

MGT705 – Advanced Cost and Management Accounting

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represent an opportunity cost and must be assigned to the activity. If the materials have no realizable value, the relevant cost of materials will be zero.

- If the materials are to be replaced, then using them for a particular activity will necessitate their replacement. Therefore the future replacement cost represents the relevant cost of the materials.

Determining relevant cost of direct labor

- Where the company has temporary spare capacity and labor force is to be maintained for the short-term, the direct labor cost incurred will remain the same for all alternative decisions. The direct labor cost will therefore be irrelevant for short-term decision making purposes.
- Where casual labor is used and where workers can be hired on a daily basis, a company may adjust the employment of labor to exactly the amount required. Labor cost will increase if company accepts additional work, and will decrease if production is reduced.
- In this situation labor cost will be a relevant cost for decision-making purposes.
- In a situation of full capacity, the only way that labor resources could be obtained for a specific order would be to reduce existing production. This would result in lost contribution, and must be taken into account in the relevant cost for the specific order. The relevant labor cost is therefore the hourly rate plus an opportunity cost consisting of the contribution lost by accepting the order.
- Example –
- A division of Dayan Autos has received an enquiry from one of its major customers for a special order for a component that will require 1000 skilled labor hours and that will incur other variable costs of Rs 8000. Skilled labor is currently in short supply, and if the company accepts the order it will be necessary to reduce production of component P. Details of cost per unit and selling price of component P are as follow:

Example – direct labor

	Rs	Rs
Selling price		88
Less: direct labor	40	
4 hrs @ Rs 10 / hr		
Other variable costs	<u>12</u>	<u>52</u>
Contribution		<u>36</u>

What is the minimum selling price the company should accept for the special order?

In this example the relevant labor cost is Rs 19 per hour, consisting of hourly wage rate of Rs 10 plus the lost contribution of Rs 9 per hour from component P. (the contribution of component P is Rs 36 and requires 4 direct labor hours.

Hence relevant cost for special order are:

- Variable cost (excl direct labor) 8000
- Direct labor (1000 hrs@ Rs 19) 19000
-
- 27000
- The acceptance of the special order means that production of component P must be reduced by 250 units (1000/4). We can now compare the special order with component P:

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P	Component order	Special
Sales (250 units @88)	22000	27000
Direct labor (250@40p.u)	10000	10000
Variable cost (250@12p.u)	<u>3000</u>	<u>8000</u>
Contribution	<u>9000</u>	<u>9000</u>

The contribution to profits will be unchanged if the selling price of the special order is equivalent to the relevant cost of the order.

Misconceptions about relevant costs

- All fixed costs are irrelevant – only correct within a short-term time horizon. E.g salaries were relevant for discontinuation decision.
- Variable costs are always relevant – two alternative production methods that require identical direct materials, and then direct materials cost is irrelevant.
- Relevant costs are incremental or differential costs. You should focus on the impact decisions will have on future costs and revenues for the company as a whole, not parts within the Co.

Dawood Ltd – alternative use of obsolete material

- Dawood Ltd is a company that has in stock some materials of type XT that cost Rs 75000 but are now obsolete and have a scrap value of only Rs 21000. Other than selling for scrap, an alternative use is: converting the obsolete materials into a specialized product, which would require the following additional work and materials:

Material A 600 units

Material B 1000 units

Direct labor: 5000 hrs skilled, 5000 hrs semi-skilled and 5000 hrs highly skilled, total 15000 hours.

Extra selling and delivery expenses Rs 27000

Extra advertising Rs 18000

900 units would be produced and sold for Rs 400 per unit.

Dawood Ltd – alternative use of obsolete material

- Material A is already in stock and is widely used within the firm. However any material used in this alternative will have to be replaced immediately.
- Material B is also in stock, but it is unlikely that any additional supplies can be obtained for some time.

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- Material B is normally used in production of product Z, which sells at Rs 390 per unit and incurs total variable cost (excl material B) of Rs 210 per unit. Each unit of Z uses 4 units of B. Details of materials A and B are:

Dawood Ltd – alternative use of obsolete material

	A	B
Acquisition cost per unit	100	10
Net realizable value per unit	85	18
Replacement cost per unit	90	-

Wage rates and overhead recovery rates of Dawood Ltd are:

Variable overhead	Rs 1 per direct labor hr
Fixed overhead	Rs 3 per direct labor hr
Unskilled labor	Rs 6 per direct labor hr
Semi-skilled labor	Rs 8 per direct labor hr
Highly skilled labor	Rs 10 per direct labor hr

- The unskilled labor is employed on a casual basis and sufficient labor can be acquired to exactly meet production requirements
- Semi-skilled labor is part of permanent force and company has temporary excess supply at present
- Highly skilled labor is in short supply, this is presently engaged in meeting demand for product L, which requires 4 hours per unit. The contribution from sale of one unit of product L is Rs 24.
- Required: advise whether stock of material XT should be sold or converted into specialized product.

Solution:

Conversion versus immediate sale:	Rs	Rs
Sales revenue (900 units at Rs 400 per unit)		360,000
Less: relevant costs:		
Material XT opportunity cost	21,000	
Material A (600 units at Rs 90)	54,000	
Material B (1000 units at Rs 45)	45,000	
Direct labor – unskilled (5000 hrs @ Rs 6)	30,000	semi-skilled
	nil	
highly skilled (5000 hrs @ Rs 16)	80,000	
Variable overheads (15000 hrs @ Rs 1)	15,000	

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Advertising	18,000	
Fixed overheads	nil	
		<u>290,000</u>
Excess of relevant revenues		<u>70,000</u>

Notes:

- Material A replacement cost Rs 90;
- Product Z relevant revenue less relevant cost is Rs 180 (selling price 390 less variable cost (210) per unit, Z uses 4 units of material B i.e Material B opportunity cost is 45 per unit ;
- Lost contribution of product L is Rs 24 or Rs 6 per hr, so relevant cost of highly skilled workers will be Rs 16 per hour.

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Example – acceptance of special order

- The production manager of your organization has approached you for some costing advice on project Xen, a one-off project from overseas that he intends to tender for.

The costs associated with the project are as follows:

Material A	4000
Material B	8000
Direct labor	6000
Supervision	2000
Overheads	<u>12000</u>
	<u>32000</u>

- You ascertain the following information :
 - i) Material A is in stock and the above was the cost. There is now no other use for Material A, other than the above project, within the factory it would cost Rs 1750 to dispose of. Material B would have to be ordered at the cost shown above.
 - ii) Direct labor costs of Rs 6000 relate to workers that will be transferred to this project from another project. Extra labor will need to be recruited to the other project at a cost of Rs 7000.
 - iii) Supervision costs have been charged to the project on the basis of 33.33% of labor costs and will be carried out by existing staff within their normal duties.
 - iv) overheads have been charged to the project at the rate of 200% on direct labor.
 - v) The company is currently operating at a point above break-even.

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vi) The project will need utilization of machinery that will have no other use to the company after the project has finished. The machinery will have to be purchased at a cost of Rs 10,000 and then disposed of for Rs 5250 at the end of the project.

- The production manager tells you that the overseas customer is prepared to pay up to a maximum of Rs 30,000 for the project and a competitor is prepared to accept the order at that price.
- He also informs you that the minimum he can charge is Rs 40,000 as the above costs show Rs 32,000 and this does not take into consideration the cost of the machine and the profit to be taken on the project.
- **Required:**
 - a) Cost of the project for the production manager, clearly stating how you have arrived at your figures.
 - b) Advise the production manager stating whether the organization should go ahead with the tender for the project, and the price bearing in mind that the competitor is prepared to undertake the project for Rs 30,000.
 - c) state four non-monetary factors that should be taken into account before tendering for this project.

Solution – acceptance of special order

(a)

Relevant costs of the project:	Rs
Material A	(1750)
Material B	8000
Direct labor	7000
Net cost of machinery	<u>4750</u>
Relevant cost	18000
Contract price	<u>30000</u>
Contribution	<u>12000</u>

- **Notes:**
 - Disposal costs of Rs 1750 are saved if material A is used in the project.
 - Actual cost of material B represents the incremental cost.
 - Labor costs are represented by the additional cash-flows of this contract.
 - The net cost of purchasing the machinery represents the additional cash-flows associated with this contract.
 - Supervision and overheads will continue even if the contract is not accepted, hence these are irrelevant.

(b)

- The costs given do not represent incremental cash-flows arising from undertaking the contract.

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- As the company is operating at an activity level in excess of break-even point, and sales revenue in excess of Rs 18,000 (incremental cost) will provide additional contribution and increase profits.
- Assuming that the company has spare capacity, and that a competitor is prepared to accept the order at Rs 30,000 a tender price slightly below Rs 30000 would be appropriate.
- (c) non-monetary factors:
 - i) is there sufficient spare capacity to undertake the project.
 - ii) is the overseas customer credit-worthy.
 - iii) Does the workforce have the necessary skills to undertake the project.
 - iv) is the contract likely to result in repeat business with the customer.

Example – deletion of a product

- Blue Turban Ltd makes three products and is reviewing the profitability of its product line. You are given the following budgeted data about the firm for the coming year

(all 000s)	A	B	C
Sales (units)	100	120	80
Revenue		1500	1440 880
Costs: material		500	480 240
labor		400	320 160
Overhead		<u>650</u>	<u>600 360</u>
		1550	1400 760
Profit / loss		(50)	40 120

- The company is concerned about the loss on product A. It is considering ceasing the production of it, and switching the spare capacity of 100, 000 units to product C.

You are told:

- (i) all production is sold
- (ii) 25% of labor cost for each product is fixed.
- (iii) Fixed administration overheads of Rs 900,000 have been apportioned to each product on the basis of units sold and are included in the overhead cost above. All other overheads are variable in nature.
- (iv) Ceasing production of product A would eliminate the fixed labor charge associated with it and one-sixth of the fixed administration overhead apportioned to product A.
- (v) Increasing the production of product C would mean that the fixed labor cost associated with product C would double, the variable labor cost would rise by 20% and its selling price would have to be decreased by Rs 1.50 in order to achieve the increased sales.
- **Required:**
 - (a) prepare marginal cost statement for a unit of each product on the basis of
 - (i) the original budget
 - (ii) if product A is deleted
 - (b) Prepare a statement showing the total contribution and profit for each product group on the basis of

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- (i) the original budget
- If product A is deleted
- (c) Advise whether product A should be deleted.

Solution – deletion of a product

(a) (i)	A	B	C
Selling price	15	12	11
Less variable cost:			
Materials	5	4	3
Labor	3	2	1.5
Variable overheads	<u>3.5</u>	<u>2</u>	<u>1.5</u>
Contribution	3.5	4	5

Fixed overheads are apportioned to the products on the basis of sales volume and the remaining overheads are variable with output.

- (ii)

	B	C
– Selling price	12	9.5
- Less variable costs:

– Materials	4	3
– Labor	2	1.8
– Variable overheads	<u>2</u>	<u>1.5</u>
– Contribution	4	3.2
- The price of C has been reduced by Rs 1.50 and variable labor cost has increased by 20%.

(b) (i)	(all 000s)	A	B	C	Total
• Total contribution		350	480	400	1230
• Less fixed costs:					
• Labor		100	80	40	220
• Administration	<u>300</u>	<u>360</u>	<u>240</u>	<u>900</u>	
• Profit		(50)	40	120	110

- | | | | | |
|------------------------|--------|-----|-----|------------|
| (b) (ii) | (000s) | B | C | Total |
| – Total contribution | | 480 | 576 | 1056 |
| – Less fixed costs: | | | | |
| – Labour | | 80 | 80 | 160 |
| – Fixed administration | | | | <u>850</u> |
| – Profit | | | | <u>46</u> |
- Fixed overhead cost apportioned to product A of 300 will decline by one-sixth, hence fixed admin overheads decline from 900 to 850.
- c)
 - If product A is eliminated the majority of the fixed cost allocated to it will continue and be borne by the remaining products.
 - Product A generates a contribution of Rs 350,000 towards fixed costs, but the capacity released will provide additional contribution from product C of Rs 176,000 (576 – 400).

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- ## Lecture 10

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Example: General Enterprises - Traditional system

- The annual overhead costs for General Enterprises which has three production centers (two machine centers and one assembly center) and two service centers (materials procurement and general factory support) are as follows:

Indirect wages and supervision	Rs	
Machine center X	1,000,000	
Y	1,000,000	
Assembly	1,500,000	
Materials procurement	1,100,000	
General factory support	<u>1,480,000</u>	6,080,000
Indirect materials		
Machine center X	500,000	
Y	805,000	
Assembly	105,000	
Materials procurement	0	
General factory support	<u>10,000</u>	1,420,000
Lighting and heating	500,000	
Property taxes	1,000,000	
Insurance of machinery	150,000	
Depreciation of machinery	1,500,000	
Insurance of buildings	250,000	
Salaries of works management	800,000	<u>4,200,000</u>
		<u>11,700,000</u>

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Example: General Enterprises - Traditional system

Expense (All Rs 000s)	Total	Mach X	Mach Y	Assmbly	Mat proc	Gen sup
Indirect wages	6080	1000	1000	1500	1100	1480
Indirect materials	1420	500	805	105	-	10
Lighting and heating	500	100	50	150	150	50
Property taxes	1000	200	100	300	300	100
Insurance of machinery 150	80	50	10	5	5	
Depreciation of machinery	1500	800	500	100	50	50
Insurance of building	250	50	25	75	75	25
Salaries of works managt 800	240	160	240	80	80	
	11700	2970	2690	2480	1760	1800
Total		Mach X	Mach Y	Assmbly	Mat proc	Gen sup
11700	2970	2690	2480	1760	1800	
Reallocation of service center costs:						
Mat proc (value of mat issued)	880	660	220	(1760)		
Gen factory sup (direct labor hrs)	450	450	900	(1800)		
	11700	4300	3800	3600		
Machine and dir labor hrs		2000	1000	2000		
Overhead rate	2.15	3.80	1.80			

- We shall compute the manufacturing cost of two products.
- Product A is a low sale volume product with direct costs of Rs 100. It is manufactured in batches of 100 units and each unit requires 5 hours in Machine center A, 10 hours in machine center B and 10 hours in the assembly center.
- Product B is a high sales volume product and is manufactured in batches of 200 units. Each unit requires 10 hours in Machine center A, 20 hours in Machine center B and 20 hours in the assembly center.
- Direct costs of Rs 200 have been assigned to Product B.
- Calculations of the manufacturing costs assigned to the products are as follows:

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Product A	Rs
Direct costs (100 units x Rs 100)	10,000
Overhead allocation:	
Machine center A (100 units x 5 mach hrs x Rs 2.15)	1,075
Machine center B (100 units x 10 mach hrs x Rs 3.80)	3,800
<u>Assembly (100 units x 10 dir lab hrs x 1.80)</u>	<u>1,800</u>
<u>Total cost</u>	<u>16,675</u>
Cost per unit (16675 / 100) = Rs 166.75	

Product B	
Direct costs (200 units x Rs 200)	40,000
Overhead allocation	
Machine center A (200 units x 10 mach hrs x 2.15)	4,300
Machine center B (200 units x 20 mach hrs x 3.80)	15,200
<u>Assembly (200 units x 20 dir lab hrs x 1.80)</u>	<u>7,200</u>
<u>Total cost</u>	<u>66,700</u>
Cost per unit (66,700 / 200) = Rs 333.50	

Illustration of cost assignment with an ABC system

Activity	Activity cost	cost driver	Quantity	cost driver rate
Production activities:				
machining: activity center A	2,970,000	machine hrs	2,000,000	1.485
machining: activity center B	2,690,000	machine hrs	1,000,000	2.69
assembling	2,480,000	dir labor hrs	2,000,000	1.24

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Material procurement :

purchasing components	960,000	purchase orders	10,000	96
receiving components	600,000	material receipts	5,000	120
disburse materials	200,000	production runs	2,000	100

General support activities:

production scheduling	1,000,000	production runs	2,000	500
set-up machines	600,000	set-up hours	12,000	50
quality inspection	200,000	item inspections	1,000	200

Total cost of manufacturing _____

Activities 11,700,000

Activity	Cost driver	Quantity	Quantity	Cost to A	Cost to B
	Rate	or 100 of A	for 200 of B		
Machining A	1.485	500 hrs	2000 hrs	743	2,970
Machining B	2.69	1000 hrs	4000 hrs	2,690	10,760
Assembly	1.24	1000 hrs	4000 hrs	1,240	4,960
Purchasing components	96	1	1	96	96
Receiving components	120	1	1	120	120
Disburse materials	100	5	1	500	100
Production scheduling	500	5	1	2,500	500
Set-up machines	50	50 hrs	10 hrs	2,500	500
Quality inspection	<u>200</u>	<u>1</u>	<u>1</u>	<u>200</u>	<u>200</u>

Total overhead cost _____ 10,589 20,206

Units produced _____ 100 200

Overhead cost per unit _____ 106 101

Direct costs per unit _____ 100 200

Total cost per unit _____ 206 301

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(Rs)	Traditional	ABC
Product A	167	206
Product B	334	301

Compared with ABC the traditional system under-costs product A and over-costs product B.

Allocating cost on the basis of machine hours or direct labor hours, the traditional system incorrectly assumes these are the cause of costs of the support activities.

Product B consumes twice as many machine hrs and direct labor hrs as product A, therefore the traditional system allocates twice the amount of support costs to B.

Lecture 11

Cost assignment with an ABC system

- ABC systems create separate cost centers for each major support activity and allocates costs to products using cost drivers that are the significant determinants of the cost of the activity.
- The ABC system recognizes that where a batch of two products consume the same quantity of purchasing, receiving and inspection activities, it allocates the same cost to both products.

Volume based and non-volume based cost drivers

- These cost drivers are appropriate for measuring consumption of expenses such as machine energy costs, depreciation related to machine usage and indirect labor employed in production centers.
- Volume based cost drivers are appropriate in the above circumstances, as activities are performed each time a unit of product is produced.
- Now consider two activities: setting up a machine and re-engineering products. Set up resources are consumed each time a machine is changed from one product to another. It costs the same to set up a machine for 10 or 5000 units.
- ABC systems rely on a greater number and variety of second stage cost drivers. They use both volume based and non-volume based cost drivers.
- Traditional systems use only volume based cost drivers. Volume based cost drivers assume that a product's consumption of overhead resources is directly related to units produced.
- Typical volume based cost drivers used by traditional systems are: units of output, direct labor hours and machine hours.
- The number of set-ups rather than units produced is a more appropriate measure of consumption of set-up activity.
- Similarly product re-engineering costs may depend upon the number of different engineering works orders and not the number of units produced.
- For both these activities, non volume based cost drivers such as number of set ups and engineering orders are needed for the accurate assignment of costs of these activities.

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- Using only volume based cost drivers to assign non-volume related overhead costs can result in reporting of distorted product costs.
- The extent of distortion depends on what proportion of total overhead costs the non-volume based overheads represent and the level of product diversity.
- If non-volume related overhead costs are only a small proportion of the total overhead costs, the distortion of product cost will not be significant. In these circumstances traditional systems are likely to be acceptable.

Product diversity

- Product diversity applies when products consume different overhead activities in dissimilar proportions. Differences in product size, product complexity, size of batches and set-up times cause product diversity.
- If all products consume overhead resources in similar proportions, product diversity will be low and products will consume non-volume related activities in the same proportion as volume related activities, product cost distortion will not occur with traditional product costing systems.
- Two conditions therefore will lead to product cost distortion in traditional costing systems: non-volume related overheads are a large proportion of total overheads, and product diversity applies.

Example – Boric Company

- The Boric Company has only one overhead cost center. It currently operates a traditional costing system using direct labor hours to allocate overhead to products.
- The company produces several products, two which are the HV and the LV.
- HV is made in high volumes whereas LV is made in low volumes.
- HV is produced in large production batches, and consumes 30% of direct labor hours.
- LV has irregular and low demand, is produced in small batches and consumes only 5% of direct labor hours.
- Detailed investigation indicates that the number of batches processed causes the demand for overhead resources.
- The traditional system is therefore replaced with an ABC system using the number of batches processed as the cost driver.
- You ascertain that each product accounts for 15% of batches processed during the period and overheads assigned to the cost center amount to Rs 1 million.
- The direct costs and sales revenues assigned to the products are as follows:

	<u>HV</u>	<u>LV</u>
• Direct costs	310,000	40,000
• Sales revenue	600,000	150,000
• Show the product profitability analysis for products HV and LV using the traditional and ABC systems.		

The reported product costs and profits for the two products are as follows:

	<u>Traditional system</u>	<u>ABC system</u>
(all 000s)	<u>HV</u> <u>LV</u>	<u>HV</u> <u>LV</u>

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Direct costs	310	40	310	40
Overheads allocated *	300 (30%)	50(5%)	150 (15%)	150(15%)
Reported profits/losses	<u>(10)</u>	60	140	<u>(40)</u>
Sales revenue	<u>600</u>	150	<u>600</u>	<u>150</u>

*Allocation of Rs 1 million overheads using direct labor hours as allocation base for traditional system and number of batches processed as cost driver for ABC system.

- HV is high volume product that consumes 30% of direct labor hours, whereas LV the low volume product consumes only 5%.
- The traditional system that uses direct labor hours as the allocation base allocated six times more overhead to product HV.
- However, ABC recognizes that overheads are caused by other factors. In this example they are caused by number of batches processed, and ABC uses this as the cost driver.
- Both products require 15% of total number of batches so they are allocated an equal number of overheads.
- It is apparent that the traditional system based on direct labor hours will over-cost high volume products. Six times more overheads were assigned to HV as the consumption ratio for HV is .3 and LV is .05
- When number of batches processed is used as the cost driver, the consumption ratio is .15 for both and an equal amount of overhead is assigned.
- Distorted product costs are reported with the traditional system that uses volume based cost driver, because two conditions specified above apply:
 - Non-volume overheads are a large proportion of total overheads. (100% in our example)
 - Product diversity exists as consumption ratios for the two identified cost drivers are significantly different.

Designing ABC systems

Four steps are involved:

- identifying major activities that take place in an organization
- assigning costs to cost pools/cost centers for each activity
- Determining the cost driver for each major activity
- Assigning the cost of activities to products, based on the product's demand for activities

Identifying activities

- Activities are composed of units of work or tasks. E.g. purchase of materials, this activity consists of many different tasks such as receiving a purchase request, identifying suppliers, preparing purchase orders, mailing purchase orders and performing follow-ups.

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- Activities are identified by carrying out an activity analysis. Starting point is to examine the physical plan of the workplace, and the payroll listing (to ensure all relevant personnel have been taken into account).
- This has to be supplemented by series of interviews, or having staff complete a time sheet for a specific period, explaining how their time is spent.
- Many detailed tasks are likely to be identified, but after further interviews, the main activities will emerge.
E.g. Purchasing:
- If decomposed into its constituent tasks may involve collection of vast amount of data and be too costly.
- Alternatively it may be merged with receiving, storage and issuing activities. This is too high a level of aggregation because a single cost driver is unlikely to provide a satisfactory determinant of cost.
- Number of purchase orders may give a good explanation of purchase costs, but inappropriate for costs relating to receiving and issuing.
- Hence it is preferable to break it into three activities, and establish separate cost driver for each.
- The final choice of activities must be a matter of judgment but it is likely to be influenced by factors such as total cost of activity center (must be significant to justify separate treatment), and the ability of a single cost driver to provide a satisfactory determinant of cost of activity.
- Where this is not possible, further decomposition of the activity will be necessary.
- Thus all activities that have the same cost driver can be merged to form a single activity.
- However, if there are significant differences in consumption ratios, activities should not be aggregated

Step 2 – Assigning costs to activity cost centers

- After the activities have been identified the cost of resources consumed over a specified period must be assigned to each activity.
- Many of the resources will be directly attributable to specific activity centers others (e.g. lighting, heating) may be indirect and jointly shared by several activities. These should be assigned on the basis of cause-and-effect cost drivers to provide a reasonable estimate.
- Arbitrary allocations should not be used.
- The greater the amount of costs apportioned to activity centers, the more arbitrary and less reliable will be the product cost information generated by the ABC system.

Step 3 – Selecting cost drivers for assigning activity costs to cost objects.

- In order to assign activity center costs to a product a cost driver must be selected for each activity.
- There are three types of activity cost drivers: transaction drivers, duration drivers and intensity drivers.
- **Transaction drivers** such as number of purchase orders, number of customer orders, number of inspections and number of set-ups, all count the number of times an activity is performed.
- Transaction drivers are the least accurate because they assume the same amount of resources are consumed each time the activity is performed.
- **Duration drivers** represent the amount of time required to perform the activity. Examples of duration drivers include set-up hours and inspection hours.
- If one product requires a long set-up time and another requires a short set-up time, then using set-up hours as a cost driver will more accurately measure resource consumption than the transaction

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driver (number of set-ups), which assumes equal amount of resources are consumed by both products.

- Using number of set-ups would result in cost of the product requiring long set-up hours being understated.
- **Intensity drivers** involve direct charging based on the actual activity resources committed to the product.
- For example if activities require unskilled and skilled personnel, a duration driver would establish an average hourly rate to be assigned to the products.
- Whereas an intensity driver would record the actual or estimated time for each type of personnel, and assign the specific resources directly to the products.
- Sometimes a weighted average approach can be used. E.g. where purchasing is an activity cost center, overseas orders may be weighted 1.5 times relative to a home order.

Step 4 – Assigning cost of activities to products

- The final stage involves applying the cost driver rates to products.
- The cost driver must be measurable in a way that enables it to be identified with the individual product.
- Thus if set-up hours are selected as the cost driver, there must be a mechanism for measuring the set-up hours consumed by each product.
- The ease and cost of obtaining data on cost driver consumption by products is therefore a factor that must be considered during the third stage. This is when an appropriate cost driver is being selected.

Lecture 12

Activity hierarchies

- Manufacturing activities can be classified along a cost hierarchy dimension consisting of:
 - 1. unit-level activities;
 - 2. batch-level activities;
 - 3. product-sustaining activities;
 - 4. facility-sustaining activities.
- Unit-level activities (also known as volume-related activities) are performed each time a unit of product or service is produced. Expenses in this category include direct labor, direct materials, energy costs and expenses that are consumed in proportion to machine processing time (such as maintenance). Unit-level activities consume resources in proportion to the number of units produced.

Batch-related activities

- Batch-related activities such as setting up a machine, or processing a purchase order are performed each time a batch of goods is produced.
- The cost of batch related activities varies with the number of batches made, but is fixed (same) for all units in the batch.
- For example, set-up resources are consumed when a machine is changed from one product to another. As more batches are produced, more set-up resources are consumed. It would cost the same to set-up a machine for 10 or 5000 items.
- Thus demand for set-up resources is independent of the number of units produced after set-up.

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- Similarly purchase resources are consumed each time a purchase order is processed, but the resource consumed is independent of the number of items on the purchase order.
- Other examples of batch-related costs include the resources devoted to production scheduling, sample inspection and materials movement.
- Traditional costing systems treat batch-related expenses as fixed costs.
- ABC systems assume that batch-related expenses vary with the number of batches processed.

Product-sustaining activities

- These are performed to enable continued production and sale of an individual product.
- Examples include maintaining and updating product specifications and technical support provided to individual products.
- Other examples are the resources to prepare and implement changes to design and test routines and to perform product enhancements.
- The costs of product sustaining activities are incurred irrespective of the number of units produced, or batches processed. Their expenses will tend to increase as the number of products produced is increased.

Facility-sustaining activities

- These are performed to support the facility's general manufacturing process and include general administrative staff, plant management and property costs.
- They are incurred to support the organization as a whole and are common and joint to all the products manufactured in the plant.
- There would have to be an expansion or contraction in the size of the plant, for facility-sustaining costs to change.
- ABC advocates that these costs should not be assigned to products since they are unavoidable and irrelevant for most decisions. Instead they are regarded as common costs to all products and deducted as lump sum from total of operating margin.

Comparison of traditional product costing with ABC - example

Details of four products and relevant information for a company, are given below for one period.

Product	A	B	C	D
Output in units	120	100	80	120
Cost per unit:		Rs	Rs	Rs
Direct material	40	50	30	60
Direct labor		28	21	14
Machine hrs p.u.		4	3	2

The four products are similar and usually produced in production runs of 20 units and sold in batches of 10 units.

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- The production overheads are currently absorbed using a machine hour rate, and the total of the production overheads for the period has been analysed as follows:

Machine dept. costs (rent, depreciation, supervision)	10430
Set-up costs	5250
Stores receiving	3600
Inspection / quality control	2100
Materials handling and despatch	4620

- You have ascertained that the cost drivers to be used are shown below for the overheads listed:

Cost	Cost Driver
Set up costs	number of production runs
Stores receiving	requisitions raised
Inspection / QC	number of production run
and despatch	orders executed
Materials handling	

The number of requisitions raised on the stores is 20 for each product, and the number of orders executed is 42, each order being for a batch of 10 units of a product

You are required:

- (a) to calculate the total costs for each product if all overhead costs are absorbed on a machine hour basis.
- (b) to calculate the total cost for each product using activity-based costing
- (c) to calculate and list the unit product costs from your figures in (a) and (b) above, to show the differences and to comment briefly on any conclusions which may be drawn which could have pricing and profit implications.

Solution

(a) Overheads absorbed on machine hr basis

- Total machine hours = $(120 \times 4) + (100 \times 3) + (80 \times 2) + (120 \times 3) = 1300$ hours
- Machine hr overhead rate = $\frac{10430 + 5250 + 3600 + 2100 + 4620}{1300 \text{ hrs}}$

= Rs 20 per machine hr

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Product	A	B	C	D
Direct material	40	50	30	60
Direct labor	28	21	14	21
Overheads @20per m/c hr	<u>80</u>	<u>60</u>	<u>40</u>	<u>60</u>
	<u>148</u>	<u>131</u>	<u>84</u>	<u>141</u>
Unit of output	120	100	80	120
Total cost	17760	13100	6720	16920

(b) Using activity-based costing:

Cost	Rs	Cost driver	vol	Cost p.u
Machine dept	10430	m/c hrs	1300	8.02
Set up costs	5250	prod run	21	250
Stores receiving	3600	requisition	80	45
Inspection / QC	2100	prod run	21	100
Mat handling	4620	orders exe	42	110

Note: 20 reqn for each prod (20x4) = 80 requisitions

Production runs = total units (420) / 20 units per run = 21 prod runs

- Cost for each product is computed by multiplying the cost driver rate per unit by the quantity of the cost driver consumed by each product.

	A	B	C	D
Prime costs	8160	7100	3520	9720
Set ups (250 ea)	1500	1250	1000	1500
Stores (45 ea)	900	900	900	900
Inspect (100 ea)	600	500	400	600
Handling (110)	1320	1100	880	1320
Machine*(8.02/hr)	<u>3851</u>	<u>2407</u>	<u>1284</u>	<u>2888</u>
Total costs	<u>16331</u>	<u>13257</u>	<u>7984</u>	<u>16928</u>

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(c) Cost per unit	A	B	C	D
• Costs from (a)	148	131	84	141
• Costs from (b)	<u>136</u>	<u>133</u>	<u>100</u>	<u>141</u>
• Difference	<u>12</u>	<u>(2)</u>	<u>(16)</u>	<u>-</u>

- Product A cost is over-stated with the traditional system. Products B and C are under-stated and similar costs are reported for product D.
- It is claimed that ABC more accurately measures the resources consumed by the products.
- Where cost-plus pricing is used, the transfer to an ABC system will result in different product prices.
- If activity based costs are used in stock valuations, then stock valuations as well as reported profits will differ.

Lecture 13

Activity-based costing profitability analysis

- The approach of activity based profitability analysis is to categorize costs according to their hierarchical levels.
- Hierarchies identify the lowest level to which cost can meaningfully be assigned without relying on arbitrary allocations.
- The lowest hierarchical level may be the product or customer, and ignoring the business unit level, the highest levels are product lines and distribution channels.
- Let us focus on the product as the cost object.
- A unit level contribution margin is calculated for each individual product. This is derived by deducting the cost of unit level activities from sale revenue.
- From this unit level contribution, expenses related to batch level activities are deducted.
- Next the cost of product sustaining activities are deducted. Thus the three different contribution levels are reported at the individual product level.
- Differentiating contributions at these levels provides a better understanding of the implications of product mix and discontinuation decisions in terms of cost and profit behavior.
- There are two further levels within the product hierarchy, these are the product brand level and product line level.
- Where products are marketed by brands, all expenditure relating to a brand, such as management and brand marketing, is for the benefit of all products within the brand and not for any specific individual product. It should thus be attributed to the brand and not the individual product.
- Similarly marketing, research and development and distribution expenses might be incurred for the benefit of the whole product line and not for any specific brand.
- Therefore these product line sustaining expenses should be attributed to the product line.
- Finally the profit for the organizational unit as a whole can be determined by deducting facility sustaining expenses from the sum of the product line contributions.
- The aim of ABC hierarchical profitability analysis is to assign all organizational expenses to a particular hierarchical or organizational level where cause-and-effect cost assignments can be established so that arbitrary allocations are non-existent.

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- The hierarchical approach helps to identify the impact on resource consumption by adding or dropping items at each level of the hierarchy.
- For example if a product within a particular brand is dropped, then all unit, batch and product-sustaining activities uniquely associated with that product will be affected but the higher level brand and product level activities will be unaffected.

Resource consumption models

- Possibly the most important theoretical advance in ABC systems was one which emphasized that ABC systems are models of resource consumption.
- ABC systems measure the cost of using resources and not the cost of supplying resources. This highlighted the critical role played by unused capacity.
- To have a good conceptual grasp of ABC it is essential that you understand the contents of this section.

Use the following equation to formalize the relationship between activity resources supplied and activity resources used for each activity:

$$\text{Cost of resources} = \text{Cost of resources} + \text{Cost of unused supplied used capacity}$$

- The left hand side of the above equation indicates the amount of expenditure on an activity depends on the cost of resources supplied rather than the cost of resources used.

Example:

- The following information relates to the purchasing activity of Cessna Company for the next year:
- 1. Resources supplied: 10 full time staff for Rs 30,000 per year
(Including employment costs) = Rs 300,000 annual activity cost.
Cost driver = number of purchase orders processed.

Quantity of cost driver supplied per year: (each member of staff can process 1500 orders per year.)

= 15000 purchase orders.

Estimated cost driver rate: Rs 20 per P.O. (300000 / 15000)

(2) Resources used

Estimated number of purchase orders to be processed during the year = 13000

Estimated cost of resources used assigned to parts and materials = Rs 260,000 (13000x20)

(3) Cost of unused capacity

Resources supplied (15000) – Resources used (13000) at Rs 20 per order = Rs 40,000 (2000x20)

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- Periodic financial accounting profit statements measure the expense incurred to make the resources available (i.e the cost of resources supplied). Whereas ABC systems measure the cost of resources used by the individual products.
- Essna Company expects to process 13000 purchase orders, the ABC system will therefore assign Rs 260,000 (13000 Orders at Rs 20 per order) to the parts and material ordered during the year. This represents the cost of resources used.
- The predicted cost of unused capacity will be Rs 40,000 (2000 orders at Rs 20 per order).

Resource consumption models

- Unused capacity arises because the supply of some resources has to be acquired in discrete amount in advance of its usage. Supply cannot be continually adjusted in the short-run to match exactly the usage of resources.
- Typical expenses in this category include the acquisition of equipment and the employment of non-piecework employees. They are categorized as fixed costs.
- Some resources e.g material, casual labor, energy can be continually adjusted to meet exactly their usage. These are categorized as variable costs.
- The problem of adjusting the supply of resources to match their usage applies only to fixed costs.
- Activity based systems will measure the cost of using these resources, even though the cost of supplying them will not vary with the short run usage.
- Managers make decisions (e.g on changes in output volume, mix and process changes) and such decisions result in changes in activity resource usage.
- Where such decisions result in a decline in demand for activity resources, then the first term on the right hand side on the equation above (cost of resources used) will decline.
- However, the cost of unused capacity (the second term on the right hand side of the equation) will increase to offset exactly the lower resource usage cost.
- To translate the benefits of reduced activity demand into cash flow savings, management action is required.
- They must permanently remove the unused capacity by reducing spending on the supply of resources.
- Demands for activity resources can also increase because of decisions to introduce new products or expand output.
- Such decisions can lead to situations where activity resource usage exceeds the supply of resources.
- In the short term the excess demand might be absorbed by people working longer hours or faster. Eventually however, additional spending will be required to increase the supply of activity resources.

Selecting the cost driver denominator level

- In the above example of Cessna Company, there are two potential denominator levels that can be used to establish the cost driver rates.
- These are the capacity supplied and the budgeted activity level.
- If practical capacity is used the cost driver rate will be $300,000 / 15000 = \text{Rs } 20$ per purchase order. Whereas if the budgeted activity level is used, the cost driver rate will be $300,000 / 13000 = \text{Rs } 23.08$
- Support activity costs are caused by the level of capacity made available, rather than the budgeted activity level. Therefore the correct denominator is practical capacity.
- Using budgeted activity would mean that the cost of unused capacity is hidden in the cost driver rate and charged to products.

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- Budgeted capacity usage can lead to higher cost driver rates, and will result in an increase in reported product costs.
- There is a danger that bid prices will be increased when demand is depressed, at a time when a firm should be considering lowering prices.
- Practical capacity ought to be used for measuring human resources. For physical resources it is recommended that a modified practical capacity i.e normal capacity (3 year outlook) should be used.

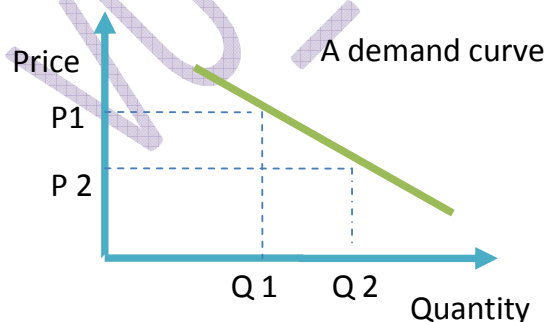
Lecture 14

Pricing decisions and profitability analysis

- Accounting information is often an important input to pricing decisions.
- Market leaders or organizations that sell highly customized products, have some discretion in setting selling prices.
- Pricing decisions will be influenced by the cost of the product.
- In other organizations prices are set by market and supply forces, nevertheless cost information is required for determining profitability of different products, and the target product mix.

Establishing optimum selling price

- The economic model shows that firms will set selling prices where profits are maximized.
- Precise quantification in practice is very difficult; management produces estimates of sales demand at various selling prices.



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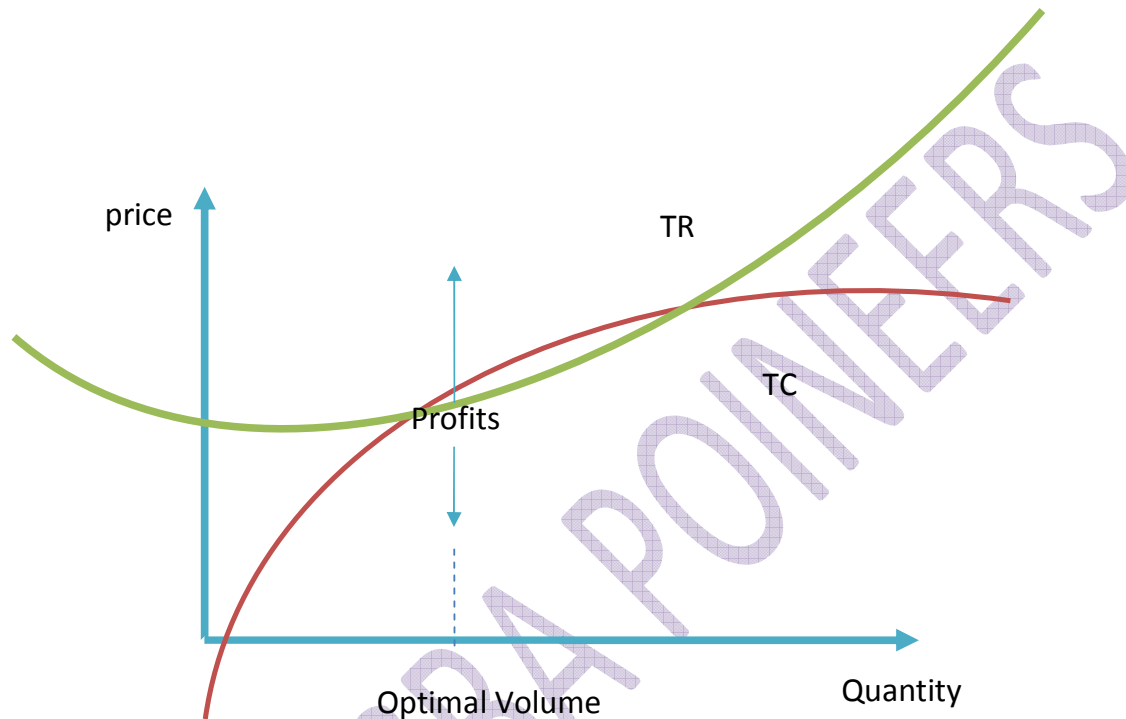
Lecture 1 – 45 Slides

Establishing optimum selling price

- Estimate of profits at different output levels:

Price	Units sold	Total Revenue	Total Cost	Profit
40	10	400	360	40
38	11	418	364	54
36	12	432	370	62
34	13	442	378	64
32	14	448	388	60
30	15	450	400	50
28	16	448	414	34

- To determine optimum selling price, it is necessary to estimate the total cost for each price level.
- Profits are maximized at a selling price of 34.



The role of cost information in pricing decisions

- Small firms operating in an industry where prices are set by dominant market leaders, will have little influence over the price of their products. They are described as price-takers.
- The market leaders and highly customized producers are described as price-setters.
- Cost information is vital to price-takers as well as price-setters. ☰

Price setting firm in short-run

- Only incremental costs of undertaking a special order should be taken into account.
- In service companies e.g. hotels, the incremental cost of accepting one-off special business are likely to be minimal. They may consist of meals, laundering and bathroom facilities.
- In most cases incremental costs are likely to be confined to unit level activities.
- Bids should be made at prices that exceed incremental costs. Cost data is likely to be the dominant factor.

Special order in the short-run

- Bids for one-time orders based on covering incremental costs should meet the following conditions:
 - Sufficient capacity is available for all resources required. If some resources are fully utilized, opportunity cost of the scarce resources must be covered by the bid price.
 - Bid price will not affect future selling price.
 - Order will utilize unused capacity in short period only, and released for more profitable opportunity

Price setting firm in the long-run

- In the long-run firms can adjust the supply of virtually all their activity resources.
- Three approaches are relevant:
 - Pricing customized products
 - Pricing non-customized products
 - Target costing for non-customized products.
- **Customized products:** product should be priced to cover all resources being used. This will require a costing system that accurately measures resources consumed by each product. For price-setters there are stronger grounds for ABC.

Product pricing using ABC – Cholistan Company

- The Cholistan company has received a request for a price quotation from one of its regular customers for an order of 500 units as follows:

Direct labor per unit produced	2 hours
Direct material per unit produced	Rs 22
Machine hour per unit produced	1 hour
Number of component and material purchases	6
Number of production runs prior to assembly	4
Average set up time per production run	3 hours
Number of deliveries	1
Number of customer visits	2
Engineering design and support	50 hours
Customer support	50

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Product pricing using ABC – Cholistan Company...

- Details of activities required for the order:

<u>Activity</u>	<u>Cost driver rate</u>
Direct labor processing and assembly	Rs 10 per labor hr
Machine processing	Rs 30 per machine hr
Purchasing and receiving materials	Rs 100 per purchase order
Scheduling production	Rs 250 per production run
Setting-up machines	Rs 120 per hr
Packaging and delivering orders	Rs 400 per delivery
Invoicing and accounts administration	Rs 120 per customer order
Marketing and order negotiation	Rs 300 per customer visit
Customer support – incl. after sales	Rs 50 per customer service hr
Engineering design and support	Rs 80 per engineering hr

- Estimate of cost of resources required to fulfill the order.

<u>Unit-level expenses</u>	
Direct materials (500x22)	11000
Direct labor (500x2x10)	10000
Machining (500x1hr x Rs 30)	<u>15000</u> 36000
<u>Batch-level expenses</u>	
Purchasing and receiving material (6x100)	600
Scheduling production (4 runs x 250)	1000
Setting-up machines (4 runs x 3 hrs x 120)	1440
Packaging and delivery (1 x 400)	<u>400</u> 3440
<u>Product sustaining expenses</u>	
Engineering design and support (50 hrs x 80)	4000
<u>Customer sustaining expenses</u>	

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Marketing and order negotiation (2visits x 300)	600	
Customer support (50 hrs x 50)	<u>2500</u>	<u>3100</u>
Total cost of resources		<u>46540</u>

- The full cost (excluding facility sustaining cost) of the order is Rs 46,540. Facility sustaining costs are incurred to support the organization as a whole and not for individual products.
- To determine a proposed selling price an appropriate percentage mark-up is added to the estimated cost.
- Mark-up should be sufficient to cover facility sustaining cost and a profit contribution.
- Assume Cholistan Co. adds 20%, it would give a price of Rs 55848. (Add 9308). This is cost-plus pricing.

Product pricing using ABC

- Consider a purchase order of 3000 units instead of 500 units, where the batch level expenses remain unchanged.

- Cost of resources used will be:

– Unit level expenses (6 x 36000)	216000	
– Batch level expenses		3440
– Product sustaining expenses		4000
– Customer sustaining expenses		<u>3100</u>
Total cost of resources		<u>226540</u>

Cost per unit for 500 unit order (46540/500) = Rs 93.08

Cost per unit for 3000 unit order(226540/3000) = Rs 75.51

Lecture 15

Pricing non-customized products

- A market leader must make pricing decisions for large and unknown volumes, of a product that is sold to thousands of customers.
- An estimate of sales volume is required to determine the unit cost. Hence two unknowns, sale price and sales volume.
- It is recommended that cost-plus selling prices are estimated for a range of potential sales volumes.

Non-customized products – Case A

- The Alipur Company is launching a new product; sales volume will be dependent on selling price.
- The best estimate is that demand is likely to range between 100,000 and 200,000 units provided the selling price is below Rs 100.
- The company has produced the following cost estimates and selling prices required to generate a target profit contribution of Rs 2million from the product.
- The Alipur Company has produced estimates of total cost for a range of output levels.
- The information indicates sales volume and accompanying selling prices that are required to generate the target profit.
- The unit cost calculation indicates the breakeven selling price.
- Management must asses the price with highest probability of generating the specified sales volume.

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Sales volume (000s)	100	120	140	160	180	200
Total cost (000s)	10000	10800	11200	11600	12600	13000
Required profit (000s)	2000	2000	2000	2000	2000	2000
Required sales (000s)	12000	12800	13200	13600	14600	15000
Required selling price	120	107	94	85	81	75
Unit cost	100	90	80	73	70	65

Non-customized products – Case B

- Same cost schedule applies, but the 2 million minimum contribution does not apply.
- Estimate of sales demand at different selling prices have been made, based on market research.

Potential selling price	100	90	80	70	60
Estimated sales volume at					
Potential prices	120	140	180	190	200
Estimated sales revenue	12000	12600	14400	13300	12000
Estimated total cost	10800	11200	12600	12800	13000
Estimated profit	1200	1400	1800	500	(1000)

- Profits are maximized at selling price of Rs 80.
- Another pricing policy could be to sell at the lower price of Rs 70 to ensure a larger market share is obtained in future.

Target Costing

- In target costing the starting point is the determination of the target selling price.
- Next a standard or desired profit is deducted to get to a target cost for the product.
- The aim is to ensure that future cost will not be higher than the target cost.

The stages involved in target costing can be summarized as follows:

Stage 1: determine the target price which customers will be prepared to pay for the product.

Stage 2: deduct a target profit margin from the target price to determine the target cost.

Stage 3: estimate actual cost of the product.

Stage 4: if estimated cost exceeds the target cost, investigate ways of driving down the actual cost to the target cost.

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- The major attraction of target costing is that marketing factors and customer research provide the basis for determining selling price.
- Whereas costs tend to be the dominant factor in cost-plus pricing.
- Further attraction is that the approach requires the collaboration of product designers, production engineers, marketing and finance staff.
- Target costing is most suited for setting prices for non-customized and high sales volume products.

Short-term product mix decisions

- Price taking firms will be faced with opportunities of taking on short-term business at a market determined selling price.
- In such situations accept short-term business where incremental sales revenue exceeds short run incremental costs.

However, as mentioned earlier in the course, such business is acceptable under certain conditions. These are:

- Sufficient capacity is available for all resources required. If some resources are fully utilized, opportunity cost of the scarce resource must be covered in the selling price.
- The company will not commit itself to repeat long-term business that is priced to cover only short-term incremental costs.
- Order will utilize unused capacity only for a short period, and capacity will be released for use on more profitable opportunities.
- Note, in the longer term capacity constraints can be removed.

Long-run product mix decisions

- In the longer-term a firm can adjust the supply of resources committed to a product.
- Therefore sales revenue from the product should exceed the cost of all resources committed to it.
- Hence there is a need to undertake periodic profitability analysis to distinguish between profitable and non-profitable products.
- Activity based profitability analysis should be used to evaluate each product's long-run profitability.
- Under this, products are the cost objects in four different hierarchical levels. Unit, brand, product line and whole business.
- Most decisions are likely to be made at the individual product level. Before discontinuing, other alternatives and considerations are taken into account.
- Sometimes it is important to maintain a full product line for marketing reasons.
- Other options considered before discontinuing products include re-engineering or re-designing the products to reduce their resource consumption.
- Where products are discontinued, overall profitability will improve only if managers eliminate spending on supply of activity resources no longer required.

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Cost-plus pricing

- Companies use different cost bases and mark-ups to determine their selling price.

Cost	Rs	m-up %	Price
Direct variable cost	200	250	500
Direct non-variable cost	<u>100</u>		
Total direct costs	300	70	510
Indirect costs	<u>80</u>		
Total cost (excl. higher level)	380	40	532
Higher level sustaining cost	<u>60</u>		
Total cost	440	20	528

Establishing target mark-up %

- Mark-ups are related to demand. Firms are able to command a higher mark-up for a product that has high demand.
- Mark-ups are likely to decrease when competition is intense.
- Luxury goods with low sales turnover may attract high profit margins, whereas non-luxury goods with high sales turnover may not.
- Another approach to choose a mark-up is to earn a target rate of return on capital investment.
- For example if the cost per unit of a product is Rs 100 and annual volume is 10,000 units. Product requires investment of Rs 1 million and the target rate of return is 15%, the target mark-up will be:
 - $15\% \times 1,000,000 = \text{Rs } 15 \text{ per unit}$ 10,000 units
 - Target price will be $100 + 15 = 115$
- The major problem with this approach is that it is difficult to determine the capital invested to support a product. Assets are normally used for many different products.
- Management should use this information together with their knowledge of the market and intended pricing strategies, before the final price is set.

Limitations of cost plus pricing

- The main criticism against cost-plus pricing is that it ignores demand for the product. It is assumed that prices should solely depend on costs.
- For example a cost-plus formula may suggest Rs 20 for a product where the demand is 100,000 units. Whereas at a price of Rs 25 the demand may be 80,000 units. Assuming that variable cost for each unit sold is Rs 15, the total contribution will be Rs 500,000 at price of Rs 20, and Rs 800,000 at the price of Rs 25.
- Thus the cost-plus pricing formula might lead to incorrect decisions.
- Cost-plus can give rise to a loss if the volume is insufficient and contribution does not cover fixed costs.

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Lecture 16

Pricing policies

- Cost information is one of the many variables that must be considered in the pricing decision.
- Final price will depend upon the pricing policy of the company.
- A price skimming or a price penetration policy might be selected.
- **Price skimming policy** is an attempt to exploit those sections of the market that are relatively insensitive to price changes.
- For example high initial prices may be charged to take advantage of the novelty appeal of a new product when demand is initially inelastic.
- A skimming policy offers a safeguard against unexpected future increases in costs, or large fall in demand after the novelty appeal has declined.
- Once the market becomes saturated, the price can be reduced to attract that part of the market that has not yet been exploited.
- A skimming pricing policy should not be adopted when a number of close substitutes are already being marketed.
- A **penetration pricing policy** is based on the concept of charging low prices initially with the intention of gaining rapid acceptance of the product.
- Such a policy is appropriate when close substitutes are available or when markets are easy to enter.

Product life-cycle

- Many products have a product life cycle consisting of four stages:
 - Introductory – product is launched, minimal awareness and acceptance.
 - Growth – sales begin to expand because of introductory promotions
 - Maturity – sales taper off as new customers are exhausted.
 - Decline – sales diminish as the product is replaced with new and better versions.
- In the introductory stage it may be appropriate to keep a slightly higher or lower price compared to the price found by normal analysis to create a more favorable demand in future years.
- Limited production capacity may rule out low prices. A higher initial price may be set and reduced progressively.
- If there is no production constraint, a lower price may be preferred. This may result in higher sales volume and a slow competitive reaction.
- At the maturity stage a firm should adopt a selling price that will maximize short-term profits.

Hamdard Ltd

- Hamdard has recently spent some time on researching and developing a new product for which they are trying to establish a suitable price. Previously they have used cost plus 20% to set the selling price.

The standard cost per unit has been established as follows:

Direct materials

Material 1	10 (4 kg at Rs 2.50 / kg)
------------	---------------------------

Material 2	7 (1 kg at Rs 7)
------------	------------------

Direct labor 13 (2 hrs at Rs 6.50 per hr)

Fixed overhead 7 (2 hrs at Rs 3.50 per hr)

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Required:

(a) Using standard costs, calculate two different cost plus prices using two different bases and explain an advantage and disadvantage of each method.

(b) Give two other possible pricing strategies that could be adopted and describe the impact of each one on the price of the product.

- **Solution:**

- (a) Variable cost plus 20% = $30 \times 1.20 = \text{Rs } 36$
Total cost plus 20% = $37 \times 1.20 = \text{Rs } 44.40$
- Advantages of variable cost include that it avoids arbitrary allocations, identifies short-term relevant costs, simplicity.
- The disadvantages are that it represents only a partial cost is short-term oriented and ignores price demand relationships.
- Advantages of total cost include that it attempts to include all costs, reduces the possibility that fixed costs will not be covered.
- Disadvantages are that some arbitrary apportionments are likely and price/demand relationship is ignored.

(b) Pricing strategies

- Price skimming is likely to lead to higher initial price.
- Price penetration policy is likely to lead to lower initial prices.

Customer profitability analysis

- In the past management accounting reports have tended to focus on analyzing profits by products. Increasing attention is now being given to analyzing profits by customers.
- Customer profitability analysis provides important information that can be used to determine which classes of customers needs to be emphasized or de-emphasized.

Case

- A company found that customer related selling costs represent 34% of the total costs. These costs were allocated on the basis of sales value.
- An activity based costing system was introduced that sought to explain the resources consumed by different customers.
- A detailed study identified two cost drivers:

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- Number of orders placed: each order had a large fixed cost that did not vary with the number of items purchased.
- Non-standard production items: these items were more costly to produce than standard items.
- The company estimated the cost per order, and the cost of handling standard and non-standard items.
- A customer profitability analysis was performed based on the sales for the previous year.
- This analysis revealed that only 40% of its customers were profitable and a further 10% lost 120% of total profits. i.e 10% incurred losses equal to 120% of the profits.
- Two of the most unprofitable customers turned out to be among the top three in total sales volume. These two companies made small orders of non-standard items.

Example – The Daisy Company

- The Daisy Company has recently adopted customer profitability analysis by a review of the past 12 months. Details of activities and the cost driver rates for customer related expenses are as follows:

Activity	Cost driver rate
– Sales order processing	Rs 300 per sales
– Sales visits	Rs 200 per sales visit
– Normal delivery cost	Rs 1 per delivery km
– Special deliveries	Rs 500 per special deliver
– Credit collection costs	10% p.a. on avg. pay-time

Details relating to four of the customers:

Customer		A	B	C	D
Number of sales orders	200	100	50	30	
Number of sales visits		20	10	5	5
Km per delivery	300	200	100	50	
Number of deliveries		100	50	25	25
Total delivery Km		30000	10000	2500	1250
Special deliveries		20	5	0	0
Average collection period (days)90		30	10	10	
Annual sales		1m	1m	.5m	2m
Annual operating profit contribution		90000	120000	70000	200000

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The profitability analysis in respect of the four customers is as follows:

Customer attributable costs	A	B	Y	Z
Sales order processing	60000	30000	15000	9000
Sales visits	4000	2000	1000	1000
Normal deliveries	30000	10000	2500	1250
Special (urgent) deliveries	10000	2500	0	0
Credit collection	<u>24658</u>	<u>8220</u>	<u>1370</u>	<u>5480</u>
	128658	52720	19870	16730
Operating profit contribution	<u>90000</u>	<u>120000</u>	<u>70000</u>	<u>200000</u>
Contribution to sustaining expenses	(38658)	67280	50130	183270

- It can be seen that A and B are high cost to serve and Y and Z are low cost to serve customers.
- Customer A provides positive operating profit contribution, but is unprofitable when customer attributable costs are taken into account.
- This is because customer A requires more sales orders, sales visits and normal and urgent deliveries than the other customers.
- In addition the customer is slow to pay and has higher delivery costs.
- Customer A can be made profitable if it can be persuaded to place smaller number of large quantity orders, avoid special deliveries and reduce credit period.
- Otherwise selling price should be increased or discounts reduced, to cover the extra resources consumed.

Example – with limiting factor

- A manufacturer has three products A, B and C. Currently sales, cost and selling price details and processing time requirements are as follows:

	A	B	C
– Annual sales	6000	6000	750
– Selling price	20	31	39
– Unit cost	18	24	30
– Processing time p.u. (hrs)	1	1	2
- The firm is working at full capacity (13500 hrs per year). Fixed manufacturing overheads are absorbed into unit costs by a charge of 200% of variable cost.

Assuming that

- (i) processing time can be switched from one product line to another,

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(ii) demand at current price is:

A	B	C
11000	8000	2000 and selling prices are not to be altered.

Required: Calculate the best production programme for the next operating period and to indicate the increase in the net profit that this should yield. Identify the opportunity cost of a processing hour.

Solution

- Fixed manufacturing overhead costs are absorbed into the unit costs by a charge of 200% of variable cost. Therefore unit variable cost is one third of total unit cost.

Contribution per processing hour	A	B	C
Selling price	20	31	39
Variable cost	<u>6</u>	<u>8</u>	<u>10</u>
Contribution	14	23	29
Contribution per processing hr	14	23	14.5
Ranking	3	1	2
Optimal programme:			
	Output	Hours	Contribution
Product B	8000	8000	184000
Product C	2000	4000	58000
Product A	1500	<u>1500</u>	<u>21000</u>
		<u>13500</u>	<u>263000</u>
Existing programme:			
	Output	Hours	Contribution
Product A	6000	6000	84000
Product B	6000	6000	138000
Product C	750	1500	<u>21750</u>
			<u>243750</u>

- Contribution and profits will increase by Rs 19250 if the optimal production programme is implemented.
- An additional hour of processing would be used to increase product A by one unit, thus increasing contribution by Rs 14. Therefore the opportunity cost of one processing hour is Rs 14.

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Lecture 17

Information for Planning and Control – The Budget Process

- The various activities within a company should be coordinated by the preparation of plans of actions for future periods. These detailed plans are usually referred to as budgets.
- Our objective is to focus on the planning process within a business organization and to consider the role of budgeting.
- Planning is the design of a desired future and of effective ways of bringing it about.
- A distinction is normally made between short-term planning and long-term planning known as corporate planning or strategic planning.

Stages in the Planning Process

Stage 1 – Establishing Objectives:

- Comprises the mission of the organization, corporate objectives and unit objectives.
- The mission describes in very general terms the broad purpose and reason for the organization, the nature of business and the customers it seeks to serve.
- Corporate objectives relate to the organization as a whole. They are normally measurable and are expressed in financial terms such as desired profits or sales levels, return on capital employed, rates of growth or market share.

Establishing objectives

Corporate objectives are formulated by the Board of Directors and handed down to senior managers.

Overall objectives are broken down into subsidiary objectives relating to areas such as project range, market segmentation, customer service etc.

Unit objectives relate to specific objectives of individual units within a company.

Stage 2 – Identify Potential Strategies

- The next stage is to identify a range of possible course of action that might enable the company's objectives to be achieved.
- The identification of strategies should take into account the following:
 - Generic strategy to be pursued
 - Lowest cost producer or a unique product, service; focus on particular segment
 - Alternative directions to develop.
 - Market penetration or new market development; product development or diversification

Stage 3 – Evaluation of strategic options

- Suitability – exploits company strengths and environmental opportunities, avoid weakness
- Feasibility – can the strategy be funded? And necessary market position achieved? Can the company cope with competitive reactions,
- Acceptability - will it be sufficiently profitable, is the level of risk acceptable.

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Stage 4 – Select course of action

- After selection of the strategic options, long-term plans should be created to implement the strategies.
- A long-term plan is a statement of preliminary targets and activities required by an organization to achieve its strategic plan, together with a broad estimate of the resources required in each year.
- As it concerns the future, plans tend to be general in nature, imprecise and subject to change.

Stage 5 – Implementation of long-term plans

- Long-term plans represent the broad direction that top management intend to follow.
- The budget is developed in the context of ongoing business and is ruled by previous decisions already taken.
- Initial estimates are reviewed in the light of more recent information.
- This review process may result in decisions being taken on possible activity adjustments within the current budget period.
- Budgeting must be considered as an integrated part of the long –term planning process.

Stages 6 & 7 – Monitor actual outcomes & respond to divergences

- The final stages are to compare the actual and planned outcomes, and to respond to any divergences from plan.

Lecture 18

The multiple functions of budgets

- Planning annual operations – managers must produce detailed plans for the implementation of the long-range plans. Encourages managers to anticipate problems before they arise.
- Coordinating the activities of various parts of the organization – the budget serves as the vehicle through which the actions of the different parts of the organization can be brought together and reconciled into a common plan.
- Communicating plans to the various responsibility center managers – everyone in the organization should have a clear understanding of the part they are expected to play in achieving the annual budget.
- Motivating managers to strive to achieve the organizational goals – budget is a useful device to influence managerial behavior. A budget is a standard that managers may be motivated to achieve. Like a challenge.
- Controlling activities – a budget assists managers in managing and controlling the activities for which they are responsible. By comparing with actual results, managers can ascertain which costs do not conform to plan and require attention. This process enables management by exception.
- Evaluating the performance of managers – success is measured in meeting the budget, bonuses may be awarded on achieving of targets.

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Conflicting roles of budgets

- As a single budget is used to serve several purposes, there is a danger that they may conflict with each other.
- Demanding budgets that may not be achieved may be appropriate to motivate maximum performance, but they are unsuitable for planning purpose.
- There is also a conflict between planning and performance evaluation roles. Budgets are set in advance on anticipated circumstances. Performance should be based on an adjusted budget to reflect actual operating circumstances.

The Budget Period

- The conventional approach is that once a year the manager of each budget center prepares a detailed budget for one year. The preparation of budgets on an annual basis has been strongly criticized on that grounds that it ties the company to a twelve month commitment. This can be risky as the budget is based on uncertain forecast.
- An alternative approach is for the budget to be broken down by months for the first three months, and by quarters for the remaining nine months. The quarterly budgets are developed into monthly budgets as the year proceeds. In 2nd qtr monthly budgets for the 3rd qtr is prepared, and so on.
- A new budget for a fifth quarter will also be prepared. This process is known as continuous or rolling budget. This ensures that a twelve month budget is always available by adding a quarter as the quarter just ended is dropped. Rolling budgets ensure that planning is not something that takes place once a year.
- Planning is a continuous process and managers are encouraged to constantly look ahead and review future plans.

A detailed illustration – The Enterprise Company

- The enterprise company manufactures two products, known as the alpha and beta. Alpha is produced in dept 1 and beta in dept 2. The following information is available for 20X0
- Standard material and labor costs:
 - Material X 7.20 per unit
 - Material Y 16.00 per unit
 - Direct labor 12.00 per unit

Overhead is recovered on a direct labor hour basis.

- The standard material and labor usage for each product is as follows:
- | | Model Alpha | Model Beta |
|---------------------|-------------|------------|
| – Material X | 10 units | 8 units |
| – Material Y | 5 units | 9 units |
| – Direct labor hour | 10 hours | 15 hours |
| – | | |

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The balance sheet for the previous year end 20X0 was as follows:

	Rs	Rs
Fixed Assets		
Land	170000	
Buildings and equipment	1292000	
Less depreciation	255000	1037000
Current Assets		
Stocks, finished goods	99076	
raw materials	189200	
Debtors	289000	
Cash	<u>34000</u>	
	611276	
Less: Current liabilities		
Creditors	(248800)	<u>362476</u>
Net Assets	1569476	
Represented by	=====	
1200000 ordinary shares	1200000	
Reserves	<u>369476</u>	1569476
	=====	

Other relevant data is as follows for the year 20X0

	Finished products	
	Alpha	Beta
Forecast sales (units)	8500	1600
Selling price per unit	Rs400	Rs560
Ending inventory required (units)	1870	90
Beginning inventory (units)	170	85

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	Direct material	
	Material X	Material Y
Beginning inventory (units)	8500	8000
Ending inventory required (units)	10200	1700
	Dept 1	Dept 2
Budgeted variable overheads rates		
(per direct labor hr)	Rs	Rs
Indirect materials	1.20	0.80
Indirect labor	1.20	1.20
Power (variable portion)	0.60	0.40
Maintenance (variable portion)	0.20	0.40
	dept 1	dept 2
	Rs	Rs
Budgeted Fixed overheads		
Depreciation	100000	80000
Supervision	100000	40000
Power (fixed portion)	40000	2000
Maintenance (fixed portion)	45600	3196
<u>Estimated non-manufacturing overheads:</u>		
Stationery etc. (admin)	4000	
Salaries		
sales	74000	
office	28000	
Commissions	60000	
Car expenses (sales)	22000	