fixed costs (60000)
 - profit = 40000

Contribution Margin(CM) Ratio

- Thus a profit of Rs 40000 will be obtained from total sales revenue of Rs 200000 i.e.
- Profit = (sales revenue x CM ratio) – Fixed Cost
= sales revenue x CM ratio

Therefore at Break-even point(where profit=0)

- Sales revenue = Fixed Cost / CM ratio

Relevant Range

- It is vital to remember that the formulae method can only be used for decisions within the relevant range of output.
- Outside this range the unit selling price and variable cost are no longer deemed to be constant.
- In our example of City Enterprises, let us assume caterers charges will be higher if ticket sales are below 4000, but lower if sales exceed 12000. Variable cost of Rs 10 relates only to a sales volume range of 4000 to 12000 tickets.
- Also the hire charges for the ground may be reduced for ticket sales of less than 4000, and increased for ticket sales of more than 12000.
- This implies that the relevant range is sales volume of 4000 to 12000, and outside this range the results of our analysis do not apply.

Margin of Safety

- The margin of safety indicates by how much sales may decrease before a loss occurs.
- Using the above example where unit selling price is Rs 20, variable cost is Rs 10 and fixed costs are Rs 60000, we noted the break-even point was 6000 tickets of Rs 120000 sales revenue.
- If sales are expected to be 8000 tickets or Rs 160000, the margin of safety will be 2000 tickets or Rs 40000.

Margin of safety can be expressed as a percentage:

- % margin of safety = $\frac{\text{expected sales} - \text{breakeven sales}}{\text{Expected sales}}$
$$= \frac{160000 - 120000}{160000} = 25\%$$

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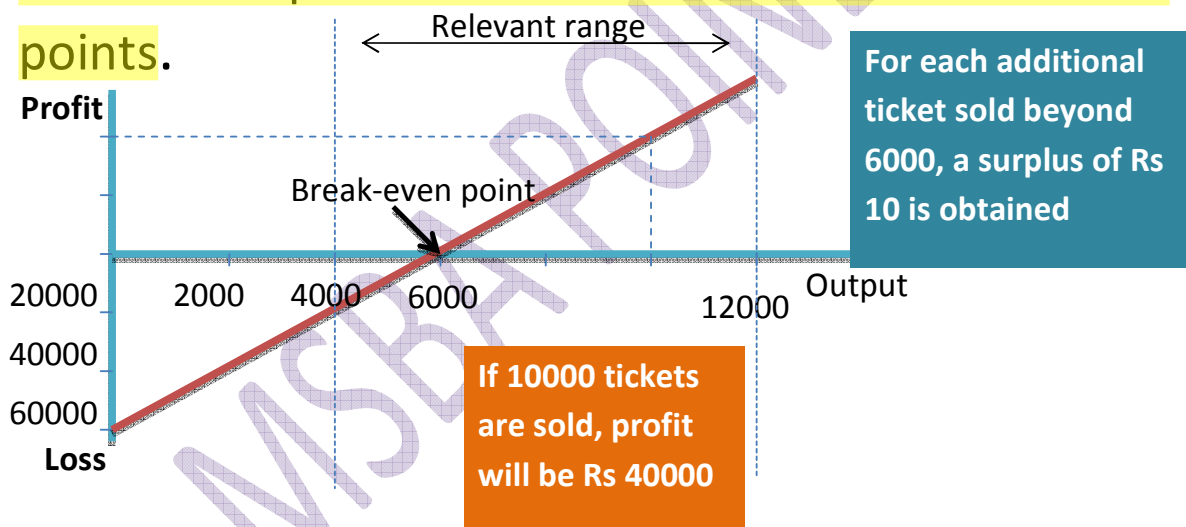
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Profit – Volume Graph

- The break-even and contribution charts do not highlight the profit or loss at different volume levels.
- The profit volume graph is a more convenient method of showing the impact of changes in volume on profit.
- The horizontal axis represents the various levels of sales volume, and the profits and losses are recorded on the vertical axis.

Profit – Volume Graph ...

- When units are zero, loss = fixed costs 60000
- At break-even (zero profit) sales volume is 6000 tickets. The profit line is drawn between these two points.



Lecture 4

Cost Volume Profit Analysis (cont...)

Break-even analysis example – Eastern Company

The summarized profit and loss statement for the Eastern Company for the last year is as follows:

Sales (50,000 units)	1000
Direct materials	350
Direct Wages	200
Fixed Production overheads	200
Variable Production overheads	50
Administration overheads	180
Selling and distribution overheads	<u>120</u>
	<u>1100</u>
Profit / (Loss)	<u>(100)</u>

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Eastern Company ...

- At a recent Board meeting the directors discussed the results and the Chairman asked for suggestions to improve the situation. You are required to evaluate the following proposals and comment briefly on each.
- A) Pay salesmen a commission of 10% of sales and this will increase sales to break-even point
- B) Reduce selling price by 10% which, it is estimated will increase sales volume by 30%
- C) Increase direct wages from Rs 4 to Rs 5 per hour as a part of productivity/pay deal. It is hoped that this would increase production and sales by 20%, but the advertising cost would increase by Rs 50000.
- D) Increase sales by advertising of Rs 300,000 with an increased selling price of 20%, setting profit margin at 10%.

Eastern Company - solution

- Workings:

Sales	1000
Variable costs	<u>600</u>
Contribution	400
Fixed costs	<u>500</u>
Profit / (Loss)	(100)
- Unit selling price = Rs 20 (Rs 1M/50,000)
- Unit variable cost = Rs 12 (Rs 600000/50,000)
- Unit contribution = Rs 8

Eastern Company –

(A) sales commission 10%, sales increase to B/E

- 10% sales commission = Rs 2 per unit
- Contribution per unit now: Rs 6 per unit
- Break-even point : $500,000/6 = 83,333$ units
- This requires an increase of 67% on previous sales of 50,000 units. The directors will need to consider whether this is realistic!

(B) Reduce selling price by 10%, increase sales volume by 30%

- 10% reduction in selling price = Rs 2 per unit.
- Revised contribution per unit = Rs 6
- If sales volume increased by 30% = $50000 \times 130\% = 65000$
- Contribution (65000×6) = 390000
- Less: fixed costs = 500000
- Profit/(Loss) (110000)
- Estimated loss is worse than last year, proposal not recommended.

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(C) Increase direct wages, production and sales will go up 20%, Adv Rs 50000

- Wages increase from Rs 4 to Rs 5 per hr – 25%
- Direct wages cost will increase from 200000 to 250000, and output increases by 20%.

Income Statement

Sales (60,000 units)		1.200,000
Direct materials and variable overheads	480,000	
(60,000 units)		
Direct wages	<u>250,000</u>	<u>730,000</u>
Contribution		470,000
Less: Fixed costs (advertising Rs 50,000)		<u>(550,000)</u>
Profit / (Loss)		<u>(80,000)</u>

This represents an improvement of Rs 20,000 over last year loss of Rs 100,000 however it does not make the Company profitable.

(D) Increase advertising by 300,000 selling price by 20%, profit margin 10%

- Revised selling price (20 x 120%) = 24
- Let X = revised sales volume,
sales – (variable cost + fixed cost) = profit
 $24X - (12X + 800,000) = .1(24X)$
 $9.6X = 800,000$; X = 83,333 units
- The proposal results in profit, but would require an increase in sales volume of 67%. Additionally, the risk of increase in fixed cost by Rs 300,000 must be considered.

Separation of semi-variable costs

- Semi variable costs include both a fixed and a variable component.
- E.g. the cost of maintenance is a semi variable cost consisting of planned maintenance which is undertaken whatever the level of activity, and a variable element which is directly related to the level of activity.
- The high-low method to separate fixed and variable costs consists of examining past costs and related activity.

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High-low method

- Selecting the highest and the lowest activity levels and comparing the changes in costs which result from the two levels.

Volume	Semi variable costs
5000	22000
Lowest activity	Highest activity
10000	32000

If variable costs per unit are constant, and fixed costs remain unchanged, the increase in costs will be due entirely to an increase in variable costs.

High-low method ...

- Variable cost per unit can be calculated as : $\frac{\text{Difference in cost}}{\text{Difference in activity}} = \frac{10000}{5000} = \text{Rs } 2 \text{ per unit}$
- The fixed cost can now be calculated for any level of activity: At 5000,
- Total cost = Rs 22000
- variable cost (5000 x 2) = Rs 10000
- Balance is fixed cost 12000

Example

- Jamal Sons operate a single retail outlet selling direct to the public. Profit statements for August and September are:

	<u>Aug</u>	<u>Sep</u>
Sales	80000	90000
Cost of sales	<u>50000</u>	<u>55000</u>
Gross profit	30000	35000
Less: Selling and Dist.	8000	9000
Admin	<u>15000</u>	<u>15000</u>
Net Profit	<u>7000</u>	<u>11000</u>

Jamal Sons...

a) Use the high-low points technique to identify the behavior of:

i) cost of sales

ii) selling and distribution costs

iii) Administration costs

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	<u>Aug</u>	<u>Sep</u>	
Diff Sales	80000	90000	10000
Cost of sales	50000	55000	5000
Selling & Dist	8000	9000	1000
Administration	15000	15000	nil

Increase in sales of 10000 results in increase in cost of sales 5000 and selling and distribution costs of 1000.

Hence variable costs are:

cost of sales – 50% of sales,

selling and dist. - 10% of sales

Fixed cost can be derived using August data:

Total.Var. cost	Fix cost (bal)	Cost of sales	
50,000	40,000	10,000	
Selling & dist	8,000	8,000	nil
		Administration	15,000
			nil
			<u>15,000</u>
			<u>25,000</u>

Total cost = 25,000 (fixed) + 60% Sales (var. cost)

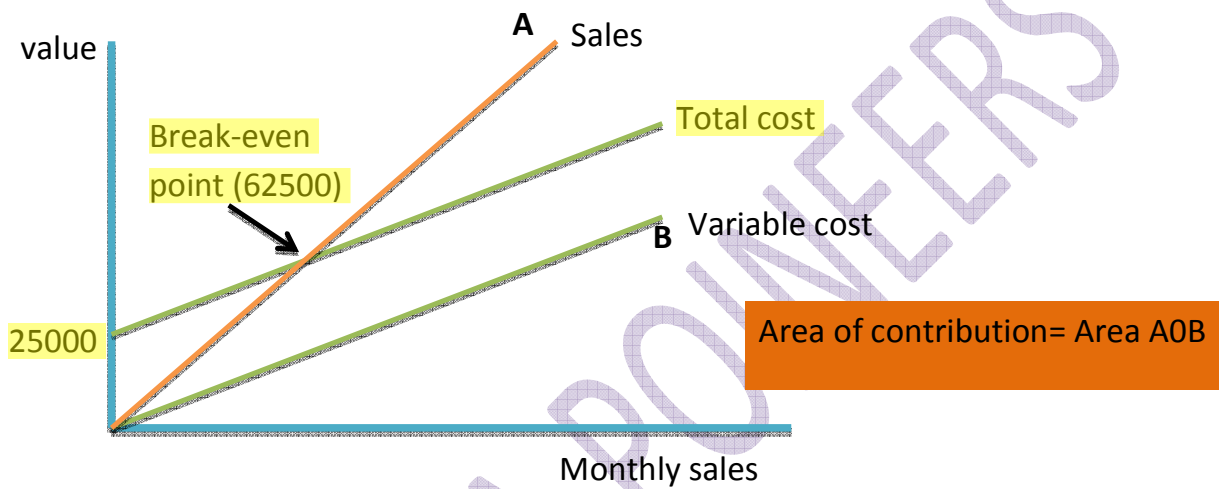
b) Draw a contribution breakeven chart and identify the monthly breakeven sales value and area of contribution.

- The following items are plotted on the graph:

Variable Cost	Total Cost	Zero sales	nil
25000 Fix	80000 sales		
48000(60%)	73000	90000 sales	
54000(60%)	79000	50000 sales	
30000(60%)	55000	100000 sales	
60000	85000		

Contribution break-even graph

- B/E pt = $\frac{\text{Fixed costs (25000)}}{\text{contribution to sales ratio (.4)}} = 62500$



c) Assuming margin of safety= 30% of break-even value, calculate Jamal Sons annual profit.

Actual sales = 1.3 x break-even sales (62500)
= 81250

Contribution (40% of sales) = 32500

Fixed costs = 25000

Monthly profit = 7500

Annual profit (7500x12) = 90000

Jamal Sons – new outlet

- Jamal sons is now considering opening another retail outlet selling the same products. They plan to use the same profit margins in both outlets and has estimated that the specific fixed costs of the second outlet will be 100000 per annum.
- Jamal sons also expects that 10% of its annual sales from the existing outlet would transfer to this second outlet.

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- Calculate the annual value of sales required from the new outlet to achieve the same profit as before.

Contribution from single outlet = 390,000 (32,500 x 12)

Contribution to cover lost sales (10%) = 39,000

Specific fixed costs = 100,000

Total contribution required 529,000

Required sales = 529,000/0.4 = 1,322,500

Lecture 5

Multi-Product Break-even Analysis

- Most firms produce and sell a number of products or services. We shall consider how we can adopt the analysis based on a single product to a multi-product setting.
- Example: The Super Waves Company sells two types of washing machines – a deluxe model and a standard model. The following information is based on the sales forecast for the period:

	Deluxe	Standard	Total
Sales volume	1200	600	
	Rs 000s	Rs 000	Rs 000s
Unit selling price	300	200	
Variable cost per unit	150	110	
Unit contribution	150	90	
Total sales revenue	360,000	120,000	480,000
Less: total variable cost	<u>180,000</u>	<u>66,000</u>	<u>246,000</u>
Contribution to direct and			
Common fixed costs	180,000	54,000	234,000
Less: Direct avoidable fixed costs	<u>90,000</u>	<u>27,000</u>	<u>117,000</u>
Contribution to common fixed costs	90,000	27,000	117,000
Less: Common fixed costs			<u>39,000</u>
Operating profit			<u>78,000</u>

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Super Waves Company

- In the above example the Company sells 2 products so there are 2 unit contribution margins. If all fixed costs are directly attributable to products i.e. there are no common fixed costs, we simply apply the analysis as follows:

Deluxe B/E pt = $\frac{\text{Direct fixed cost } 90,000}{150} = 600$ units

Unit contribution 150

Standard B/E Pt = $\frac{27000}{90} = 300$ units

- However, as there are common fixed costs also, selling 600 deluxe and 300 standard machines will not cover the common fixed costs and the break-even for the firm as a whole will not be achieved.
- The common fixed costs cannot be specifically identified with the product, and any allocation will be inappropriate and arbitrary.

Multi product B/E ...

- The solution to the problem is to convert the sales volume measure of the individual product into standard batches of products based on a planned sales mix.
- In the example, the Super Waves Company plans to sell 1200 deluxe and 600 standard machines giving a sales mix ratio of 2:1.
- We therefore define our standard batch of products as comprising 2 deluxe and 1 standard machine, giving a contribution of 390 per batch.
 - 2 deluxe machines contribution of 150 each = 300
 - 1 standard machine contribution = 90
 - 390

The break-even point in standard batches can be calculated by the same method as before:

$$\begin{aligned}
 \text{B/E number of batches} &= \frac{\text{Total fixed costs}}{\text{Contribution margin per batch}} \\
 &= \frac{117000 + 39000}{390} \\
 &= \frac{156000}{390} = 400 \text{ batches}
 \end{aligned}$$

Thus 800 deluxe machines and 400 standard machines must be sold to break-even.

The following profit statement verifies this:

	Deluxe	Standard	Total
Units sold	800	400	
	Rs 000s	Rs 000s	Rs 000s
Unit contribution margin	150	90	

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Contribution to direct and			
Common fixed costs	120,000	36,000	156,000
Less: Direct fixed costs	<u>90,000</u>	<u>27,000</u>	<u>117,000</u>
Contribution to common fixed costs	30,000	9,000	39,000
Less: Common fixed costs			<u>39,000</u>
Profit			<u>nil</u>

Note: Contribution has been defined as sales less variable cost. Where fixed costs are divided into direct and common (indirect) fixed costs, it is possible to identify 2 separate contribution categories. The first is contribution to direct and common fixed costs, being equal to sales less variable cost. The second is after deduction of direct fixed cost and is described as contribution to common or indirect fixed cost.

Multi-product break-even...

- Let us assume that the actual sales volume of 1200 units consisted of 600 units of each type of machine. The sales mix is 1:1 compared to the planned sales mix of 2:1. The contribution to direct and common fixed costs will be:
- Deluxe (150x600) = 90,000
- Standard (90x600) = 54,000
- 144,000
- Less : Direct and common fixed cost = 156,000
- (12,000) Loss

Multi-product...

- Hence the break-even point will vary depending on the sales mix. The sales mix changed from 2:1 to 1:1, and contribution per batch changed from 390 to 240(1x150)+(1x90)
- The revised break-even point will be : 156000/240 = 650 units based on sales mix of 1:1.

Multi products-example Zeno Ltd

Zeno Ltd produces 2 products and the following budget applies for the year 2012:

	Product X	Product Y
	Rs	Rs
Selling price	6	12
Variable Cost	<u>2</u>	<u>4</u>
Contribution Margin	<u>4</u>	<u>8</u>
Fixed Costs	100,000	200,000
Units sold	70,000	30,000

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Required: Calculate the break-even points of each of the products, and the Company as a whole, comment on your findings.

Break-even point =
$$\frac{\text{Fixed Cost}}{\text{Contribution per unit}}$$

Product X : $100,000/4 = 25,000$ **Product Y :** $200,000/8 = 25,000$

Company as whole : $300,000/5.20^* = 57,692$

*Average contribution per unit: $[(70,000 \times 4) + (30,000 \times 8)] / 100,000 = 5.20$

Hence the sum of the break-even points is less than the break-even for the Company as whole. It would be incorrect to simply add the B/E of the products to arrive at the B/E for the Company, because the sales mix will be different from the plan. Summing up would assume 50:50 sales mix whereas the planned sales mix is 70:30

Break-even analysis assumptions

- All other variables remain constant.
- A single product or constant sales mix.
- Total costs and revenues are linear functions of output.
- Profits are calculated on variable costing basis.
- The analysis applies to relevant range of output only.
- Costs can be accurately divided into their fixed and variable elements.
- The analysis applies only to a short term horizon.

Problem: Indus Ltd

- Indus Ltd is a company engaged solely in the manufacture of sweaters, which are bought mainly for sporting activities. Present sales are direct to retailers, but in recent years there has been a steady decline in output because of increased foreign competition. In the last trading year (20X1) the accounting report indicated that the company produced the lowest profit for ten years. The forecast for 20X2 indicates that the present deterioration in profits is likely to continue.
- The company considers that a profit of Rs 80,000 should be achieved to provide an adequate return on capital. The managing director has asked that a review be made of the present pricing and marketing policies. The marketing director has completed this review, and passes the proposals on to you for evaluation and recommendation, together with the profit and loss for the year ending December 31, 20X1.

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Indus Ltd – Profit and Loss Account y/e 31 December 20X1

Sales revenue			1,000,000
(100, 000 sweaters @ Rs 10)			
Factory cost of goods sold:			
Direct materials	100,000		
Direct labor		350,000	
Variable factory overheads		60,000	
Fixed factory overheads	<u>220,000</u>	730,000	
Administration overhead			140,000
Selling and Distribution overhead:			
Sales commission(2% of sales)	20,000		
Delivery cost		50,000	
(variable per unit sold)			
Fixed cost	<u>40,000</u>	<u>110,000</u>	<u>980,000</u>
Profit			<u>20,000</u>

Indus Ltd-Information for MD

- Information to be submitted to MD includes the following three proposals:
 - To proceed on the basis that the demand for sweaters is such that 10% reduction in selling price would increase demand by 40%.
 - To proceed on the basis that a 10% price reduction, together with a national advertising campaign costing Rs 30,000 may increase sales to the maximum capacity of 160,000 sweaters.
 - To proceed with an enquiry from a mail order company of purchasing 50,000 units annually if the selling price is right. The mail order company would transport the sweaters from Indus Ltd to its own warehouse and no sales commission would be paid on these sales by Indus Ltd. However, if an acceptable price can be negotiated, Indus Ltd would be expected to contribute Rs 60,000 per annum towards the cost of producing a mail order catalogue. It would also be necessary for Indus Ltd to provide special additional packaging at a cost of Rs .50 per sweater. The marketing director considers that in 20X2 sales from the existing business would remain unchanged at 100,000 units, based on a selling price of Rs 10 if the mail order contract is undertaken.

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Required:

- a) The calculation of break-even sales value based on 20X1 accounts.
- b) A financial evaluation of proposal (i) and a calculation of the number of units Indus Ltd would be required to sell at Rs 9 each to earn a target profit of Rs 80,000.
- c) A financial evaluation of proposal (ii).
- d) A calculation of the minimum price that would have to be quoted to the mail order company, first, to make sure that Indus Ltd at least break-even on the mail order contract, secondly, to ensure that same overall profit is earned as proposal (i) and thirdly, to ensure that the overall target profit is earned.

Indus Ltd – break even sales value

- $B/E \text{ sales} = \text{Fixed costs} / \text{contribution margin}$
- $\text{Contribution} = \text{sales} - \text{variable cost}$
- $\text{Contribution margin} = \text{contribution} / \text{sales}$
- Fixed costs:
 - Fixed factory overheads 220,000
 - Administration overheads 140,000
 - Selling & distribution 40,000

400,000

Indus Ltd – (a) break even sales value...

- Variable cost:
 - Direct material 100,000
 - Direct labor 350,000
 - Variable overheads 60,000
 - Sales commission 20,000
 - Delivery costs 50,000
- $\text{Contribution} = 1,000,000 - 580,000 = 420,000$
- $\text{Contribution margin} = 420,000 / 1,000,000 = 0.42$
- $B/E \text{ sales} = \text{Fixed costs} / \text{contribution margin}$
- $= 400,000 / 0.42$
- $= 952,380$

580,000

(b) Financial evaluation of proposal (i)

- Proposal: 10% reduction in selling price will increase demand by 40%.
Revised selling price 9.00

Less: variable costs

Direct materials 1.00

Direct labor 3.50

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Variable overhead	0.60
Delivery expenses	0.50
Sales commission (2% of price)	<u>0.18</u> <u>5.78</u>
Contribution per unit	<u>3.22</u>

Proposal (i)...

Number of units sold (40% increase)	140,000
Total contribution (3.22x140000)	450,800
Fixed costs	<u>400,000</u>
Profit from proposal (i)	<u>50,800</u>

Part (b) Units required for profit of Rs 80,000 at selling price of Rs 9 per unit:

Desired contribution: 480,000

Contribution per unit: Rs 3.22

Required units: $480,000 / 3.22 = 149,068$

(c) Financial evaluation of proposal (ii)

Proposal (ii): Price reduction 10%, advertising Rs 30,000 and sales 160,000 units.

At selling price Rs9, unit contribution = Rs 3.22

Total contribution of 160000 units =Rs 515,200

Fixed costs (increase by Rs 30,000) = Rs430,000

Profit Rs 85,200

(d) Proposal (iii)

- Proposal: mail order 50,000 units, no transport cost, no sales commission. Fixed costs increase by Rs 60,000 for catalogue and packaging costs increase by Rs0.50
- Variable cost:

– Direct material	1.00	
– Direct labor	3.50	
– Variable overhead	0.60	
– Delivery expense	nil	
– Sales commission	nil	
– Additional packaging	<u>0.50</u>	5.60

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Break-even contribution per unit:

$$60,000(\text{fixed cost}) / 50,000 \text{ units} = \text{Rs } 1.20$$

Therefore required selling price is:

Variable cost	Rs 5.60
Contribution	<u>Rs 1.20</u>
Selling price	<u>Rs 6.80</u>

Part ii) earn profit of Rs 50,800:

$$\text{Contribution required} = 60,000 + 50,800 = 110,800 \text{ i.e.}$$

$$\text{Contribution per unit} = 110,800 / 50,000 = \text{Rs } 2.22$$

Variable cost: 5.60,

Required price: Rs 7.82

Part iii) earn profit of Rs 80,000

$$\text{Contribution required} = 140,000 \text{ i.e. Rs } 2.80$$

$$\text{Required selling price} = 2.80 + 5.60 = \text{Rs } 8.40$$

Lecture 6 Measuring Relevant Costs and Revenues

- Relevant costs and revenues for decision making are only those that will be affected by the decision.
- Costs and revenues independent of the decision, and not affected by it, are obviously not relevant and need not be considered when making that decision.

Qualitative factors

- Many times it is difficult to quantify in monetary terms all the important elements of a decision, these are referred to as qualitative factors.
- A decline in employee morale that results from redundancies is an example of a qualitative factor which can affect future output.
- Outside suppliers may not deliver on time, resulting in loss of customer goodwill and a decline in future sales.
- Hence qualitative factors should also be taken into account in the decision making process.

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Example – The Faisalabad-One Company

- The Faisalabad-One Company is a manufacturer of clothing that sells its output directly to clothing retailers.
- One of its departments manufactures sweaters. The department has a capacity of 50,000 sweaters per month. Because of the liquidation of one of its major customers, the Company has excess capacity.
- For the next quarter, monthly production and sales volume is expected to be 35000 sweaters at a selling price of Rs 40 per sweater.

Expected costs and revenues for the next month at 35000 sweaters are as follows:

	Rs.	Per Unit
Direct labor	420,000	12
Direct materials	280,000	8
Variable manufacturing overheads	70,000	2
Manufacturing non-variable		
Overheads	280,000	8
Marketing & distribution cost	<u>105,000</u>	<u>3</u>
Total costs	1,155,000	33
Sales	<u>1,400,000</u>	<u>40</u>
Profit	<u>245,000</u>	<u>7</u>

-
- The Faisalabad Company is expecting an increase in demand and considers that the excess capacity is temporary.
- Another company has offered to buy for its staff 3000 sweaters each month for the next three months at a price of Rs 20 per sweater. The company will collect the sweaters from Faisalabad One's factory thus no distribution cost will be incurred.
- No subsequent sales to this customer are anticipated. The company would require its logo inserted on the sweater which will cost Rs 1 per sweater.
- Should the Faisalabad company accept this offer.

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	Do not accept	accept	Difference
Direct labor	420,000	420,000	
Direct materials	280,000	304,000	24,000
Variable manufacturing overheads	70,000	76,000	6,000
Manufacturing non-variable overheads	280,000	280,000	
Inserting Company logo	3,000	3,000	
Marketing and distribution cost	<u>105,000</u>	<u>105,000</u>	
Total cost	1,155,000	1,188,000	33,000
Sales	<u>1,400,000</u>	<u>1,460,000</u>	<u>60,000</u>
Profit per month	<u>245,000</u>	<u>272,000</u>	<u>27,000</u>

Important factors

Four important factors must be considered before recommending acceptance of order:

- 1) It is assumed that future selling price will not be affected by selling some of the product below market price. Otherwise loss of future profits may be greater than short-term profits.
- 2) No better opportunities are likely to arise during the period.
- 3) Company has no alternative use of resources that yield contribution more than Rs 27000 p.m.
- 4) Fixed costs are unavoidable for the period under consideration

Evaluation in the longer-term

- In the previous example we focused on the short-term, so direct labor and fixed costs were considered irrelevant, as they were unlikely to change in the short-term.
- However in the long-term it may be possible to reduce capacity and spending on fixed costs and direct labor.
- In our example of Faisalabad-One Company, the following factors will apply in the long-term:
 - Direct labor cost could be reduced as this labor could be made redundant with no redundancy costs involved.
 - Capacity could be reduced by cancellation of rental contracts of some machinery.
 - Cost savings could be made in some supervisory and support staff costs.
 - If capacity is reduced, it may be possible to rent out part of the facility.

Therefore in the longer-term decisions, some of the costs that were fixed in the short-term could be changed and no longer remain fixed.

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Product mix decisions – when capacity constraint exists

- In the short term, sales demand may be in excess of current productive capacity. Output may be restricted by a shortage of skilled labor, materials, equipment or space.
- The resources responsible for limiting the output should be identified; these are known as limiting factors.
- Where limiting factors apply, profit is maximized when the contribution to profit from the limiting factor is maximum.

Example – Dayan Autos

Dayan autos supplies component parts to firms operating in the automobile industry. Information on three components is as follows:

	X	Y	Z
Contribution per unit (Rs)	12	10	6
Machine hours per unit	6	2	1
Estimated sales (units)	2000	2000	2000
Machine hrs for 3 months	12000	4000	2000

- Due to break-down capacity is limited to 12000 hrs for three months. You are asked to advice on product mix for the three month period.
- You may think top priority should be given to product X as it has the highest contribution per unit, but this assumption would be incorrect.
- Component X requires 6 machine hours per unit, whereas Y and Z require 2 and 1 hours respectively.
- The optimum production plan is determined by calculating the contribution per limiting factor for each component.

Example –capacity constraint

	X	Y	Z
Contribution per unit	12	10	6
Machine hours required	6	2	1
Contribution per machine hour	2	5	6
Ranking	3	2	1

The company can now allocate the 12000 machine hours according to the above rankings.

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- Priority would be to produce maximum component Z. Sales are projected at 2000 units so 2000 hours will be used, leaving 10,000 hours unused.
- Second choice would be to produce maximum product Y. Sales of 2000 units will result in use of 4000 hours, leaving a balance of 6000 hours
- This will enable 1000 units of component X to be produced.

The allocation can be summarized as:

Production	hrs used	bal
2000 units of Z	2000	10000
2000 units of Y	4000	6000
1000 units of X	6000	nil

This production program results in the following total contribution:

2000 units of Z at Rs 6 per unit 12,000

2000 units of Y at Rs 10 per unit 20,000

1000 units of Z at Rs 12 per unit 12,000

Total contribution 44,000

- It is necessary to consider qualitative factors before the production program is determined. Customer goodwill may be lost if company is unable to supply all three products to its major customers. This may cause a reduction in future sales.
- Difficulties arise where more than one resource is scarce. E.g. it could not be applied if labor hours were also limited, and based on contribution per labor hour, a different ranking resulted. In these situations linear programming is used for decision making. This will be covered later in the course.
- In the longer term, additional resources should be acquired if the additional contribution can justify incurring the cost.

Question - Limiting factors and optimal production program

- A farmer is planning his production for the next season, he has asked you to recommend the optimal mix of vegetable production for the coming year. He has given you the following data relating to the current year:

	Potatoes	Turnips	Peas	Carrots
Area occupied (acres)	25	20	30	25
Yield per acre (tons)	10	8	9	12
Selling price per ton (Rs)	100	125	150	135
Variable cost per acre (Rs)				
Fertilizers	30	25	45	40

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Seeds	15	20	30	25
Pesticides	25	15	20	25
Direct Wages	400	450	500	570
Fixed overheads per annum Rs 54000				

The land that is being used for production of carrots and peas can be used for either crop, but not for potatoes or turnips. The land that is being used for potatoes and turnips can be used for either crop but not for carrots or peas. In order to provide an adequate market service, the gardener must provide each year at least 40 tons each of potatoes and turnips and 36 tons each of carrots and peas.

You are required to present a statement to show :

- (i) The profit for the current year
- (ii) The profit for the production mix that you would recommend.

Solution - Limiting factors and optimal production program

Preliminary calculations:

Variable costs are quoted per acre, but selling prices are quoted per ton. Therefore it is necessary to calculate the planned sales revenue per acre:

	Potatoes	Turnips	Peas	Carrots
Yield per acre in tons	10	8	9	12
Selling price per ton	100	125	150	135
Sales revenue per acre	1000	1000	1350	1620
Variable cost per acre	470	510	595	660
<u>Contribution per acre</u>	<u>530</u>	<u>490</u>	<u>755</u>	<u>960</u>
Profit statement for the current year:				
Acres	25	20	30	25
Contribution per acre	530	490	755	960
Total contribution	13250	9800	22650	24000
Overall contribution				69700
Less: Fixed cost				<u>54000</u>
Profit				<u>15700</u>
Profit statement for the recommended mix:				

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	Area A (45 acres)		Area B (55 acres)	
	Potatoes	Turnips	Peas	Carrots
Contribution per acre	530	490	755	960
Ranking	1	2	2	1
Minimum sales requirements (acres)		5	4	
Acres allocated	40			51
Recommended mix	40	5	4	51
Contribution	21,200	2450	3020	48960
Total contribution	75,630			
Less: Fixed costs	<u>54,000</u>			
Profit	<u>21,630</u>			

Notes – The minimum sales requirement for turnips is 40 tons, and this will require allocation of 5 acres. The minimum sales requirement for peas is 36 tons, requiring allocation of 4 acres.

Lecture 7

Replacement of equipment

- We will examine one aspect of asset replacement at this stage, that is the treatment of book values, and apply relevant cost principles (i.e. past or sunk costs are irrelevant for decision making).

Example - Dayan Autos...

- Dayan autos purchased a machine three years ago for Rs 180,000. Depreciation, using the straight line basis, assuming a life of six years with no salvage value, has been recorded each year in the financial accounts. The present written down value of the equipment is Rs 90,000 and it has a remaining life of three years.
- Management is considering replacing this with a new machine that will reduce variable operating costs. The new machine will cost Rs 70,000 and will have an expected life of 3 years with no scrap value.
- The variable operating costs are Rs 3 per unit for the old machine, and Rs 2 per unit for the new machine. It is expected that both machines will be operated at 20,000 units per annum. Sales revenues of both machines will hence be identical.
- Current disposal value of the old machine is Rs 40, 000 and will be zero in three years time.

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Total costs over a period of 3 years for each alternative are as follows:

	Retain	Replace	difference
Present mach	machine		
	(relevant cost)		
Variable operating cost			
20,000 units @ Rs 3 for 3 yrs	180,000		
20,000 units @ Rs 2 for 3 yrs		120,000	(60,000)
Old machine book value:			
3 yr depreciation charge			
Lump sum write-off	90,000	90,000	nil
Old machine disposal value		(40,000)	(40,000)
Purchase of new machine		<u>70,000</u>	<u>70,000</u>
<u>270,000</u>	<u>240,000</u>	<u>30,000</u>	

- It can be seen that the 90,000 book value of the old machine is irrelevant to the decision as it will be written off in both cases. The disposal value of the old machine together with cost and benefit of the new machine need to be considered.
- These are all items with a cashflow impact. The decision therefore considers all items that have a cashflow impact.
- The above analysis shows there is a cashflow advantage of Rs 30,000 over 3 years, in replacing the old machine with the new one. This advantage arises due to reduction in variable operating cost.

Managers can sometimes take incorrect decisions as they may view the old asset in isolation as follow:

Book value	90,000
Sale proceeds	<u>40,000</u>
Loss on sale	<u>50,000</u>

However the decision should be viewed together with the advantage obtained from the purchase of the new machine and the cost and benefit of replacement examined over three years. Depreciation and profit or loss on sale of replaced assets is irrelevant for replacement decisions

Special pricing – example: A company which produces a range of products and absorbs production overheads using a rate of 200% on direct wages, is faced with a decision-making problem. The absorption rate was calculated from the following budgeted figures:

– Variable production costs	64,000
– Fixed production costs	96,000
– Direct labor costs	80,000

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Problem 1

- The normal selling price of product x is Rs 22 and production cost of one unit is:

– Raw material	8
– Direct labor	4
– Production overhead	<u>8</u>
	20

There is a possibility of supplying a special order for 2000 units of product X at a price of Rs 16 each. Normal budgeted sales will not be affected, and Company has spare capacity for the additional units.

Solution 1

- Production overhead absorption rate = $\frac{64,000(\text{Variable}) + 96,000(\text{fixed})}{80,000(\text{direct labor})}$ = 200% of direct labor
- Variable overhead rate = $\frac{64,000 \text{ variable}}{80,000 \text{ direct labor}}$ = 80% of direct labor

	Per unit	2000 units
Additional revenue	16.00	32,000
Additional costs:		
Raw material	8.00	
Direct labor	4.00	
variable overhead		
(80% of direct labor)	<u>3.20</u>	<u>15.20</u>
		<u>30,400</u>
Contribution	<u>0.80</u>	<u>1,600</u>

The order should be accepted because it provides a positive contribution to fixed costs. It is assumed that direct labor is a variable cost.

Outsourcing

- Outsourcing is the process of obtaining goods and services from outside suppliers instead of producing the same goods or providing the same services within the organization. Many organizations outsource some of their activities such as maintenance of certain machinery, cleaning, photocopying and packaging.

Example - Make or buy decision

- A company which produces a range of products and absorbs production overheads using a rate of 200% on direct wages, is faced with a decision-making problem. The absorption rate was calculated from the following budgeted figures:

– Variable production costs	64,000
– Fixed production costs	96,000
– Direct labor costs	80,000

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Problem 2

- The cost of making component Q, which forms part of product Y, is stated below:

	Rs
– Raw materials	4
– Direct labor	8
– Production overhead	<u>16</u>
	<u>28</u>
- Component Q could be bought from an outside supplier for Rs 20. Should the company continue making component Q?

Solution 2

- Relevant manufacturing costs of the component are:

	Rs
– Raw material	4.00
– Direct labor	8.00
– Variable overhead (80% $\times$ 8)	<u>6.40</u>
	<u>18.40</u>
- The additional costs of manufacturing are lower than the cost of purchase, hence company should continue to manufacture component.

Case A

- One of the divisions of Dayan Autos is currently negotiating with another supplier regarding outsourcing component A which it manufactures. The division currently manufactures 10,000 units per annum of the component. The cost currently assigned to the component are as follows:

	Total	unit cost
Direct materials	120,000	12
Direct labor	100,000	10
Variable manufacturing overheads	10,000	1
Fixed manufacturing overheads	80,000	8
Share of non-manufacturing overheads	<u>50,000</u>	<u>5</u>
Total costs	<u>360,000</u>	<u>36</u>

The above costs are expected to remain unchanged in the foreseeable future

If Dayan Autos continues to manufacture the component.

- The supplier has offered to supply 10,000 components per annum at a price of Rs 30 per unit guaranteed for a minimum of three years.
- If component A is outsourced, the current direct labor will be made redundant at no additional cost.
- Direct materials and variable overhead are avoidable if component A is outsourced.
- Fixed manufacturing overheads would be reduced by Rs 10,000 per annum, but non-manufacturing costs would remain unchanged.
- Should the division of Dayan Autos make or buy the component?

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- At first it appears that the component should be outsourced since the purchase price of Rs 30 is less than the unit cost of manufacturing of Rs 36. However, the unit cost includes some costs that would remain unchanged whether or not the components are outsourced. These costs are therefore not relevant to the decision.

•

(Rs per annum)	Make 10000	Buy 10000	Difference
Direct materials	120,000	-	120,000
Direct labor	100,000	-	100,000
Variable manufacturing overhead	10,000	-	10,000
Fixed manufacturing overhead	80,000	70,000	10,000
Non-manufacturing overhead	50,000	50,000	-
Outside purchase cost	_____	<u>300,000</u>	<u>(300,000)</u>
Total cost per annum	360,000	420,000	(60,000)

This is easier to interpret if restated as follows:

(Rs per annum)	Relevant cost of making	Relevant cost of outsourcing
Direct materials	120,000	
Direct labor	100,000	
Variable overheads		10,000
Fixed overheads	10,000	
Outsourcing cost	_____	<u>300,000</u>
	<u>240,000</u>	<u>300,000</u>

Case B

- Now assume that the extra capacity that will be made available from outsourcing component A, can be used to manufacture and sell 10,000 units of part B at a price of Rs 34 per unit.
- All the labor force required to manufacture component A will be used to make part B.

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- The variable overheads, fixed overheads and non-manufacturing overheads will be the same as for A.
- Material required for part B would cost Rs 13 per unit.
- Should Dayan autos outsource component A?
- The management of Dayan Autos now have three alternatives:
 - 1. Make component A , do not make part B
 - 2. Outsource component A, do not make part B
 - 3. Outsource component A, make and sell part B. It is assumed there is insufficient capacity to make both A and B.

	(1)Make A	(2) Buy A	(3)Buy A
	Not B	No B	Make B
Direct materials	120,000		130,000
Direct labor	100,000		100,000
Variable overheads	10,000		10,000
Fixed overheads	80,000	70,000	80,000
Non-manufacturing overheads	50,000	50,000	50,000
Outsourcing cost		300,000	300,000
Revenue from sale of part B			<u>(340,000)</u>
	<u>360,000</u>	<u>420,000</u>	<u>330,000</u>

Note except for non-manufacturing costs, all other costs vary between the alternatives, and are therefore relevant to the decision. Non-manufacturing costs are irrelevant to the

decision and may be ignored.

Comparison of the three alternatives indicates that buying component A and using the extra capacity to make part B is the preferable alternative.

- The incremental costs of outsourcing are Rs 60,000 more than making component B, but the extra capacity released enables Dayan Autos to obtain a profit contribution of Rs 90,000. (sales Rs 340,000 less incremental costs of Rs 250,000). Overall outcome is a benefit of Rs 30,000.
- Incremental (relevant) cost of making part B are as follows:

	Rs
– Direct materials	130,000
– Direct labor	100,000
– Variable overheads	10,000
– Fixed overheads	<u>10,000</u>
	<u>250,000</u>

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Lecture 8

Discontinuation Decisions

- Periodic profitability analysis provides attention-directing information that highlights those unprofitable activities which requires a more detailed appraisal to ascertain whether or not they should be discontinued.
- We will see how the principle of relevant costs can be applied to discontinuation decisions.

Example – The Dollar Company

- The dollar company is a wholesaler which sells its products throughout Asia. The company headquarters are in Singapore and has a regional structure with each region consisting of 3-5 territories.
- Each region has its own regional office and a warehouse which distributes the goods directly to the customers.
- Each territory has an office where marketing staff are located.
- The West Asia region consists of three sales territories with offices located in Karachi, Colombo and Dacca. The budgeted results for the next quarter are as follows:

(Rs 000s)	Karachi	Colombo	Dacca	Total
Cost of goods sold	800	850	1000	2650
Salespersons salaries	160	200	240	600
Sales office rent	60	90	120	270
Depn of sales office equipment	20	30	40	90
Apportionment of warehouse rent	24	24	24	72
Depn of warehouse equipment	20	16	22	58
Region and Headquarter costs				
Cause and effect allocations	120	152	186	458
Arbitrary apportionments	<u>360</u>	<u>400</u>	<u>340</u>	<u>1100</u>
Total costs assigned to each location	1564	1762	1972	5298
Reported profit / (loss)	<u>236</u>	<u>238</u>	<u>(272)</u>	<u>202</u>
Sales	<u>1800</u>	<u>2000</u>	<u>1700</u>	<u>5500</u>

Assuming the above results are typical of future performance, should Dacca territory be discontinued?

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Example – The Dollar Company

- It is apparent that the West Asia region is profitable, but the analysis suggests that the Dacca sales territory is unprofitable. A more detailed study is required to ascertain whether it should be discontinued.
- This study indicates:
 - Discontinuing Dacca territory will eliminate cost of goods sold, salespersons salaries, sales office rent and Regional Headquarter expenses arising from the cause and effect allocation.
 - it will have no effect on depreciation of sales office equipment, warehouse rent, depreciation of warehouse equipment, and arbitrary cost allocation of HQ expenses.

Relevant cost computation

Total costs and revenues	Rs 000s		
		Keep Dacca	Discontinue Difference
Cost of goods sold	2650	1650	1000
Salespersons salaries	600	360	240
Sales office rent	270	150	120
Depn sales office equipment	90	90	
Apportionment of warehouse rent	72	72	
Depn of warehouse equipment	58	58	
Regional and Headquarter costs			
Cause and effect allocations	458	272	186
Arbitrary apportionment	1100	1100	
Total costs to be assigned	5298	3752	1546
Reported profit	202	48	154
Sales	5500	3800	1700

Determining the relevant cost of direct materials

- The company will continue to incur some costs even if the Dacca territory is closed, these costs are therefore irrelevant to the decision. This shows that profits will decline by Rs 154,000 if the Dacca territory is closed.
- We have assumed when considering various decisions that any materials required would not be taken from existing stock but would be purchased at a later date, so the estimated purchase price would be the relevant material cost.
- Where materials are taken from existing stock, the original purchase price represents a past or sunk cost and is therefore irrelevant for decision-making.
- Consider the situation where the materials have no further use apart from the particular activity. If the materials have some realizable value, their use will result in loss of this sales revenue. This will