

# Strategic Analysis of Operating Income

## Basic Question for ABC

### Revenue Effect/Cost Effect on Operating Income

**Question 2:** Y Limited is a manufacturer of Cardboard boxes. An analysis of its operating income between 2016 and 2017 shows the following:

	Income Statement (amount in 2016)	Revenue & Cost Effect of Growth Component in 2017	Revenue & Cost Effect of Price Recovery Component in 2017	Cost Effect of Productivity Component in 2017	Income Statement (amount in 2017)
Revenue (₹)	40,00,000	2,00,000(F)	4,20,000(F)	-	46,20,000
Cost (₹)	29,20,000	60,000 (A)	2,56,000(A)	58,000(F)	31,78,000
Operating Income (₹)	10,80,000	1,40,000(F)	1,64,000(F)	58,000(F)	14,42,000

Y limited sold 4,00,000 boxes and 4,20,000 boxes in 2016 and 2017 respectively. During 2017 the market for cardboard boxes grew 3% in terms of number of units and all other changes are due to company's differentiation strategy and productivity.

**Required: COMPUTE** how much of the change in operating income from 2016 to 2017 is due to the industry market size factor, productivity and product differentiation and also reconcile the profit of both years due to these factors.

#### Solution

#### Reconciliation of Operating Income

Particulars	Amount (₹)
Operating Income in 2016	10,80,000
Add: Change Due to Industry Market Size Factor (W.N.-1)	84,000
Changes Due to Productivity (W.N.-2)	58,000
Changes Due to Product Differentiation (W.N.-3)	2,20,000
Operating Income in 2017	14,42,000

#### Workings

Total Increase in Sale of Cardboard Boxes 20,000 Boxes (4,20,000 Boxes – 4,00,000 Boxes). Out of this increase in Sales of 20,000 Boxes, 12,000 Boxes (3% of 4,00,000) is due to growth in market size, and the remaining 8,000 Boxes (20,000 Boxes – 12,000 Boxes) are due to an increase in market share .

W.N.1 Effect of the Industry Market Size Factor on operating income:

$$= \text{Revenue and Cost Effect of Growth Component in 2017} \times \frac{\text{Increase in Sales Unit Due to Market Growth}}{\text{Total Growth in Sales Unit (from 2016 to 2017)}}$$

$$= ₹ 1,40,000 \times \frac{12,000 \text{ Boxes}}{20,000 \text{ Boxes}}$$

$$= ₹ 84,000 \text{ (F)}$$

W.N.2 Effect of Productivity on operating income:

$$= \text{Cost Effect of Productivity Component in 2017}$$

$$= ₹ 58,000 \text{ (F)}$$

W.N.3 Effect of Product Differentiation on operating income:

Particulars	Amount (₹)
Increase in the Selling Price (Revenue Effect of the Price Recovery Component)	4,20,000 (F)
Increase in Prices of Inputs (Cost Effect of the Price Recovery Component)	2,56,000 (A)
Growth in Market Share Due to Product Differentiation* $\left( ₹ 1,40,000 \times \frac{8,000 \text{ Boxes}}{20,000 \text{ Boxes}} \right)$	56,000 (F)
Total	2,20,000 (F)

\* Revenue and Cost Effect of Growth Component in 2017×

$$\frac{\text{Increase in Sales Unit Due to Product Differentiation}}{\text{Total Growth in Sales Unit}}$$



**Question 4:** Octave buys T-shirts in bulk applies its own trendsetting silk-screen designs, and then sells the T-shirts to a number of retailers. Octve wants to be known for its trendsetting designs, and it wants every teenager to be seen n a distinctive Octave T-shirt. Octave presents the following data for its first two year of operations, 2014 and 2015.

	A	B	C
		2014	2015
1	Number of T-shirts purchased	2,00,000	2,50,000
2	Number of T-shirts discarded	2,000	3,300
3	Number of T-shirts sold	1,98,000	2,46,700

4	Average selling price	₹250	₹260
5	Average cost per T-shirt	₹100	₹85
6	Administrative capacity (no. of customers)	4,000	3,750
7	Administrative cost	₹1,20,00,000	₹1,16,25,000
8	Administrative cost per customer	₹3,000	₹3,100
9	Design staff	5	5
10	Total design costs	₹25,00,000	₹27,50,000
11	Design cost per employee	₹5,00,000	₹5,50,000

Administrative costs depend on the number of customer that Octave has created as capacity to support, not on the actual number of customers. Octave had 3,600 customers in 2014 and 3,500 customers in 2015. At the start of each year, the management uses its discretion to determine the number of employees on the design staff for the year. The design staff and its costs have no direct relationship with the number of T-shirts purchased and sold or the number of customers to whom T-shirts are sold.

### Required:

- (1) Calculate operating income in 2014, 2015
- (2) Calculate growth, price recovery and productivity components.

### Solution:- Answer:

Strategy balanced scorecard, merchandizing operation

1. Octave follows a product differentiation strategy. Octave designs an e” trendsetting and its T-shirt are distinctive and it aims to make its T-shirt a “must have” for each and every teenager. These are all clear signs of a product differentiation strategy. And to succeed. Octave must continue to innovate and be able to charge a premium price for its product.
2. Possible key element of Octave’s balance scorecard, given its product differentiation strategy are:

### Financial Perspective:-

- (i) Increase in Operating Income from charging higher margins and (2) Price premium earned on products.
- (ii) These measures will indicate whether octave has been able to charge premium prices and achieve operating income increases through product differentiation.

### Customer perspective:

- (i) Market share in distinctive name brand T –short (2) Customer satisfaction (3) new customers, (4) Number of mentions of Octave’s T-shirt in the leading fashion magazines.
- (ii) Octave a strategy should result in improvements in these customers measures that help evaluate whether Octave product differentiation strategy is succeeding with its customers. These measures are, in turn, leading indicators of superior financial performance.

### Internal-Business Process Perspective

- (i) Quality of silk screening (number of colors, use of glitter, durability of the design).
- (ii) Frequency of new designs, and (3) time between concept and delivery of design.  
Improvements in these measures are expected to result in more distinctive and trendset-ting designs delivered to its customers and in turn, superior financial performance.

**Learning & Growth Perspective**

- (i) Ability to attract and retain talented designers (2) /improvements in silk-screening process (3) continuous education and skill levels of marketing and sales staff, and (4) employee satisfaction.
- (ii) Improvements in these measures are expected to improve Octave’s capabilities to produce distinctive designs that have a cause-and –effect relationship with improvements in internal business processes, which in turn lead to customer satisfaction and financial performance.

**Solution:**

Strategic analysis of operating income (continuation of 12-16)

**1. Operating –Income Statement**

	2014	2015
Revenue ( `250 × 1,98,000; `260 × 2,46,700)	`4,95,00,000	`6,41,42,000
Costs T-shirt purchases ( `100 × 2,00,000; `85 × 2,50,000)	2,00,00,000	2,12,50,000
Administrative costs	1,20,00,000	1,16,25,000
Design costs	25,00,000	27,50,000
Total Costs	3,45,00,000	3,56,25,000
Operating Income	`1,50,00,000	`2,85,17,000
Change in Operating income	`1,35,17,000F	

**2 The growth Component**

Revenue effect of growth=

× Selling

**ual units of output sold in 2015 – Actual units of output sold in 2014)**

price in 2014

$$= (2,46,700 – 1,98,000) × `250 = `1,21,75,000F$$

Cost effect of growth for variable costs = (Units of input required to produce 2015 output in 2014 – Actual units of input used t produce 2014 output 0 × Input price in 2014

Cost effect of growth for fixed Costs = (Actual units of capacity in 2014 if adequate to produce 2015 output in 2014 OR in 2014 capacity inadequate to produce 2015 output in 2014 units of capacity required to produce 2015 output in 2014 – actual units if capacity in 2014) X Price per unit of capacity in 2014

Direct materials (purchased T-shirt) costs that would be required in 2015 to sell 2,46,700 T-shirt instead of the 1,98,000 sold in 2014, assuming the 2014 input-output relationship continued into 2015, would equal 2,49,192.

Purchased T-shirts (2,46,700/1,98,000 × 2,00,000)

Administrative costs will not change as adequate capacity exists in 2014 to support year 2015 output and customers Design capacity is discretionary and edequate to support output in year 2015.

The cost effect of growth component are

Direct materials costs	$(2,49,192 - 2,00,000) \times$	$\text{`100}$	$= \text{`49,19,200 U}$
Administrative costs	$(4,000 - 4,000) \times$	$\text{`3,000}$	$=0$
Design cost	$(5 - 5) \times$	$\text{`5,00,000}$	$=0$
Cost effect of growth			<b><u><math>\text{`49,19,200 U}</math></u></b>

In summary the net increase in operating income as a result of the growth component equals:

Revenue effect of growth	$\text{`1,21,75,000 F}$
Cost effect of growth	$49,19,200 \text{ U}$
Change in operating income due to growth	<b><u><math>\text{`72,55,800 F}</math></u></b>

The price Recovery Component

Revenue effect of price recovery = (Selling price in 2015 – Selling price in 2014) × Actual units if output sold 2015.

$$= (\text{`260} - \text{`250}) \times 246,700 = \text{`24,67,000F}$$

Cost effect of price-recovery for variable costs = (Input price in 2015 – Input price in 2014) X Units of input required to X produce 2015 output in 2014.

Cost effect of price recovery for fixed costs = (price per unit of capacity in 2015 – Price per unit of capacity in 2014) × units of input required to produce 2015 output in 2014.

Cost effect of price recovery for fixed costs = (Price per unit of capacity in 2015 – Price per unit of capacity in 2014) × actual units of capacity in 2014, if adequate to produce 2015 output in 2014

OR

If 2014 capacity inadequate to produce 2015 output in 2014, then units of capacity required to produce 2015 output in 2014, then units of capacity required to produce 2015 output in 2014

Direct materials costs	$(\text{`85} - \text{`100})$	$\times 2,49,192 =$	$\text{`37,37,880F}$
Administrative costs	$(\text{`3,100} - \text{`3000})$	$\times 4,000 =$	$4,00,000 \text{ U}$
Design costs	$(\text{`5,50,000} - \text{`5,00,000})$	$5 =$	$2,50,000 \text{ U}$
Total cost effect of price recovery component			$\text{`30,87,880F}$

In summary the net increase in operating income as a result of the price-recovery component equals:

Revenue effect of price-recovery	$\text{`24,67,000F}$
Cost effect of price-recovery	$30,87,880 \text{ F}$
Change in operating income due to price -recovery	<b><u><math>\text{`55,54,880 F}</math></u></b>

The productivity Component

Cost effect of productivity for variable costs = (Actual units of input used produce 2015 output - Units in input required to produce 2015 output in 2014) × Input price in 2015

Cost effect of productivity for fixed costs = (Actual units of capacity in 2015 – Actual units of capacity in 2014, if adequate to produce 2015 output in 2014

OR

If 2014 capacity inadequate to produce 2015 output in 2014, than units of capacity required to produce 2015 output in 2014) X Price per unit of capacity in 2015

The productivity component of cost changes are

Direct materials costs	(2,50,000 – 2,49,192) X	₹85	= 68,680 U
Administrative costs	(4,000 – 3,750) X	₹3,100	= 7,75,000 F
Design costs	(5 – 5)	₹5,50,000	= 0
Change in operating income due to productivity			<b>₹7,06,320 F</b>

The change in operating income between 2014 and 2015 can be analyzed as follows:

	Income statement Amount in 2014	Revenue & Cost effects of growth in 2015	Revenue & Cost effects of price recovery in 2015	Cost effect productivity in 2015	Income statement amount in 2015
	(1)	(2)	(3)	(4)	(5) =(1) + (2) + (3) + (4)
Revenue	₹4,95,00,000	₹1,21,75,000F	₹24,67,000F	--	₹6,41,42,000
Costs	3,45,00,000	49,19,200 U	30,87,880F	₹7,06,320F	3,56,25,000
Operating income	₹1,50,00,000	₹72,55,800F	₹55,54,880F	₹7,06,320F	₹2,85,17,000
	₹1,35,17,000F				
	Change in Operating Income				

- The analysis of operating income indicates that growth, price recovery, and productivity all resulted in favorable changes in operating income in 2015. Further a significant amount of the increase in operating income resulted from Octave’s product differentiation strategy. The company was able to continue to charge a premium price while growing sales. It was also able to earn an additional operating income by improving its productivity.



**Question 5:** As a result of action taken, quality has significantly improved in 2015 while rework and unit cost of DVD player have decreased. Sony has reduced manufacturing capacity because capacity is no longer needed to support rework. Sony has also lowered the DVS Player’s selling price to gain market share and unit sales have increased. Information about the current period (2015) and last period (2014) follows.

		2014	2015
1.	Units of DVD produced and sold	8,000	11,000
2.	Selling price	₹ 4,750	₹ 4,000
3.	Direct materials used (kits*)	10,000	11,000
4.	Direct materials cost per kits*	₹ 1,600	₹ 1,600
5.	Manufacturing capacity in kits processed	14,000	13,000
6.	Total conversion costs	₹ 1,40,00,000	₹ 1,30,00,000
7.	Conversion cost per unit of capacity (row 6 ÷ row 5)	₹ 1,000	₹ 1,000
8.	Selling and customer – service capacity	90 customers	90 customers
9.	Total selling and customer – service costs	₹ 6,75,000	₹ 8,10,000
10.	Selling and customer – service capacity cost per customer (row 6 ÷ row 8)	₹ 7,500	₹ 9,000

\*A kit is composed of all the major components needed to produce a DVD player

Conversion costs in each year depend on production capacity defined in terms of kits that can be processed, not the actual kits started. Selling and customer-service costs depend on the number of customer that Sony can support, not the actual number of customer's it serves. Sony has 70 customers in 2014 and 80 customers in 2015.

### **Required:**

1. Calculate operating income of Sony Company for 2014 and 2015.
2. Calculate the growth, price-recovery, and productivity components that explains the change in operating income from 2014 to 2015.
3. Comment on your answer in requirement 2. What do these components indicate?

Solution:-

**Operating income for each year is as follows:**

	2014	2015
Revenue costs (₹ 4,750 x 8,000; ₹ 4,000 x 11,000)	₹ 3,80,00,000	₹ 4,40,00,000
Direct material costs (₹ 1,600 x 10,000; ₹ 1,600 x 11,000)	1,60,00,000	1,76,00,000
Conversion costs	1,40,00,000	1,30,00,000
Selling & customer service costs	6,75,000	8,10,000
Total costs	3,06,75,000	3,14,10,000

	2014	2015
Operating income	`73,25,000	` 1,25,90,000
Change in operating income	`52,65,000 F	

1. The growth component

$$\text{Revenue effect of growth} = \left( \frac{\text{actual units of output sold in 2015}}{\text{actual units of output sold in 2014}} - 1 \right) \times \text{selling price in 2014}$$

$$= (11,000 - 8,000) \times ` 4,750 = ` 1,42,50,000 F$$

$$\text{Cost effect of growth for variable costs} = \left( \frac{\text{units of input required to produce 2015 output in 2014}}{\text{actual units of inputs used to produce 2014 output}} - 1 \right) \times \text{input price in 2015}$$

$$\text{Cost effect of growth for fixed costs} = \left( \frac{\text{actual units of capacity in 2014 because adequate capacity exists to produce 2015 output in 2014}}{\text{actual units of capacity in 2014}} - 1 \right) \times \text{price per unit of capacity in 2014}$$

Direct materials that would be required in 2015 to produce 11,000 units instead of the 8,000 units produced in 2014, assuming the 2014 input-output relationship continued into 2015, equal 13,750 kits  $\frac{10,000}{8,000} \times 11,000$ . that is, the number of kits to produce 11,000 units is 10,000 kits ÷ 8,000 units = 1.25 kits per unit x 11,000 units = 13,750 kits. Conversion costs and selling customer-service capacity will not change because adequate capacity exists in 2014 to support year 2015 output and customers.

**The cost effect of growth component are:**

Direct materials costs	(13,750 – 10,000) x `1,600 = ` 60,00,000 U
Conversion costs	(14,000 – 14,000) x ` 1,000 = 0
Selling & customer-service costs	(90 - 90) x ` 7,500 = 0
Cost effect of growth	` 60,00,000 U

In summary, the net increase in operating income as a result of the growth component equals:

Revenue effect of growth	` 1,42,50,000 F
Cost effect of growth	60,00,000 U
Change in operating income due to growth	<b>` 82,50,000 F</b>

**The Price- Recovery Component**

$$\text{revenue effect of price-recovery} = \left( \frac{\text{selling price in 2015}}{\text{selling price in 2014}} - 1 \right) \times \text{actual units of output sold in 2015}$$

$$= (` 4,000 - ` 4,750) \times 11,000 = `82,50,000 U$$

$$\text{cost effect of price-recovery for variable costs} = \left( \frac{\text{price per unit of capacity in 2015}}{\text{price per unit of capacity in 2014}} - 1 \right) \times \text{actual units of capacity in 2014 because adequate capacity exists to produce 2015 output in 2014}$$

Direct materials costs	(` 1,600 – ` 1,600) x 13,750 = `0
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Conversion costs	$(\text{€ } 1000 - \text{€ } 1,000) \times 12,000 = 0$
Selling & customer-service costs	$(\text{€ } 9,000 - \text{€ } 7,500) \times 90 = 1,35,000 \text{ U}$
Cost effect of price-recovery	$\text{€ } 1,35,000 \text{ U}$

In summary, the net increase in operating income as a result of the price-recovery component equals:

Revenue effect of price recovery	$\text{€ } 82,50,000 \text{ U}$
Cost effect of price-recovery	$\text{€ } 1,35,000 \text{ U}$
Change in operating income due to price-recovery	$\text{€ } 83,85,000 \text{ U}$

The productivity component

$$\text{Cost effect of productivity for variable costs} = \left( \frac{\text{actual units of input used to produce 2015 output}}{\text{units of input required to produce 2015 output in 2014}} - 1 \right) \times \text{unit price in 2015}$$

$$\text{Cost effect of productivity for fixed costs} = \left( \frac{\text{actual units of capacity in 2015}}{\text{actual units of capacity in 2014 because adequate capacity exists to produce 2015 output in 2014}} - 1 \right) \times \text{price per unit of capacity in 2015}$$

**The productivity component of cost changes are**

Direct materials costs	$(11,000 - 13,750) \times \text{€ } 1,600 = \text{€ } 44,00,000 \text{ F}$
Conversion costs	$(13,000 - 13,750) \times \text{€ } 1,600 = \text{€ } 10,00,000 \text{ F}$
Selling & customer-service costs	$(90 - 90) \times \text{€ } 9,000 = 0$
Change in operating income due to productivity	<u><math>\text{€ } 54,00,000 \text{ F}</math></u>

The change in income between 2014 and 2015 can be analyzed as follows:

	Income Statement Amounts in 2014 (1)	Revenue and cost effects of growth component in 2015 (2)	Revenue and cost effects of Price-recovery component in 2015 (3)	Cost effect of productivity component in 2015 (4)	Income statement amounts in 2015 (5) = (1) + (2) + (3) + (4)
Revenues	$\text{€ } 3,80,000$	$\text{€ } 1,42,50,000 \text{ F}$	$\text{€ } 82,50,000 \text{ U}$	-	$\text{€ } 4,10,00,000$
Costs	$3,06,75,000$	$60,00,000 \text{ U}$	$1,35,000 \text{ U}$	$\text{€ } 54,00,000 \text{ F}$	$3,14,10,000$
Operating income	$\text{€ } 73,25,000$	$\text{€ } 82,50,000 \text{ F}$	$\text{€ } 83,50,000 \text{ U}$ $\text{€ } 52,65,000 \text{ F}$	$\text{€ } 54,00,000 \text{ F}$	$\text{€ } 1,25,90,000$

**Change in operating income**

2. The analysis of operating income indicates that a significant amount of the increase in operating income resulted from Sony's cost leadership strategy. The company was able to improve quality and grow sales. The price recovery component indicates that Sony reduced price to be competitive in the market, but Sony also improved direct material productivity and reduced conversion cost capacity as rework decreased. Lower prices and higher quality boosted sales.



**Question 6:** Suppose that during 2015, the market for DVD player grew 10%. All increase in market share (that is, sales increases greater than 10%) and decreases in the selling price of the DVD are the result of Sony's strategic actions.

**Required:** Calculate how much of the change in operating income from 2014 to 2015 is due to the industry-market-size factor, product differentiation, and cost leadership. How does this relate to Sony's strategy and its success in implementation? Explain.

**Solution**

Effect of the industry-market-size factor on operating income

Of the 3,000-unit increase in sales from 8,000 to 11,000 units, 10% or 800 (10% × 8,000) units are due to growth in market size, and 2,200 (3,000 – 800) units are due to an increase in market share. The change in Sony's operating income from the industry-market size factor rather than from specific strategic actions is:

$$\$82,500,000 \text{ (the growth component in Exercise 12-29)} - \frac{800}{3,000} \times 22,000,000 \text{ F}$$

Effect of product differentiation on operating income

The change in operating income due to:

$$\text{Increase in price of inputs (cost effect of price recovery)} \quad \$1,350,000 \text{ U}$$

Effect of cost leadership on operating income

The change in operating income from cost leadership is:

$$\text{Productivity component} \quad \$54,000,000 \text{ F}$$

$$\text{Decrease in selling price (revenue effect of price recovery)} \quad 82,500,000 \text{ U}$$

Growth in market share due to cost leadership

$$-\$82,500,000 \text{ (the growth component in exercise 12-29)} + \frac{2,200}{3,000} \times 60,500,000 \text{ F}$$

$$\text{Change in operating income due to cost leadership} \quad \$52,650,000 \text{ F}$$

The change in operating income between 2014 and 2015 can be summarized as follows:

Change due to industry market-size	\$22,000,000 F
Change due to product differentiation	1,350,000 U
Change due to cost leadership	52,650,000 F

Sony has been successful in implementing its cost leadership strategy. The increase in operating income during 2015 was due to cost leadership through quality improvements and sales growth. It cuts its prices significantly to gain market share that might also benefit it in future periods.

Sony's operating income increase in 2015 was also helped by a growth in the overall market size.



**Question 7:** Following a strategy of product differentiation, Westwood company makes a high-end kitchen range hood, KE8. Westwood's data for 2012 and 2013 follows:

		2012	2013
1	Units of KE8 produced and sold	40,000	42,000
2	Selling price	¥1,000	¥1,100
3	Direct materials (square feet)	1,20,000	1,23,000
4	Direct material cost per square foot	¥100	¥110
5	Manufacturing capacity for KE8	50,000 units	50,000 units
6	Conversion costs	¥1,00,00,000	¥1,10,00,000
7	Conversion cost per unit of capacity (Row 6 ÷ Row 5)	¥200	¥220
8	Selling and customer –service capacity	30 customers	29 customers
9	Selling and customer-service costs	¥72,00,000	¥72,50,000
10	Cost per customer of selling and customer-service capacity (Row 9 ÷ Row 8)	¥2,40,000	¥2,50,000

Westwood produced no defective units and reduced direct material usage per unit of KE8 in 2013. Conversion cost in each year are tied to manufacturing capacity. Selling and customer service costs are related to the number of customers that the selling and service functions are designed to support. Westwood has 30 customers (wholesalers) in 2012 and 29 customers in 2013.

**Required:**

1. Describe briefly the element you would include in Westwood's balanced scorecard.
2. Calculate the growth, price recovery, and productivity components that explain the change in operating income from 2012 to 2013.
3. Suppose during 2013, the market size for high end kitchen range hoods grew 3% in terms of number of units and all increases in market share (that is, increases in the number of units sold greater than 3%) are due to Westwood's product-differentiation strategy. Calculate how much of the change in operating income from 2012 to 2013 is due to the industry-market-size factor, cost leadership, and product differentiation.

**Solution:**

1. The balanced scorecard should describe Westwood’s product differentiation strategy. Element that should be included in its balanced scorecard are:

- **Financial perspective** Increase in operating income from higher margins on KE8 and from growth.
- **Customer perspective** market share in the high-end market and customer satisfaction.
- **Internal business process perspective** Manufacturing quality , order delivery time, on-time delivery , new product features added, development time for new products, and improvements in manufacturing processes.
- **Learning and growth perspective** Percentage of employees trained in process and quality management and employee satisfaction ratings.

2. Operating Income for each year is:

	2012	2013
Revenues		
(`1,000 per unit × 40,000 units ; `1,100 per unit × 42,000 units)	`4,00,00,000	`4,62,00,000
Costs		
Direct material Costs		
(`100 per sq ft × 1,20,000 Sq Ft ; `110 per sq ft × 1,23,000 sq. ft)	1,20,00,000	1,35,30,000
Conversion costs		
(`200 per unit × 50,000 units ; `220 per unit × 50,000 units)	1,00,00,000	1,10,00,000
Selling and customers service cost		
(`2,40,000 per customer × 30 customers)		
`2,50,000 per customer × 29 customers	72,00,000	72,50,000
Total Costs	2,92,00,000	3,17,80,000
Operating income	`1,08,00,000	`1,44,20,000
Change in operating income		`36,20,000 F

Growth Component of Operating Income Change

$$\begin{aligned}
 & \text{Revenue effect of growth} \left( \frac{\text{Actual unit of output sold in 2013}}{\text{Actual unit of output sold in 2012}} - \text{Actual unit of output sold in 2012} \right) \times \text{Selling price in 2012} \\
 & = (42,000 \text{ units} - 40,000 \text{ units}) \times `1,000 \text{ per unit} = `20,00,000 \text{ F} \\
 & \text{Cost effect of growth for variable Costs} \left( \text{unit of input required to produce 2013 output in 2012} \right. \\
 & \quad \left. - \text{Actual unit of input used to produce 2012 output} \right) \times \text{input price in 2012}
 \end{aligned}$$

Cost effect of growth for direct materials

$$= \left( 1,20,000 \text{sqft} \times \frac{42,000 \text{ units} - 1,20,000 \text{Sq. Ft}}{40,000 \text{ units}} \right) \text{Rs. } 100 \text{ persqft.}$$

$$= (1,26,000 \text{sq ft} - 1,20,000 \text{sq ft}) \times `1,20,000 \text{sq. Ft} = `6,00,000 \text{ U}$$

Cost effect of growth for fixed Costs

$$= (\text{Actual units of capacity in 2012 because adequate capacity exist to produce 2013 output in 2012} - \text{Actual unit of capacity in 2012})$$

X Process per unit of capacity in 2012.

Cost effects of growth for fixed Costs are:

Conversion costs: (50,000 units - 50,000 units) × 200 per unit = `0

Selling and customer-service costs: (30 customers - 30 customers) × `2,40,000 per customer = `0

In summary the net increase in operating income attributable to growth equals:

Revenue effect of growth		`20,00,000 F
Cost effect of growth		
Direct material costs	`6,00,000 u	
Conversion costs	0	
Selling & Customer -service costs	<u>0</u>	<u>6,00,000 U</u>
Change in operating income due to growth		<u><b>`14,00,000 F</b></u>

Price -Recovery Component of Operating -Income Change

Revenue effect of price recovery = (Selling price in 2013 - Sellign price in 2012) × Actual units of output sold in 2013

$$= (`1,110 \text{ per unit} - `1,000 \text{ per unit}) \times 42,000 \text{ units} = `42,00,000 \text{ F}$$

Cost effect of price recovery for fixed costs = (price per unit of capacity in 2013 - Price oer unit of capacity in 2012) × Actual units if capacity in 2012 because asequate capacity exists to produce 2013 output in 2012

Cost effect of price recovery for fixed costs are:

Conversion Costs: (`220 per unit - `200 per unit) × 50,000 units = `10,00,000 u

Selling and cust- service costs: (`2,50,000 per cust - `2,40,000 per cust) × 30 customers × `3,00,000 u

In summary, the increase in operating income attributable to price recovery equals:

Revenue effect of price recovery		`42,00,000 F
Cost effect of price recovery		
Direct material costs	`12,60,000 U	
Conversion Costs	10,00,000 U	
Selling and customers service costs	<u>3,00,000 U</u>	<u>25,60,000 U</u>
Change in operating income due to price recovery		<u><b>`16,40,000 F</b></u>

Productivity Component of operating –income change

Cost effect of productivity for variable costs =  
(*Actual unit of input used to produce 2013 output – unit of input required to produce 2013 output in 2012*)

× Input price in 2013

Cost effect of productivity for direct materials = (1,23,000 Sq.ft – 1,26,000 sq ft) X ` 110 per sq ft = `3,30,000F

Cost effect of productivity for fixed costs =  
(*Actual units of capacity in 2013 –*

*Actual unit of capacity in 2008, because adequate capacity exist to produce 2013 output in 2012*)

× Price per unit of capacity in 2013

Cost effects of productivity for fixed costs are:

Conversion costs: (50,000 unit – 50,000 unit) × 220 pe runti = `0

Selling and customer – Service costs : (29 customers – 30 customers) × `2,50,000/customers = `2,50,000F

In Summary the net increase in operating income attributable to productivity equals:

Cost effect of productivity	
Direct material costs	`3,30,000 F
Conversion costs	0
Selling & Customers-service costs	2,50,000 F
Change in operating income due to productivity	<u><b>`5,80,000 F</b></u>

A summary of the change in operating income between 2012 and 2013 follows:

	Income statement Amounts in 2012 (i)	Revenue & Cost effect of growth component in 2013 (2)	Revenue & Cost effect of price-Recovery component in 2013 (3)	Cost effect of productivity component in 2013 (4)	Income statement Amount in 2013 (5) = (1) + (2) + (3)+(4)
Revenue	`4,00,00,000	`20,00,000F	`42,00,000F	--	`4,62,00,000
Costs	2,92,00,000	6,00,000 U	25,60,000 U	`5,80,000F	3,17,80,000
Operating					
Income	`1,08,00,000	`14,00,000F	`16,40,000F	`5,80,000F	`1,44,20,000
				36,20,000 F	
				Change in Operating Income	

3. Effect of the Industry –market size factor on operating income of the increase in sales from 40,000 to 42,000 units, 3% or 1,200 are due to an increase in market share. The change in Westwood’s operating income from the industry market size factor rather than specific strategic actions is:

₹14,00,000 (column 2 of preceding table) X

$$\frac{1,200 \text{ units}}{Rs.2,000 \text{ unit}} = ₹8,40,000 \text{ F}$$

**Effect of product differentiation on Operating income**

Increase in the selling price of KE8(revenue effect of the price-recovery component)	₹42,00,000F
Increase in prices of inputs(cost effect of the price-recovery component)	25,60,000 U
Growth in market share due to product differentiation	<u>5,60,000 F</u>
₹14,00,000 (Column 2 of preceding table × 800 units/ 2,000 units	
Change in operating income due to product differentiation	<u>₹22,00,000F</u>
Effect of cost leadership on operating income	
Productivity component	<u>₹5,80,000F</u>

**A Summary of the net increase in operating income from 2012 to 2013 follows:**

Change due to the industry market size factor	₹8,40,000 F
Change due to product differentiation	22,00,000 F
Change due to cost leadership	5,80,000 F
Change in operating income	<u>₹36,20,000 F</u>

4. The analysis of operating income indicates that a significant amount of the increase in operating income resulted from WestWood’s successful implementation of its product-differentiation strategy (operating income attributable to product differentiation ₹ 22,00,000F). The company was able to continue to charge a premium price for KE8 while increasing market share. Westwood was **also** able to earn additional operating income through productivity improvement (operating income attributable to cost leadership ₹ 5,80,000F)



**Direct Product Profitability**

**Question 9:-**Direct Product Profitability is most commonly found in:

- A. The car manufacturing industry
- B. The grocery trade
- C. Product design departments
- D. The travel agency business
- E. Production departments

**Answer: B**



**Question 10:**Superglow Ltd is a trader in four major varieties of paints. All varieties are equally popular and the monthly sales of each are 500 tins. The following information is presented for a month.

Variety	Ruby red	Marvel Green	Silver White	Regal Blue
Selling price per Tin	₹150	₹125	₹250	₹500
Purchase price per tin	₹90	₹80	₹180	₹400
Warehouse area occupied	50cu. cm	75 cu.cm	125 cu.cm	200 cu.cm
Financing cost per unit per day	₹2	₹2	₹2.5	₹3
Average stay in stores	3 days	3 days	3 days	3 days

**The varieties Direct Costs are—**

(a) Transportation -2% of Purchase Price	(c) Ware house Rent-₹ 9,000 (Based on area occupied)
(b) Incentive to staff -1% of sale price	(d) Financing Cost- Based on average say in stores

Indirect Costs and Establishment Expenses work out to ₹ 71,625.

Prepare a statement showing Direct Product profit per unit for each variety. Also compute the profit for the month.

**Solution:** **Direct Product Profitability Statement**

Product	Ruby Red	Marvel Green	Silver White	Regal Blue
Sale Price per tin	150.00	125.00	250.00	500.00
Less: Purchase price per tin	90.00	80.00	180.00	400.00
Transportation at 2%	1.80	1.60	3.60	8.00
Incentive on sales	1.50	1.25	2.50	5.00
Warehouse Rent(See note)	2.00	3.00	5.00	8.00
Financing Cost	6.00	6.00	7.50	9.00
Direct Product Profit per unit	48.70	33.15	51.40	70.00
Quantity Sold	500 units	500 units	500 units	500 units
Total Direct Product Profit	24,350	16,575	25,700	35,000

Total Direct Product profit =24,350 + 16,575+25,700 +35,000	₹1,01,625
Less: General Indirect costs and Establishment Expenses (given) hence, Net Profit	₹71,625
Hence, Net Profit	₹30,000

**Note:** Warehouse Rent= ₹9,000, apportioned based on area occupied as ₹1,000, ₹1,500, ₹2,500 and ₹4,000 respectively. Cost per tin is calculated by dividing each by 500 tins.



**Question 11:** AB plc is a supermarket group which incurs the following costs:

- (i) The bought-in price of the good
- (ii) Inventory financing costs
- (iii) Shelf refilling costs
- (iv) Costs of repacking or pack out prior to storage before sale.

AB plc’s calculation of Direct Product Profitability would include:

- A. All of the above costs, except
- B. All of the above costs, except (ii)
- C. All of the above costs, except (iv)
- D. Costs (i) and (ii) only
- E. Cost (i) only

**Solution:** The answer is A: All of the costs described can be identified with specific goods and would be deducted from the selling price to determine the direct product profit.



**Question 12:**Jigyasa India Ltd. (JIL) has 30 retail stores of uniform sizes ‘Fruity &Sweety Retails’ across the country. Mainly three products namely ‘Butter Jelly’, ‘Fruits & Nuts’ and ‘Icy Cool’ are sold through these retail stores. JIL maintains stocks for all retail stores in a centralised warehouse. Goods are released from the warehouse to the retail stores as per requisition raised by the stores. Goods are transported to the stores through two types of vans i.e. normal and refrigerated. These vans are to be hired by the JIL.

Costs per month of JIL are as follows:

	(₹)
<b>Warehouse Costs:</b>	
Labour & Staff Costs	27,000
Refrigeration Costs	1,52,000
Material Handling Costs	28,000

		(₹)
Total		2,07,000
<b>Head Office Cost:</b>		
Salary & Wages to Head Office Staff		50,000
Office Administration Costs		1,27,000
Total		1,77,000
<b>Retail Stores Costs:</b>		
Labour Related Costs		33,000
Refrigeration Costs		1,09,000
Other Costs		47,000
Total		1,89,000

Average transportation cost of JIL per trip to any retail stores are as follows:

	₹
Normal Van	3,200
Refrigerated Van	4,900

The Chief Financial Manager asked his Finance managers to calculate profitability based on three products sold through Fruity & Sweety retail stores rather than traditional method of calculating profitability.

The following information regarding retail stores are gathered:

	Butter Jelly	Fruits & Nuts	Icy Cool
No. of Cartons per cubic metre (m <sup>3</sup> )	42	28	40
No. of Items per cartons (units)	300	144	72
Sales per month (units)	18,000	4,608	1,152
Time in Warehouse (in months)	1	1.5	0.5
Time in Retail Stores (in months)	1	2	1
Selling Price per unit (₹)	84	42	26
Purchase Price per unit (₹)	76	34	22

Butter Jelly and Icy-Cool are required to be kept under refrigerated conditions. Additional information:

Total Volume of All Goods Sold per month	40,000 m <sup>3</sup>
Total Volume of Refrigerated Goods Sold per month	25,000 m <sup>3</sup>
Carrying Volume of each van	64 m <sup>3</sup>

**Required:** CALCULATE the Profit per unit using Direct Product Profitability (DPP) method.

**Solution**

**Direct Product Profitability (DPP) Statement**

(Amount in `)

	Butter Jelly	Fruits & Nuts	Icy Cool
Selling Price per unit	84.00	42.00	26.00
Less: Purchase Price per unit	76.00	34.00	22.00
Gross Profit ... (A)	8.00	8.00	4.00
Direct Product Costs:			
Warehouse Costs per m <sup>3</sup> [W.N.-1]	7.46	2.07	3.73
Retail Stores Costs per m <sup>3</sup> [W.N.-2]	6.36	4.00	6.36
Transportation Costs [W.N.-3]	76.56	50.00	76.56
Total DPP costs per m <sup>3</sup>	90.38	56.07	86.65
Items per m <sup>3</sup> [W.N.-4]	12,600	4,032	2,880
Cost per item ... (B)	0.007	0.014	0.030
Direct Product Profit ... (A) – (B)	7.993	7.986	3.97

**Working Notes**

**(1) Warehouse Related Costs**

	General Costs (₹)	Cost Related with Refrigerated Goods (₹)
Labour & Staff Costs	27,000	—
Refrigeration Costs	—	1,52,000
Material Handling Costs	28,000	---
Total	55,000	1,52,000
Volume of Goods Sold	40,000 m <sup>3</sup>	25,000 m <sup>3</sup>
Cost per m <sup>3</sup> per month	1.38	6.08

Products	Time in Warehouse	Cost per m <sup>3</sup> per month (₹)	Total Cost (₹)
----------	-------------------	---------------------------------------	----------------

Butter Jelly	1 Month	7.46 (1.38 + 6.08)	7.46
Fruits & Nuts	1.5 Months	1.38	2.07
Icy-cool	0.5 Months	7.46 (1.38 + 6.08)	3.73

(2) Retail Stores Related Costs

	General Costs (₹)	Cost Related with Refrigerated Goods (₹)
Labour Related Costs	33,000	—
Refrigeration Costs	—	1,09,000
Other Costs	47,000	—
Total	80,000	1,09,000
Volume of Goods Sold	40,000 m <sup>3</sup>	25,000 m <sup>3</sup>
Cost per m <sup>3</sup> per month	2.00	4.36

Products	Time in Retail Stores	Cost per m <sup>3</sup> per month	Total Cost
Butter Jelly	1 Month	6.36 (2.00 + 4.36)	6.36
Fruits & Nuts	2 Months	2.00	4.00
Icy-Cool	1 Month	6.36 (2.00 + 4.36)	6.36

(3) Transportation Costs

	Normal Van Costs	Refrigerated Van Costs
Cost per trip	3,200	4,900
Volume of Van	64 m <sup>3</sup>	64 m <sup>3</sup>
Cost per m <sup>3</sup> per trip	50.00	76.56

(4) No. of Items per m<sup>3</sup>

Products	No. of Cartons (m <sup>3</sup> )	No. of Items per Cartons (units)	No. of Items per m <sup>3</sup>
----------	-------------------------------------	-------------------------------------	---------------------------------

Butter Jelly	42	300	12,600 (42 × 300)
Fruits & Nuts	28	144	4,032 (28 × 144)
Icy - Cool	40	72	2,880 (40 × 72)



**Question 13:** RS Company is a retail organization. It has 15 super markets, all of which are the same Goods are transported to RS Company’s central warehouse by supplier’s vehicles and stored at the warehouse until needed at the supermarkets- at which point they transported by RS Company’s lorries. (Ice Cream is to be kept in Refrigerator)

RS Company’s Cost are:

	`000
<b>Warehouse costs, per week</b>	
Labour costs	220
Refrigeration costs	160
Other direct product costs	340
	<b>720</b>
<b>Head- office costs, per week</b>	
Labour costs	80
Other costs	76
	<b>156</b>
	`
<b>Supermarket costs, per shop per week</b>	
Labour costs	16,000
Refrigeration costs	24,000
Other direct product costs	28,000
	<b>68,000</b>
	<b>Amount ( ` )</b>
<b>Transport costs per trip</b>	
Standard vehicles	3750

Refrigerated vehicles	4950
-----------------------	------

The company has always used retail sales revenue less bought in price to calculate the relative profitability of the different products. However the chief executive is not happy with this method and has asked for three products-baked beans, ice cream and south African White Wine- to be costed on a direct product profit basis.

The accountant has determined the following information for the supermarket chain:

	Baked Beans	Ice cream	White wine
No. of cases per cubic meter (m <sub>3</sub> )	28	24	42
No of items per case	80	18	12
Sales for the week –items	15000	2000	500
Time in warehouse-weeks	1	2	4
Time in supermarket –weeks	1	2	2
Retail selling price per item	`0.32	`1.60	`3.45
Bought in price per item	`.24	`.95	`.85

**Additional information:**

Total volume of all goods sold every week	20,000 m <sup>3</sup>
Total volume for refrigerated goods sold per week	5000 m <sup>3</sup>
Carrying volume of each vehicle	90 m <sup>3</sup>
Total sales revenue per week	`.5m
Total sales Revenue of refrigerated goods per week	`.650000

**Required:** Calculated the profit per item using the direct product profitability method.

Solution:- Initial Costings

		\$per cubic meter
Warehouse costs per week		
Refrigeration	\$160,000/5,000	32.00 per week
Other	\$560,000/20,000	28.00 per week
Supermarket costs per week		
Refrigeration	15X\$24,000/5,000	72.00 per week
Other	15X \$44,000/20,000	33.00 per week

Transport costs per trip		
Refrigerated	\$4,950/90 cubic meters	55.00 per week
Standard	\$3,750/90 cubic meters	41.67 per week

Direct Product Profit (DPP)

	Baked beans		Ice cream		White wine	
	\$ per item	\$ per item	\$ per item	\$ per item	\$ per item	\$ per item
Sales revenue		0.320		1.600		3.450
Direct cost		0.240		0.950		2.850
Gross Profit		<u>0.080</u>		<u>0.650</u>		<u>0.600</u>
Warehouse costs						
refrigeration						
\$32/24/18X2 Weeks			0.148			
Other						
\$28 /28 / 80 X 1 week	0.012					
\$28 /24 / 18 X 2 week		0.130				
\$28 /42 / 12 X 4 week				0.222		
Supermarket Costs						
Refrigretion						
\$72 / 24 / 18 X 2 Weeks		0.333				
Other						
\$33 / 28 / 80 X 1 week	0.015					
\$ 33 / 24 / 18 X 2 week		0.153				
\$33 / 42 / 12 X 2 week				0.131		
Transport						
\$41.67 / 28 / 80	0.019					

\$ 55 / 24 / 18		0.127				
\$ 41.67 / 42 / 12				0.083		
	0.046		0.891		0.436	
Direct Product Profit	<u>0.034</u>		<u>(0.241)</u>		<u>0.164</u>	
% of Sales	25%		40.6%		17.4%	

Using DPP the ranking of profits is as follows:-

- 1<sup>st</sup> Baked beans
- 2<sup>nd</sup> White wine
- 3<sup>rd</sup> Ice cream-loss-making

Using the traditional method the ranking was as follows.

- 1<sup>st</sup> Ice cream
- 2<sup>nd</sup> Baked beans
- 3<sup>rd</sup> White Wine

There are two main causes of the difference in profits between the two methods.

- (i) The traditional method focused on the gross margin only and did not apportion overhead costs.
- (ii) With DPP, Ice cream is charged a higher proportion of overhead to reflect the fact that it uses the high cost activities of refrigerated transport and storage. The beans and the wine absorb only the costs of the (Lower cost) resources that they use.

Ways in which probability could be improved

- (i) Refrigerated transport. At \$4,950 per trip this is a high cost activity.
  - (a) Care must be taken to ensure all journeys using refrigerated transport carry full loads.
  - (b) Suppliers of goods requiring refrigeration should be contacted to determine whether they would be able to deliver direct to the store, thus eliminating this cost for Rs.
- (ii) Adjust selling prices. A full DPP analysis should be carried out and adjustments made to selling prices wherever possible to reflect any costs which are found not to be covered.
- (iii) Adjust the product range. Where prices cannot be increased sufficiently and where does not need to be stocked in order to attract customers, consideration might be discontinuing that product and replacing it with a line with a higher DPP.

(C) Ways in which DPP differs from traditional overhead absorption

- (i) Traditional absorption costing would utilize an overhead rate by department rather than products. Products that generate a high level of overhead spending would not be penalised and would be averaged out over all products which use a department's facilities regarding cost generated by that use.

- (ii) Traditional overhead absorption may have attempted to include a share of the head whereas DPP would ignore this because the costs are not caused by the individual.
- (iii) DPP is likely to provide better information for planning and control. High cost activity recognized and controlled more tightly. The stocking of products which utilise only activities may be encouraged. Selling prices should more accurately reflect the action generated.



**Question 14:** Super Food Ltd. Manufactures 3 types of biscuits, A, B and C, in a fully mechanised factory. The company has been following conventional method of costing and wishes to shift to Activity Based Costing System and therefore wishes to have the following data presented under both the systems for the month.

Inspection Cost	₹ p.m.	73,000
Machine – Repairs & Maintenance	₹ p.m.	1,42,000
Dye Cost	₹ p.m.	10,250
Selling Overheads	₹ p.m.	1,62,000

	Product A	Product B	Product C
Prime Cost (₹ per unit)	12	9	8
Selling Price (₹ per unit)	18	14	12
Gross Production (units/production run)	2,520	2,810	3,010
No. of Defective (units/production run)	20	10	10
Inspection: No. of Hours/Production Run	3	4	4

	Product A	Product B	Product C
Dye Cost/Production Run (₹)	200	300	250
No. of Machine Hours/Production Run	20	12	30
Sales – No. of Units/Month	25,000	56,000	27,000

The following additional information is given:

- (1) No accumulation of inventory is considered. All good units produced are sold.
- (2) All manufacturing and selling overheads are conventionally allocated on the basis of units sold.
- (3) Product A needs no advertisement. Due to its nutritive value, it is readily consumed by diabetic patient of a hospital. Advertisement costs included in the total selling overhead is `83,000.
- (4) Product B needs to be specially packed before being sold, so that it meets competition. `54,000 was the amount spent for the month in specially packing B, and this has been included in the total selling overhead cost given.

You are required to present product wise profitability of statements under the conventional system and the ABC system and accordingly rank the products.

**Solution:**

Particulars	A	B	C	Total
Sales Units	25,000	56,000	27,000	1,08,000
Selling Price per unit	18	14	12	
Sales Value (₹) ... (A)	4,50,000	7,84,000	3,24,000	15,58,000
Prime Cost Overhead	12	9	8	
No. of Units per run	2,520	2,810	3,010	
Prime Cost (₹) ... (B)	3,02,400	5,05,800	2,16,720	
Gross Margin ... (A) – (B)	1,47,600	2,78,200	1,07,280	5,33,080

Particulars	A	B	C	Total
Inspection Cost $\left( \frac{73,000}{146} \times 30 / 80 / 36 \text{ respectively} \right)$	15,000	40,000	18,000	73,000
Machine Maintenance	40,000	48,000	54,000	1,42,000

Particulars	A	B	C	D
$\left( \frac{1,42,000}{710} \times 200 / 240 / 270 \text{ respectively} \right)$				
Dye Cost	2,000	6,000	2,250	10,250
Production Overheads	57,000	94,000	74,250	2,25,250
Advertisement	---	56,000	27,000	83,000

Particulars	A	B	C	D
$\left( \frac{83,000}{56,000 + 27,000} \times 56 / 27 \text{ respectively} \right)$				
Packing	---	54,000	---	54,000
Other Overheads	5,787	12,963	6,250	25,000
$\left( \frac{25,000}{108} \times 25 / 56 / 27 \text{ respectively} \right)$				
Selling Overheads	5,787	1,22,963	33,250	1,62,000

**Workings:**

No.	Particulars	A	B	C	Total
(1)	Gross Production (Unit/run)	2,520	2,810	3,010	
(2)	Defective/Run	20	10	10	
(3)	Good Units /Run	2,500	2,800	3,000	
(4)	Sales (goods units)	25,000	56,000	27,000	
(5)	No. of Runs	10	20	9	
(6)	Gross Production ... (1 × 5)	25,200	56,200	27,090	
(7)	Prime Cost /Unit	12	9	8	
(8)	Prime (₹)	3,02,400	5,05,800	2,16,720	10,24,920
(9)	Inspection Hours/Run	3	4	4	
(10)	Inspection Hours ... (9 × 5)	30	80	36	146
(11)	M/c Hours/Run	20	12	30	
(12)	M/c Hours ... (11 × 5)	200	240	270	710
(13)	Dye Cost/Run	200	300	250	
(14)	Dye Cost ... (13 × 5)	2,000	6,000	2,250	10,250

**Conventional Accounting System**

Particulars	A	B	C	Total
Sales – Units/Production (good units)	25,000	56,000	27,000	1,08,000
Gross Margin (₹) ... (A)	1,47,600	2,78,200	1,07,280	5,33,080

Production Overheads (°)		52,141	1,16,797	56,313	2,25,250
Selling Overheads (°)		37,500	84,000	40,500	1,62,000
Sub-Total Overheads (°)	...(B)	89,641	2,00,797	96,813	3,87,250
Net Profit (°)	(A) – (B)	57,959	77,403	10,467	1,45,830
Ranking		II	I	III	

Activity Based System

Particulars	A	B	C	Total	
Sales – Units/Production (good units)	25,000	56,000	27,000	1,08,000	
Gross Margin (°)	...(A)	1,47,600	2,78,200	1,07,280	5,33,080
Production Overheads (°)		57,000	94,000	74,250	2,25,250
Selling Overheads (°)		5,787	1,22,963	33,250	1,62,000
Sub-Total Overheads (°)	...(B)	62,787	2,16,963	1,07,500	3,87,250
Net Profit (°)	(A) – (B)	84,813	61,237	(220)	1,45,830
Ranking		I	II	III	



**Question 15:** Supermarket wholesaler sells over 40,000 product lines to retailers who visit the store. It has 45,000 m<sup>3</sup> of general storage including 100m<sup>3</sup> of cold storage. General overheads are \$90,000 and additional cold storage costs are \$ 5,000 Two of the products sold are single frozen desserts (FD) and trays of 48 cans of soft drinks(SD)

The wholesaler pays \$0.4 a FD which is 0.03m<sup>3</sup> and sells for \$4. The trays of SD are 0.3m<sup>3</sup> and are bought for \$5 and sold for \$30.

Calculated to two decimal places the net profit per FD is:

And per crate of FD is \$

And per crate of SD is \$

**Answer:** The cold storage was included in the space of general storage and therefore the Frozen desserts should be allocated a share of the general costs as well as the cold storage costs.

General Storage= \$90,000/45,000 = \$2m<sup>3</sup>

Cost storage = \$5,000/100= \$50m<sup>3</sup>

Net profit of SD = \$30-\$5-(0.3m<sup>3</sup> × \$2) = \$24.40



**Question 16:**Walken supermarkets sells over 30,000 product lines. It wishes to introduce

Direct Product Profitability analysis and a team of management accountants have ascertained the following information relating to the following year:

Budgeted Weekly overhead	\$
Warehouse costs	75,000
Supermarket Costs	40,000 per supermarket
Transportation costs	400 per delivery

The warehouse is expected to handle 10,000 cubic meters (m<sup>3</sup>) of goods.

Each supermarket will handle 5,00m<sup>3</sup> of goods each week.

Each transportation vehicle holds 40m<sup>3</sup> of goods.

Three products sold by Walken are Kitchen Roll (Kr), Tinned Spaghetti (TS) and Toothpaste (T):

	Kr	TS	T
Retail price per item	\$1.00	\$0.60	\$1.75
Bought-in price per item	\$.60	\$0.30	\$1.00
Number of items per case	10	25	40
Number of cases per m <sup>3</sup>	20	30	20
Time in warehouse	1 week	2 weeks	3 weeks
Time in supermarket	2 Weeks	4 Weeks	2 Weeks

**Required:-** Calculate the following figures, in \$ to four decimal places:—

The net profit per kitchen roll

The net profit per tin of spaghetti

The net profit per tube of toothpaste

**Solution:-**

Warehouse cost  $\$75,000 \div 10,000 = \$7.50\text{m}^3$

Supermarket cost  $\$40,000 \div 5,000 = \$8.00 \text{ per m}^3$

Transportation cost  $\$400 \div 40 = \$10 \text{ per m}^3$

	KR\$	TSS\$	T\$
Retail price	1.00	0.60	1.75
Less bought –in–price	(0.60)	(0.30)	(1.00)
Gross margin	0.40	0.30	0.75

Less Overheads:			
Warehouse costs (See workings)	0.0375	0.02	0.0281
Supermarket costs (See workings)	0.08	0.0427	0.02
Transportation costs (See workings)	0.05	0.0133	0.0125
Net profit	0.2325	0.2240	0.6894

**Workings:**

Number of items per m<sup>3</sup>     $10 \times 20 = 200$      $25 \times 30 = 750$      $40 \times 20 = 800$

**Warehouse charge:**

Kitchen roll ( $\$7.50 \div 200$ )  $\times 1$  week = 0.0375

Tinned spaghetti ( $\$7.50 \div 750$ )  $\times 2$  weeks = 0.02

Toothpaste ( $\$7.50 \div 800$ )  $\times 3$  weeks = 0.028125



## Customer Profitability

**Question 18:** Which one of the following is NOT a valid benefit or advantage of conducting customer profitability analysis?

- It enables resources to be focuses on the most profitable areas
- It identifies unexpected differences in profitability between customers
- It highlights the benefit of retaining existing customers
- It is a simple exercise.

**Answer:** The correct answer is: it is a simple exercise.

Practical customer profitability calculations can be complex or rely on estimates, Assigning indirect costs to different activities or customers is often difficult.



**Question 23:** Established in the year 1997, Excellent woodcraft Private Limited (EWPL) is one of the distinguished manufactures and suppliers of an unlimited array of Wooden Furniture Items. Product compliation comprises of Modular Furniture, Workstations, and Cefeteria Furniture. Moreover, it is also engaged in presenting FurnitureSevices that include interior Fit out, Office interiors and corporate interior Designing .Sicneinceprion, it has strived to proffer an excellent blend of optimum quality and price, and successfully established the company as the preferred choice of customers in the past years.This is the reason that tis products and services are applauded in the industry for its flawlessness.

At EWPL, a world class infrasturcture is set up with different types of latest technology based machines and equipment which provide great support in hassle-free production and storage of the proffered assortment. Besides the spacious workspace, it has recruited a

team of skilled and experienced professionals, who are magnificently trained to understand and meet the diverse client equirietn within the committed tiem period. It aims to attain complete client satisfaction and put in its best efforts to achieve the same by offering outstanding product range & feasible services.

EWPL's Budgeting Process for sales

- 1:- Each salesgirl makes a customer wise listing of sales for the last few years. Based on this information and her knowledge about customer's requirements, she determines an overall sales goal.
- 2:- The sale managers, W Robert gathers all this information and modifies it a bit. APrticularly W looks at varicne in sales growth and modifies low projections to be in lien with the average. He, of course, discusses this correction with the concerned sales girl. The usual approach is to hold up the other forecasts and attribute lack of sales growth to lowest talent.
- 3:- W then meets with J Donald , Managing Director .By this time, J already back out of his sales expectations for next year based on his desired profit. J discusses the overall target with the W. The usual result is a 7% to 10% increase in projected sales which the W allocates among the salesgirl based on their past performcne.
- 4:- Of course J desires that the W discuss and negotiate any alteration with the sales force. HE believes that with apporpratie logics, not high but attainable targets for his sales team can be met.

### Required

- 1:- Discuss the participative nature of the sales budgeting process at EWPL.
- 2:- Advice on best apporch from EWPL's perspective that may be adopted.

**Solution:-** In Participative budgeting, subordinate managers create their own budget and these budgets are reviewed by senior management. Such budget communicates a sense of responsibility to subordinate managers and fosters creativity. This is also called bottom up approach (Sometime referred as participative approach).

As the subordinate managers creates the budget , it might be possible that the budget such goals become the managers personal goal rsulting in greatere goal congruence. In addition to the behavioural benefits, participative budgeting also has the advantage of involving individuals whose knowledge of local conditions may enhance the entire planning process.

The participative budget described here appers participative in name only. In virtually every instance, the participative input is subject to oversight and discussion by slaes manager. Some amount of revision is also common. However excessive and arbitrary review that substitutes a top-down target for a bottom-up estimate makes a deceit process. Such a gutting appears to be the case in EWPL. J's statement indicates a vary automatic style. The revision process also seems to be arbitrary and capricious. There is little incentive for the salesgirls to spend much time and effort in projecting the true expected sales because they know that the target wold be revised again and j's statement indicates a very aotumatic style. The revision process also seems to be arbitrary and capricious. There is little incentive for the salesgirl to spend much time and effort in projecting the truw expected sales because they know that the target

would be revised again and J's estimate will prevail. This situation creates an interesting discussion about the costs and benefits of participative budgeting and gives rise to game playing and slack.

- (i) In top down approach, budget figure will be imposed on sales personnel by senior management and sales personnel will have a very little participation in the budget process. Such budget will not interest them since it ignores their involvement altogether. While in bottom up approach each sales person will prepare their own budget. These budgets will be combined and reviewed by seniors with adjustment being made to coordinate the needs and goals of overall company. Proponents of this approach is that salespersons have the best information of customers requirements therefore they are in the best position in setting the sales goal of the company. More importantly salespersons who have role in setting these goals are more motivated to achieve these goals. However this approach is time intensive and very costly when compared with top down approach in order to achieve personal goals, participants may also engage in politics that create budgetary slack and other problems in the budget system.
- (ii) Since both top down and bottom up approaches are legitimate approaches, so EWPL can use combination of both. Seniors know the strategic direction of the company and the important external factors that affect it, so they might prepare a set of planning guidelines for the salesgirls. These guidelines may include forecast of key economic variables and their potential impact on the EWPL plans for introducing and advertising a new product and some board sales targets etc. With these guidelines, salesgirl might prepare their individual budget. These budgets need to be reviewed to validate the uniformity with the EWPL's objectives. After review, if changes are to be made, the same should be discussed with salesgirl involved.



**Question 27:** Bookmark LLP is a publishing firm that started operations very recently. The firm has published "Advanced Learner's Dictionary" this first year, that have been sold to 3 distributors PER, MGH and WLY. The firm's financials reflect profits in its first year of operations. The management is pleased with the results. However, they are interested in finding out how profitable each customer is. This would help them formulate their sales strategy.

Particulars	PER	MGH	WLY
Sales units p.a.	1,000	950	1,250
Sale price (gross)	250	250	250
Payment terms	3/10 net 30	net 30	3/10 net 30
Sales returns	0.5%	0%	10%
Delivery terms	FOB destination	FOB destination	FOB shipping point

In order to get market share, PER and WLY have been extended credit terms to avail discount if payment is made within 10 days. Customer MGH does not have much bargaining power and hence has been allowed only 30 days' credit period without any benefit of availing discount for early payment. Both PER and WLY have made payments within 10 days to avail of the discount extended.

On the cost front, variable cost of goods sold is `150 per unit. Key metrics of customer assignable marketing, administrative and distribution costs are as below:

Activity	Activity Driver	No. of Units of Activity Driver			Cost Driver Rate (₹)
		PER	MGH	WLY	
Order taking and processing	# of orders	4	2	15	300
Expedited/rush orders	# of orders	1	-	5	250
Delivery costs	# distance in km.	100	50	-	80
Sale return processing	# of returns	1	-	8	150
Billing cost	# of invoices	4	2	15	50
Customer visit	# of visits	1	-	5	800
Inventory carrying cost *	# 1 per unit	1,000	950	1,250	10

\* Assume no opening and closing Stock

Fixed cost that are not assignable to any customer is `1,00,000 p.a.

**Required**

- (i) PREPARE the customer wise profitability statement as also the overall profitability statement of Bookmark LLP.
- (ii) RECOMMEND a strategy for Bookmark LLP regarding its customers.

Solution:- Answer:

**(i) Customer Wise Profitability Statement and Overall Profitability Statement**

S No.	Particulars	PER	MGH	WLY	Total
A	Sales (net proceeds) –Table 1	241,288	237,500	272,812	751,600
B	Variable Cost of Goods Sold @150 p.u.	1,50,000	1,42,500	1,87,500	4,80,000
C	<i>Assignable- Marketing and Administration Cost - Table 2</i>				
	· Order Taking and Processing	1,200	600	4,500	6,300
	· Sale Return Processing	150	-	1,200	1,350

S No.	Particulars	PER	MGH	WLY	Total
	· Billing Cost	200	100	750	1,050
	· Customer Visit	800	-	4,000	4,800
	Total Assignable Marketing and Administration Cost	2,350	700	10,450	13,500
D	Assignable- Distribution Cost - Table 2				
	· Expedited/Rush Orders	250	—	1,250	1,500
	· Delivery Costs	8,000	4,000	—	12,000
	· Inventory Carrying Cost	10,000	9,500	12,500	32,000
	Total Assignable Distribution Cost	18,250	13,500	13,750	45,500
E	Non-Assignable Fixed Cost	—	—	—	100,000
F	Total Costs (B+C+D+E)	170,600	156,700	211,700	639,000
G	Net Profit (Step A - F)	70,688	80,800	61,112	112,600
H	Profit % of Sales (G / A)	29%	34%	22%	15%

**Workings****Table 1: Customer Sales Analysis - Revenue Analysis**

All figures in `

Particulars	PER	MGH	WLY	Total
Sales {Sale Units × Sale Price (gross)}	2,50,000	2,37,500	3,12,500	8,00,000
Less: Sale Return (Step 1 × Return%)	1,250	-	31,250	32,500
Net Sales	2,48,750	2,37,500	2,81,250	7,67,500
Less: Cash Discount	7,462	-	8,438	15,900
Net Proceeds	2,41,288	2,37,500	2,72,812	7,51,600
Final Collections vs Original Sale	97%	100%	87%	94%

**Table 2: Assignable Marketing, Administrative and Distribution Costs**

All figures in `

Particulars	PER	MGH	WLY	Total
Order Taking and Processing (# of orders × cost per order)	1,200	600	4,500	6,300

Particulars	PER	MGH	WLY	Total
Expedited / Rush Orders (# of orders × cost per order)	250	-	1,250	1,500
Delivery Costs (Distance in km. × cost per km)	8,000	4,000	-	12,000
Sale Return Processing (# of returns × cost per return)	150	-	1,200	1,350
Billing Cost (# of invoices × cost per invoice)	200	100	750	1,050
Customer Visit (#of customer visits × cost per visit)	800	-	4,000	4,800
Inventory Carrying Cost (# of units × inventory carrying cost p.u.)	10,000	9,500	12,500	32,000

(ii) Customer strategy: It can be seen that Bookmark LLP has an overall profit of ₹112,600 or 15% of sales. While the performance is good, the firm's management has to analyze customer wise profitability.

- WLY is the largest customer in terms of units sold. However, Table 1 above shows that sale returns at 10%, which is unusually large compared to other customers. Bookmark LLP has to investigate why the returns are of such large quantity. Possibly, there could be communication gap between the firm and WLY. Possible non-conformity in goods delivered has resulted in returns. Only 87% of the original sale value is being collected. The root cause of the problem has to be identified and rectified. This will also reduce the sale return processing costs.
- WLY has placed many rush orders, which requires Bookmark LLP to ship these orders immediately, using costlier means of transportation. Currently, there is no charge for shipping rush orders. In order to deter WLY from repeatedly placing rush orders, Bookmark LLP can charge the customer for shipping such orders beyond a threshold number of orders. Say rush orders beyond 2 orders will be charged to the customer.
- WLY has placed 15 orders for 1,250 units. Comparatively, PER and MGH placed 4 and 2 orders for approximately 1,000 units each. WLY can be requested to place fewer orders with larger quantity per order, in order to optimize ordering cost.
- Being the largest customer, WLY has 5 sale visits from Bookmark LLP, which is more than the other 2 customers. Priced at ₹800 per visit, this is very costly. At the same time, WLY is yielding the least profit. Therefore, Bookmark LLP should reassess if resources can be reallocated to the other two more profitable customers. That may encourage more sales from higher yielding customers.
- Since WLY seems to need more hand-holding in terms of more sales visits as well as higher rush orders, Bookmark LLP may assess if it wants to discontinue or reduce business. Alternatively, it may reassign these resources towards existing or newer customers to get better profitability. However, if WLY can be migrated to a higher profitability, Bookmark LLP need not lose out its market share.
- Customer MGH is the most profitable yielding 34% return over sales, although in terms of 'Advanced Learner's Dictionary' ordered, it is the smallest of the three. Bookmark LLP can

assess if it can extend some discount, in order to encourage more sales. Currently, Customer MGH does not get any discount.

- (g) Bookmark LLP can assign more sales visits to Customer PER and MGH to encourage them purchase more as well as provide high quality customer service.



**Question28:**A Manufacturing organization has four different customers A, B, C and D. A single product is sold to them at different prices because of trade discount offered. Data is give for cost per unit of business activity. You are required to prepare customer profitability statement.

Customers	A	B	C	D
No. of units sold	60,000	80,000	1,00,000	70,000
Selling price net of discount	25p	23p	21p	22p
No. of sales visits	2	4	6	3
No. of purchase orders	30	20	40	20
No. of deliveries	10	15	25	14
Kilometers per journey	20	30	10	50
No. of rush delivers	—	—	1	2
Cost of each activity				
Sales visit	` 210 per visit			
Order placing	` 60 per order			
Product handling	` 0.10 per item			
Normal delivery cost	` 2 per kilometer			
Rushed delivery cost	` 200 per delivery			

**Solution:**

**Customer profitability statement**

Customers	A	B	C	D
Revenue	15,000	18,400	21,000	15,400
Costs:	(60,000 × ` 0.25)	(80,000 units × 0.23)	(1,00,000 × 0.21)	(70,000 × 0.22)
Sales visit	420	840	1,260	630
Ordering Processing	1,800	1,200	2,400	1,200
Product handling 0.10	6,000 (30 × 60)	8,000	10,000	7,000
Normal Delivery	400 (20 × 10 × 2)	900 (15 × 30 × 2)	500	1,400

Customers	A	B	C	D
Rush deliveries	—	—	200	400
Total	8,620	10,940	14,360	10,630
Operating profit	6,380	7,460	6,640	4,770
Percentage profitability	43%	41%	32%	31%

It is apparent from above solution that all four customers are profitable, but customers C and D not particularly so when compared with customers A and B. There are several reason for this range in profitability one reason is the negotiation of favourable terms such as higher trade discount as compared to other customers.



**Question 30:** A and B are two customers of XYZ Electronics Ltd., a manufacturer of audio players. Selling price per unit is ` 5,400. Its cost of production per unit is ` 4,420.

Additional costs are:

Order Processing Cost..... 2,000 per order

Delivery Costs..... 3,500 per delivery

**Details of customers A and B for the period are given below:**

	Customer A	Customer B
Audio Players purchased (nos.)	350	500
No. of orders	5 (each of 70 units)	10 (each of 50 units)
No. of deliveries	5	0

The company’s policy is to give a discount of 5% on the selling price on orders for 50 units or more, and to further give 8% discount on the undiscounted selling price if a customer uses his own transport of collect the order. Assume that production levels are not altered by these orders.

**Required:—**

- (i) ANALYSE the profitability by comparing profit per unit for each customer.
- (ii) COMMENT on the discount policy on delivery.

**Solution:**

**Customer’s Profitability Statement**

Particulars	Customer- A	Customer- B
Sales (units)	350	500
	( )	( )
Selling Price per unit	5,400	5,400

Less: Discount (Quantity)	270 ( 5,400 × 5%)	270 ( 5,400 × 5%)
Less: Discount (Delivery)	---	432 ( 5,400 × 8%)
Selling Price (Net of Discounts) per unit	5,130	4,698
Less: Variable Cost per unit	4,420	4,420
Contribution per unit	710	278
Total Contribution	2,48,500 ( 710 × 350 units)	1,39,000 ( 278 × 500 units)
Less: Additional Overheads		
Delivery Cost	17,500 (5 × 3,500)	---
Order Processing Cost	10,000 (5 × 2,000)	20,000 (10 × 2,000)
Profit per customer*	2,21,000	1,19,000
Profit per customer per unit	631.43	238.00

## Analysis

(i) Even though A has lower sales volume (30% lesser from B), it is contributing almost double profit that is being contributed by B as overall discount offered to customer A is quite less.

(ii) Comments on the “Discount Policy on Delivery”

Discount on delivery offered to customer B is 432 per unit. If transport for delivery is provided to customer B then the cost would have been 70 per unit (10 deliveries × Rs. 3,500 / 500 units), which is lesser by 362. It may also be noted that delivery cost in case of customer A is only 50 per unit (17,500 ÷ 350 units). Hence, company needs to review discount policy on delivery but significance of profitability of customer B should also be kept in mind while doing so.



**Question 34:** XY Provides accountancy services and has three different categories of client:

Limited companies

Self employed individuals

Employed individuals requiring taxation advice.

XY Currently charges its clients a fee by adding a 20% mark-up to total costs. Currently the costs are attributed to each client based on the hours spent on preparing accounts and providing advice. XY is considering changing to an activity based costing system. The annual costs and the causes of these costs have been analyzed as follows:

Accounts preparation and advice	\$580,000
Requesting missing information	\$30,000
Issuing fee payment reminders	\$15,000
Holding client meetings	\$60,000
Travelling to clients	\$40,000

The following details relate to three of XY’s clients and to XY as a whole:

	Client			XY
	A	B	C	
Hours spent on preparing accounts and providing advice	1,000	250	340	18,000
Requests for missing information	4	10	6	250
Payment reminders sent	2	8	10	400
Client meetings held	4	1	2	250
Miles travelled to clients	150	600	0	10,000

**Required:** Prepare calculating to show the effect on fees charged to each of these three clients of changing to the new costing system.

**Solution:**

**Cost drivers rates:**

Accounts preparation and advice	$\$580,000 / 18,000 \text{ hours} = \$32.222 \text{ per hour}$
Requesting missing information	$\$30,000 / 250 \text{ times} = \$120 \text{ per request}$
Issuing fee payment reminders	$\$15,000 / 400 \text{ times} = \$37.50 \text{ per reminder}$
Holding client meetings	$\$60,000 / 250 \text{ meetings} = \$240 \text{ per meeting}$
Travelling to clients	$\$40,000 / 10,000 \text{ miles} = \$4 \text{ per mile}$

**Clients Costs:-**

	Clients		
	A	B	C
Accounts preparation and advice	\$32,000	\$8,055	\$10,955
Requesting missing information	\$480	\$1,200	\$720

Issuing fee payment reminders	\$75	\$300	\$375
Holding client meetings	\$960	\$240	\$480
Travelling to clients	\$600	\$2,400	\$0
Total costs	\$34,337	\$12,195	\$12,530
Total Costs on original basis(*)	\$40,280	\$10,070	\$13,695
Clients fees-new basis (W1)	\$41,204	\$14,634	\$15,036
Client fees-original basis	\$48,336	\$12,084	\$16,434
Increase/(Decrease)	\$(7,132)	\$2,550	\$(1,398)

(\*)  $\$725,000/18,000 \text{ hours} = \$40.28 \text{ per hour}$

(W1) Client fees calculations, new basis

**Client A:** Total costs  $\$34,337 \times (1 + 20\% \text{ mark-up on costs}) = \$41,204$ .

**Client B:** Total Costs  $\$12,195 \times (1+20\% \text{ mark-up on costs}) = \$14,634$ .

**Client C:** Total costs  $\$12,530 \times (1 + 20\% \text{ mark-up on costs}) = \$15,036$ .



## Activity Based Management

### Benefits of ABB

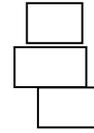
Some writer treat ABB as the complete philosophy in itself and attribute to it all the good features of strategic management accounting, zero based budgeting, total quality management, and other ideas. For example, the following claims have been made.

- (a) Different activity levels will provide a foundation for the 'base' package and incremental packages of ZBB.
- (b) It will ensure that the organisations's overall strategy and any actual or likely changes in that strategy will be taken into account, because it attempts to manage the business as the sum of its interrelated parts.
- (c) Critical success factors will be identified and performance measures devised to monitor progress towards them. (A critical success factor is an activity in which a business must perform well if it is to succeed.)
- (d) Because concentration is focused on the whole of an activity, not just its separate parts, there is more likelihood of getting it right first time. For example, what is the use of being able to produce goods in time for their dispatch date if the budget provides insufficient resources for the distribution manager who has to deliver them?



**Question 37:** Put the following stages of an activity based budgeting system in chronological order.

- 1st
  - 2nd
  - 3rd
  - 4th
- A. Take action to adjust the capacity of resources to match the projected supply
- B. Determine the resources that are required to perform organization activities
- C. Estimate the production and sales volume by individual products & customers
- D. Estimate the demand for organizational activities



**Question 38: Which of the following are included within activity based management (ABM)?**

- (a) Cost reduction
  - (b) Product design decision
  - (c) Variance analysis
  - (d) Operational control
  - (e) Performance evaluation
- (a) only
- (a), (c), (d) and (e)
- (c), (d) and (e) only
- (a), (b), (d) and (e) only

**Answer:** The correct answer is: (a), (b), (d) and (e) only.

ABM includes cost reduction, product design decisions, operational control and performance evaluation. Although there have been a great many different definitions of ABM, none have specifically included variance analysis

ABM does include more than the activities mentioned above, however.



## Activity Based Budgeting

**Question 39:** (a) Which statement is correct regarding the benefits to be gained from using ABB?

- A. If there is much inefficiency within the operations of a business then ABB will identify and remove these areas of inefficiency.
- B. In a highly direct labour intensive manufacturing process, an ABB approach will assist management in budgeting for the majority of the production costs.
- C. In an organization currently operating efficiently, where the next period will be relatively unchanged from the current one, then ABB will make the budgeting process simpler and quicker.
- D. If an organization produces many different types of output using different combinations of activities' then ABB can provide more meaningful information for budgetary control.

**Solution:**

D is the correct answer.

Situation A would be best suited by implementing Zero Base Budgeting situation B does not require ABB since it has relatively low overheads Situations C would be suitable for incremental budgeting ABB will certainly not be quicker.



### Question based on ABB

**Question 41:** NYE Co manufactures three standard products which it sells to several large wholesale chains. Production is highly automated and occurs in large batches. Goods are shipped to customers in slightly smaller batches. Details of a typical month's output are as follows.

	Product X	Product Y	Product Z
Units of output	50,000	100,000	225,000
Production machine hours (PMH) per unit of output	0.3 PMH	0.2 PMH	0.4 PMHR
Production batch size (units)	1,250	2,000	3,750
Shipment batch size (units)	1,000	1,000	2,500

Two types of indirect labour are employed – 4 quality control inspectors (at a cost of \$4,000 each per month) and 9 administrators (at a monthly cost of \$3,500 each). Each employee works a standard 180 hours per month.

The role of the quality control staff is to inspect a sample from each batch of output produced. The standard inspection time is 4 hours per batch. The administrators perform two tasks- shipment processing work (which takes 3 hours per batch shipped) and monitoring of production (at a rate of 1 hour of administrator time for every 600 units of output).

In addition to the production machinery (which has a capacity of 100,000 production machine hours [PMH] per month) there are two additional types of specialized machinery which perform automated production setup and automated shipment loading procedures. Details of these two machines are provided below.

	Production setup machinery	Shipment loading machinery
Monthly capacity	8000 hours	520 hours
Usage rates	5 hours per batch produced	2 hours per batch shipped

**Required:** Use activity based budgeting to assess whether the resources currently owned or employed by the company are sufficient to meet typical monthly output. Comment on any significant surplus/shortfall in resource

**Solution: Marketing scheme**

(a) Number of PMH	1	
Number of batches produced	1	
Number of batches shipped	1	
Indirect labour hours	2	
Machinery hours	2	
Indirect labour staff numbers	3	
Machine capacity	2	
Comment re shortfall of production machine capacity	1	
Comment re surplus of administrations	<u>1</u>	
		14
		<u>6</u>
(b) Up to 1 mark per well explained point		<u>20</u>

**(a) Step 1 – calculate amount of activities required for typical monthly output**

	Product X	Product Y	Product Z	Total
Number of PMH	15,000 PMH	20,000 PMH	90,000 PMH	125,000
	(50,000 x 0.3)	(100,000 x 0.2)	(225,000 x 0.4)	
Number of batches produced	40	50	60	150
	(50,000/1,250)	(100,000/2,000)	(225,000/3,750)	
Number of batches shipped	50	100	90	240
	(50,000/1,000)	(100,000/1,000)	(225,000/2,500)	

**Step 2 – calculate the resource required to perform the amount of activities identified in step 1**

Indirect labour

Quality control = 150 batches produced x 4 inspection hours = 600 inspection hours

Administration = 240 batches x 3 administration hours = 720 administration hours + 375,000 units of output/ 600 = 625 administration hours = **1,345 administration hours**

**Machinery**

Production machinery = 125,000 PMH (calculated in step 1)

Setup machinery = 150 batches produced x 5 hours = 750 hours

Shipment loading machinery = 240 batches shipped x 2 hours = 480 hours

**Step 3 – assess whether resources currently owned or employed by the company are sufficient to meet the requirements identified in step 1 and 2**

Indirect labour – staff numbers

	Quality control inspectors	Administrators
--	----------------------------	----------------

Number employed at present	4 inspectors	9 administrators
Number required	3.33 inspectors	7.47 administrators
	(600 hours/ 180 hours each)	(1,345 hours/180 hours)
<b>Surplus/(shortfall)</b>	<b>0.67 inspectors</b>	<b>1.53 administrators</b>

(b) Briefly outline THREE advantages that may be claimed for the use of activity based budgeting rather than a traditional incremental budgeting system.

**Answer of Activity Based Costing**

(c) **Step 1 – calculate amount of activities required for typical monthly output**

	Product X	Product Y	Product Z	Total
Number of PMH	15,000 PMH	20,000 PMH	90,000 PMH	125,000
	(50,000 × 0.3)	(100,000 × 0.2)	(225,000 × 0.4)	
Number of batches produced	40	50	60	150
	(50,000/1,250)	(100,000/2,000)	(225,000/3,750)	
Number of batches shipped	50	100	90	240
	(50,000/1,000)	(100,000/1,000)	(225,000/2,500)	

**Step 2 – calculate the resource required to perform the amount of activities identified in step 1**

Indirect labour

Quality control = 150 batches produced x 4 inspection hours = 600 inspection hours

Administration = 240 batches x 3 administration hours = 720 administration hours + 375,000 units of output/ 600 = 625 administration hours = **1,345 administration hours**

**Machinery**

Production machinery = 125,000 PMH (calculated in step 1)

Setup machinery = 150 batches produced x 5 hours = 750 hours

Shipment loading machinery = 240 batches shipped x 2 hours = 480 hours

**Step 3 – assess whether resources currently owned or employed by the company are sufficient to meet the requirements identified in step 1 and 2**

**Indirect labour – staff numbers**

	Quality control inspectors	Administrators
Number employed at present	4 inspectors	9 administrators
Number required	3.33 inspectors	7.47 administrators
	(600 hours/ 180 hours each)	(1,345 hours/180 hours)

Surplus/(shortfall)	0.67 inspectors	1.53 administrators
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**Machine capacity**

	Production machinery	Setup machinery
Capacity of existing equipment	100,00 PMH	800 HOURS
Capacity required	125,000 PMH	750 HOURS
Surplus/(shortfall)	(25,000) PMH	50 HOURS

From above it is clear that the company has too little production machine capacity. Un bottleneck is removed the budgeted levels of output of some or all of the three products achieved.

It is also evident that the company has a surplus of administrators. The company currently employs 9 administrators, which is 1.5 more than it needs. Since the cost of employing an administrator is \$3,500 per month, the cost of this spare capacity is \$5,250 per month. The company should consider how this idle time cost can be avoided. Redundancy may be one but only after NYE Co has considered the full long-term consequences (including redundan payments).

(d) Advantage claimed for the use of activity based budgeting include the following:

**Resource allocation** is **linked** to a **strategic plan** for the future, prepared after considering alternative strategies. **Traditional budgets** tend to **focus on resources and inputs** rather than objectives and alternatives.

New **high priority activities** are **encouraged**, rather than focusing on the existing planning. Activity based budgeting **focuses on activities**. This allows identification of the cost of activity. It also allows the **ranking of activities** where financial constraints limit the range of activities that may be achieved.

There is **more focus** on **efficiency** and **effectiveness** and the alternative method by which may be achieved. Activity based budgeting assist in the operation of a **total quality**.

It avoids arbitrary cuts in specific budget areas in order to meet the overall financial targets. Value added activities may be identified as those which should be eliminated.

It tends to **increase management commitment** to the **budget process**. This should be achieved since the activity analysis enables management to focus on the objectives of each activity.

Identification of primary and secondary activities and non value added activities should also motivating management in activity planning and control.



## Kaizen Costing – Basic Concepts

### Implementation of Kaizen Costing System

**Question 43:** 6-Twelve is an Indian – Japanese international chain of convenience stores for food, snacks, hot and cold beverages is formulating its activity-based budget for January 2018. 6-Twelve has only three product types: Soft Drinks, Fresh Drinks, and Ready to Eat Food. The budgeted data relating to three products are as under:

Activity and Driver	Cost Driver Rates		Jan 2018 Budgeted
	2017	Jan 2018	Amount of Driver Used

	Actual Rate (₹)	Budgeted Rate (₹)	Soft Drinks	Fresh Drinks	Ready to Eat Food
Ordering (per purchase order)	5,000	4,500	16	20	16
Delivery (per delivery)	4,000	4,100	13	60	20
Shelf-Stocking (per hour)	1,000	1,050	15	170	93
Customer Support (per item sold)	10	9	4,500	34,600	10,500

6-Twelve has a continuous improvement system to budgeting monthly activity costs for each month of 2018. February's budgeted cost-driver rate is 0.996 times the budgeted January 2018 rate. March's budgeted cost-driver rate is 0.996 times the budgeted February 2018 rate and so on.

### Required:

- What is the total budgeted cost for each activity in January 2018.
- What advantages might 6-Twelve gain by using an activity-based budgeting approach over, say, an approach that allocates the cost of these activities to products as a percentage of the cost of goods sold?
- What is the total budgeted cost for each activity in March 2018 if March 2018 has the same budgeted amount of cost-driver usage as January 2018.
- What are the benefits of 6-Twelve adopting a kaizen budgeting approach? What are the limitations?

### Solution

#### (i) Calculation of Total Budgeted Cost for Each Activity

Activity	Cost Hierarchy	Soft Drinks	Fresh Drinks	Ready to Eat Food	Total
Ordering $4,500 \times 16; 20; 16$	Batch-Level	72,000	90,000	72,000	2,34,000
Delivery $4,100 \times 13; 60; 20$	Batch-Level	53,300	2,46,000	82,000	3,81,300
Shelf stocking $1,050 \times 15; 170; 93$	Output Unit Level	15,750	1,78,500	97,650	2,91,900
Customer support	Output Unit Level	40,500	3,11,400	94,500	4,46,400

(c)

Activity	Cost Hierarchy	Soft Drinks	Fresh Drinks	Ready to Eat Food	Total
9 × 4,500; 34,600; 10,500)					
Total Budgeted Costs		1,81,550	8,25,900	3,46,150	13,53,600

(ii) An Activity Based Budgeting approach identifies how different products require different mixes of support activities. The relative percentage of how each product area uses the cost driver at each activity area is:

Activity	Cost Hierarchy	Soft Drinks (%)	Fresh Drinks (%)	Ready to Eat Food (%)	Total (%)
Ordering	Batch-Level	30.77	38.46	30.77	100.0
Delivery	Batch-Level	13.98	64.52	21.50	100.0
Shelf Stocking	Output Unit Level	5.40	61.15	33.45	100.0
Customer Support	Output Unit Level	9.07	69.76	21.17	100.0

By identifying these differences, 6-Tweleve managers are better able to budget for different unit sales levels and different mixes of individual product-line items sold. Using a single cost driver such as ‘Cost of Goods Sold’ considers similarity in the use of indirect costs (support activities) across product lines which does not occur at 6-Tweleve.

Other benefits cited by managers include:

- (1) Better identification of resource needs.
- (2) Clearer linking of costs with staff responsibilities, and
- (3) Identification of budgetary slack.

(iii) **March 2018 Rates**

(C)

Activity	Cost Hierarchy	January	February	March
Ordering	Batch-Level	4,500.00	4,482	4,464.07
Delivery	Batch-Level	4,100.00	4,083.60	4,067.27
Shelf-stocking	Output Unit Level	1,050.00	1,045.80	1,041.61
Customer support	Output Unit Level	9.00	8.96	8.93

These March 2018 rates can be used to compute the total budgeted cost for each activity area:

Activity	Cost Hierarchy	Soft Drinks	Fresh Drinks	Ready to Eat Food	Total
Ordering 4,464.07 × 16; 20; 16)	Batch-Level	71,425	89,281	71,425	2,32,131

Delivery 4,067.27 × 13; 60;20)	Batch-Level	52,875	2,44,036	81,345	3,78,256
Shelf-Stocking 1,041.61 × 15; 170; 93)	Output Unit Level	15,624	1,77,073	96,870	2,89,567
Customer support 8.93 × 4,500; 34,600; 10,500)	Output Unit Level	40,185	3,08,978	93,765	4,42,928
Total Budgeted Costs		1,80,109	8,19,368	3,43,405	13,42,882

(iv) A kaizen budgeting approach indicates management's commitment to organized cost reduction.

**Compare the budgeted costs from previous part.**

	Ordering	Delivery	Shelf-Stocking	Customer Support
Part (i)	2,34,000	3,81,300	2,91,900	3,81,300
Part (iii)	2,32,131	3,78,256	2,89,567	4,46,400

The kaizen budget number will show unfavorable variances for managers whose activities do not meet the required monthly cost reductions. This likely will put more pressure on managers to creatively seek out cost reductions by working 'better' within 6-Twelve.

One limitation of kaizen budgeting, as illustrated, is that it considers minor incremental improvements each month. It is possible that some cost improvements arise from irregular fluctuations in operating processes, supplier networks, or customer interactions. Companies need to highlight the importance of seeking these improvements as well as the minor incremental improvements



**Question 45: Which two of the following statements do not relate to Kaizen costing?**

- Management should investigate and respond when targets are not met.
- It assumes continuous improvement.
- Targets are set and applied monthly.
- It is used for cost control.
- Employees are often viewed as the cause of problems.
- It is used for cost reduction.

**Answer:** The correct answers are:

- Employees are often viewed as the cause of problems.
- It is used for cost control.

Employees are viewed as the source of (and are empowered to find) solutions. Kaizen costing is used for cost reduction – not cost control. The other options all relate to Kaizen costing.



**Question 46: Kaizen costing emphasizes:**

- A. The need to achieve a target and maintain it
- B. Continuous improvement
- C. The immediate elimination of all an efficiencies
- D. Japanese culture

**Answer: The answer is B, Continuous improvement.**

A. Kaizen Costing is one of two approaches of continuous Improvement: (Target costing being the other) Kaizen is the Japanese for making improvements to a process though small, incremental amount rather than through large innovations, Kaizen Costing is applied during the manufacturing stage of the product's life cycle. This focuses on achieving cost reductions through the increased efficiency of the production process. Improve is the aim and responsibility of every worker in every activity, at all times.

Through continual efforts significant reductions in cost can be achieved over time. In order to encourage continues cost reduction an annual (or monthly) Kaizen cost goal is established. Actual results are then compared with Kaizen goal and then the current actual cost becomes the base line for setting the new Kaizen goal the following year.



**Question 47:** The following statement has been made about kaizen costing Select All the apply:

- (a) The Focus is on elimination waste, improving process and systems and improving productivity.
- (b) In Kaizen costing, employees are often viewed as the cause of problems.
- (c) In Kaizen Costing, costs are reduced by implementing continuous improvement
- (d) The aim of Kaizen costing is to achieve cost reduction targets.

**Answer:-**

Kaizen Focuses on eliminating waste, improving process and systems and improving productivity. **TRUE**

In Kaizen Costing , employees are often viewed as the cause of problems. **FALSE** one characteristics of Kaizen is that it involves all employees and all areas of the business.

In Kaizen Costing, costs are reduced by implementing continuous improvements **TRUE**.

The aim of Kaizen costing is to achieve cost reduction targets. **TRUE**.



**Question 49:** FZ India Ltd. (FZIL) is an automobile manufacturer in India and a subsidiary of Japanese automobile and motorcycle manufacturer Fuji. It manufactures and sells a complete range of cars from the entry level to the hatchback to sedans and has a present market share of 27% of the Indian passenger car markets. FZIL uses a system of standard costing to set its budgets. Budgets are set semi-annually by the Finance department after the approval of the Board of Directors at FZIL. The Finance department prepares variance reports each month for review in the Board of Directors meeting, where actual performance is compared with the budgeted figures. Ms. Kiyoshi, group CEO of the Fuji is of the opinion that Kaizen costing method should be implemented as a system of planning and control in the FZIL.

**Required:** Recommend key changes vital to FZIL's planning and control system to support the adoption of Kaizen Costing Concepts.

**Solution:**

**Kaizen Costing** emphasizes on small but continuous improvement. Targets once set at the beginning of the year or activities are updated continuously to reflect the improvement that has already been achieved and that are yet to be achieved.

The suggestive changes which are required to be adopted Kaizen Costing concepts in FZIL are as follows:

**Standard Cost Control System to Cost Reduction System:** Traditionally Standard Costing system assumes stability in the current manufacturing process and standards are set keeping the normal manufacturing process into account thus the whole effort is on to meet performance cost standard. On the other hand Kaizen Costing believes in continuous improvements in manufacturing processes and hence, the goal is to achieve cost reduction target. The first change required is the standard setting methodology i.e. from earlier Cost Control System to Cost Reduction System.

**Reduction in the periodicity of setting Standards and Variance Analysis:** Under the existing planning and control system followed by the FZIL, standards are set semi-annually and based on these standards monthly variance reports are generated for analysis. But under Kaizen Costing system cost reduction targets are set for small periods say for a week or a month. So the period covered under a standard should be reduced from semi-annually to monthly and the current practice of generating variance reports may be continued or may be reduced to a week.

**Participation of Executives or Workers in standard setting:** Under the Kaizen Costing system participation of workers or executives who are actually involved in the manufacturing process are highly appreciated while setting standards. So the current system of setting budgets and standards by the Finance department with the mere consent of Board of Directors required to be changed.



## Customer Response Time and on-Time performance

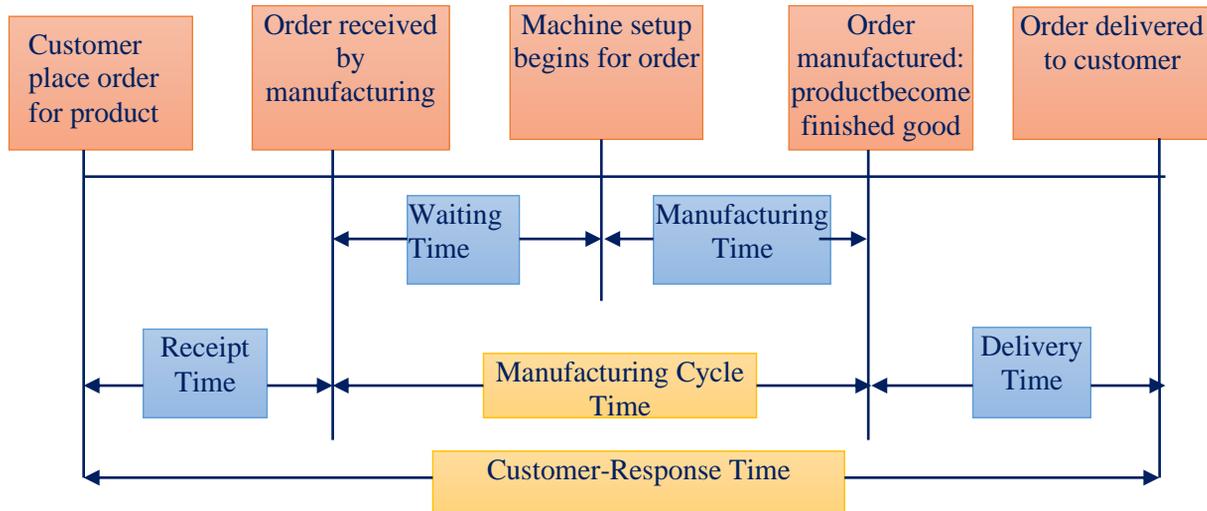
**Question 50:** Customer Response time is how long it takes from the time a customer places an order for a product or service to the time the product or service is delivered to the customer. Quickly responding to customers is strategically important in many industries including construction, banking, car rental, and fast food industries/Some companies, such as Airbus, have to pay penalties to compensate their customers (Airline companies) for lost revenues and profits (From being unable to operate flights) as a result of delays in delivering products to them.

Describe the components of customer-response time, Receipt time is how long it takes the Marketing Department to specify to the Manufacturing Department the exact requirements in the customer's order. Manufacturing cycle time (also called manufacturing lead time) is how long it takes from the time as order is received by Manufacturing to the time a finished goods is produced. Manufacturing cycle time is the sum of waiting time and manufacturing time for an order. For example an aircraft order received by Airbus may need to wait for components before the plane can be assembled. Delivery time is how long It takes to deliver a completed order to a customer.

Some companies evaluate their response time improvement efforts using a measure called manufacturing cycle efficiency (MCE).

$$\text{MCE} = (\text{Value-Added manufacturing time} \div \text{Total manufacturing})$$

### Components of Customer-Response Time



Value added manufacturing activities are activities that customers perceive as adding value or utility to a product. The time spent efficiently assembling the product is value-added manufacturing time. The rest of manufacturing cycle time, such as the time the product spends waiting for parts or for the next stage in the production process, and being repaired, is non value added manufacturing time. Identifying and minimizing the sources of non-value –added manufacturing time increases a firm’s responsiveness to its customers and reduces its costs.

Similar measures apply to service-sector companies. Consider a 40 minute doctors office visit. Suppose a patient spends 9 of those minutes on administrative tasks such as filling out forms, 20 minutes waiting in the reception area and examination room, and 11 minutes with a nurse or doctor. The service cycle efficiency for this visit equals  $11 \div 40$ , or 0.275. In other words, only 27.5% of the 40 minutes added value to the patient/customer. Minimizing their non-value added service times has allowed hospitals such as Kailash medical centre in Noida to treat more patients in less time.

On-Time performance is the delivery of a product or service by the time it is scheduled to be delivered. Consider FedEx, which specifies a price per package and a next day delivery time of 10.30am for its overnight courier service. FedEx measures the on-time performance of the service based on how often the firm meets that standard. Commercial airlines gain loyal passengers as a result of consistent on-time service. But there is a tradeoff between a customer’s desire for a shorter response time and better on-time performance scheduling longer customer-response times, such as airlines lengthening scheduled arrival times, displeases customers on the one hand but increase customer satisfaction on the other hand by improving the airlines on-time performance.



**Question 51:** Reliance Manufacturing evaluates the performance of its production managers based on a variety of factors, including cost, quality and cycle time. The following are nonfinancial measures for quality and time for 2014 and 2015 for its only product:

Non financial quality Measures	2014	2015
Number of returned goods	750	915
Number of defective units reworked	2,200	1,640
Annual hours spent on quality training per employee	38	44
Number of unit delivered on time	24,820	29,935
Annual totals	2014	2015
Units of finished goods transported	28,480	33,668
Average total hours worked per employee	2,000	2,000

The following information relates to the average amount of time needed to complete an order:—

Time to Complete an order	2014	2015
Wait time		
From customer placing order being received by production	15	14
From order received by production to machine set up for production	13	12
Inspection time	4	2
Process time	8	8
Move time	4	4

1. Compute the manufacturing cycle efficiency for an order for 2014 and 2015
2. For each year 2014 and 2015, calculate the following:
  - A. Percentage of goods returned
  - B. Defective units reworked as a percentage of units shipped
  - C. Percentage of on-time deliveries
  - D. Percentage of hours spent y each employee on quality training
3. Evaluate management performance on quality and timeliness in 2014 and 2015.

**Solution:** 1:- Manufacturing cycle time= Total time from receipt of an order by production until its completion.

Manufacturing cycle time for 2014= (13+4+8+4) days = 29 days

Manufacturing cycle time for 2015 = (12 + 2 + 8 + 4) days = 26 days

Manufacturing cycle efficiency (MCE) is defined as follows:

$MCE = \text{Value added manufacturing time} \div \text{Manufacturing cycle time}$

MCE for reliance manufacturing for 2014 is:

$MCE = 8 \text{ days of processing time} \div 29 \text{ days manufacturing cycle time} = 0.28$

MCE for Reliance Manufacturing for 2015 is:

$MCE = 8 \text{ days of processing time} \div 26 \text{ days manufacturing cycle time} = 0.31$

It may be argued that a part of inspection time is also value added time. Reliance reduced inspection time to two days in 2015, so if we think of two days of inspection as value-added time in 2014 (out of four days) and in 2015:

$MCE \text{ in } 2014 = (8+2) \text{ days} \div 29 \text{ days} = 10 \div 29 = 0.34$

$MCE \text{ in } 2015 = (8+2) \text{ days} \div 26 \text{ days} = 10 \div 26 = 0.38$

Reliance has become more efficient in its value-added manufacturing time as a percentage of total manufacturing time during the last year.

Reliance has also shortened its lead time, which means that customers have less time to wait between placing their order and receiving their shipment. This improvement in timeliness will likely lead to greater customer satisfaction.

Some students might ask if inspection has been excessively reduced or simply become more efficient. The key is to improve processes and only then reduce inspection so that the percentage of goods returned does not increase.

**2:- Non- Financial Quality Measure**

	2014	2015
Percentage of goods returned (as a percentage of units shipped) (750÷28,480; 915÷33,668)	2.63%	2.72%
Defective units reworked as a percentage of units shipped (2,200 ÷ 28,450; 1,640 ÷33,668)	7.72%	4.87%
Percentage of on-time deliveries (24,820 ÷ 28,480 ; 29,935 ÷33,668)	87.15%	88.91%
Percentage of hours spent by each employee on quality training (38÷ 2,000 ; 44÷2,000)	1.90%	2.20%

3. Reliance has become more efficient in its value added manufacturing time as a percentage of manufacturing cycle time and has improved the company lead time. This improved efficiency should result in cost savings for the company as well as greater customer satisfaction.

It is important to evaluate the other nonfinancial quality measures in relation to annual totals (total units sold etc) rather than as absolute values. For example the total number of on time deliveries increased from 24,820 to 29,935 during 2015. This is an improvement in the timeliness of the company's deliveries. As a percentage of total units delivered, the percentage of on-time deliveries increased from 87.15% to 88.88%.

Management also had two noteworthy areas of improvement related to the nonfinancial quality measures above. The first is the reduction in the total number of defective units reworked. This is a significant improvement compared to the prior year. However, it should be noted that a greater

percentage of goods were returned in 2015 than in 2014. Reliance may want to investigate if the reduction in rework led to more defective units being sold to the end consumer. Second the company spent an increased amount of time per employee on quality training. Because quality training programs are considered lead measures of performance, it is likely that the company will, as a result see improvements in the quality of its output in the future.



**Question based on Value Added**

**Question 52: State Whether each of the Following Independent activities is value-added or non-value added:**

- (i) Polishing of furniture used by a systems engineer in a software firm.
- (ii) Maintenance by a software company of receivable management software for a banking company.
- (iii) Painting of Pencils manufactured by a pencil factory.
- (iv) Providing brake adjustments in cars received for service by a car service station.

**Solution:**

SL. No	Item	Value Added / Non Valued Added
(i)	Polishing furniture used by a Systems Engineer in a software firm.	Non-Value Added
(ii)	Maintenance by a software company of receivables management software for a banking company.	Value-Added
(iii)	Painting of pencils manufactured by a pencil factory.	Value-Added
(iv)	Customers' computer key board cleaning by a computer repair centre.	Value-Added
(v)	Providing brake adjustments in cars for repairs by a care service station.	Value-Added



**Question 53:** Queenstown Furniture (QF) manufactures high-quality wooden doors within the forests of Queenstown since 1952. Management is having emphasize on creativity, engineering, innovation and experience to provide customers with the door they desire, whether it is a standard design or a one-of-a-kind custom door. The following information pertains to operations during April:

Processing time	9.0 hrs.*	Waiting time	6.0 hrs.*
Inspection time	1.5 hr.*	Move time	7.5 hrs.*

Units per batch	60 units	
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(\* average time per batch

**Required:**

Compute the following operational measures:

- (i) Average non-value-added time per batch
- (ii) Average value added time per batch
- (iii) Manufacturing cycle efficiency
- (iv) Manufacturing cycle time

**Solution**

- (i) Average Non Value Added Time per batch  
 = Inspection Time + Waiting Time + Move Time  
 = 1.5 hr. + 6.0 hrs. + 7.5 hrs.  
 = 15 hrs.
- (ii) Average Value Added Time per batch  
 = Processing Time  
 = 9 hrs.
- (iii) Manufacturing Cycle Efficiency  
 = 
$$\frac{\text{Processing Time}}{\text{Processing Time} + \text{Inspection Time} + \text{Waiting Time} + \text{Move Time}}$$
 = 
$$\frac{9.0 \text{ hrs.}}{9.0 \text{ hrs.} + 1.5 \text{ hr.} + 6.0 \text{ hrs.} + 7.5 \text{ hrs.}}$$
 = 37.5%
- (iv) Manufacturing Cycle Time  
 = 
$$\frac{\text{Total Production Time}}{\text{Units per Batch}}$$
 = 
$$\frac{24 \text{ hrs.}}{60 \text{ units}}$$
 = 0.40 hrs. per unit



**Question 56:** A small retail outlet sells four main group of products. Basic Foods (milk, bread etc) Newspaper & Magazines: Frozen Foods: and Canned Foods. A budgeted weekly profit statement is shown below:—

	Basic Foods	Newspapers and Magazines	Frozen Foods	Canned Foods

	\$	\$	\$	\$
Sales revenue	800	1,000	1,500	2,400
Cost of Sales	600	700	550	1,200
Gross margin	200	300	950	1,200
	\$	\$	\$	\$
Power for Freezers			100	
Overheads'	100	100	200	400
Net margin	100	200	650	800

- The freezers would be emptied and switched off as necessary during redecoration.
- Overhead costs comprise general costs of heating and lighting, rent and rates, and other general overhead costs. These costs are attributed to products in proportion to the floor area occupied by each product group which is as follows:

	Basic Foods	Newspapers and Magazines	Frozen Foods	Canned Foods
Floor area (m3)	50	50	100	200

For each product group, analysis has shown that the sales revenue achieved changes in direct proportion to the floor space allocated to the product.

The owner of the retail outlet has decided that the premises need not be redecorated but is undecided as to which of the following two options would be the most profitable.

### **OPTION 1:**

Close the retail outlet completely for four weeks while the redecoration takes place. The company that is to complete the redecoration would charge \$2,500 under this option. It is expected that following the re-opening of the retail outlet there would be a loss of sales for the next 12 weeks because customers would have had to find alternative suppliers for their goods. The reduction in sales due to lost customers has been estimated to be 30% of the budgeted sales during the first four weeks of reopening; 20% during the next four weeks; and 10% during the third four weeks. In addition, in order to encourage customers to return to the retail outlet, there would be a 10% price reduction on all Basic Foods and Canned Foods for the entire 12 week period.

### **OPTION 2:**

Continue to open the retail outlet while the redecoration takes place but with a reduced amount of floor area. The useable floor area would be reduced to 40% of that originally available. After three weeks, the retail outlet would be closed for 0-5 weeks while the

goods are moved to the newly redecorated area. The retail outlet would then continue to operate using 40% of this original floor area for a further three weeks before the work was fully completed. The company that is to complete the redecoration would charge \$3,500 under this option, and in addition there would be product movement costs of \$1,000. The owner has determined that in order to avoid losing customers there should be no reduction in the amount of floor area given to Basic Foods and Newspaper and Magazine throughout this period. The floor area to be used by Frozen Foods and Canned Foods should be determined on the basis of their profitability per unit of area. However, the Frozen Foods are presently kept in four freezers, and therefore any reductions in floor area must be determined by complete Freezer units. It may be assumed that each freezer unit incurs equal amounts of power costs.

**Required:**

- (a) Advise the owner of the retail outlet which option to choose in order to minimise the losses that will occur as a result of the decision. All workings must be shown.
- (b) Explain how Activity Based Costing may be used in a retail environment to improve the decision making and profitability of the business.

**Solution:**

**(a) Comparison of the two available options**

Option One

Relevant costs and savings:

- 1:- Redecoration costs \$2,500
- 2:- Loss of gross profit after reopening

	\$
First Four Weeks = 30% of \$2,650 × 4	3,180
Next four Weeks = 20% of \$2,650 × 4	2,120
Third four weeks = 10% of \$2,650 × 4	1,060
	<b><u>6,360</u></b>

3:- Loss of gross profit during shutdown = 4 × \$2,650 = \$10,600

4:- Savings in power for Freezers = 4 × \$100 = \$ 400

**5:- Price reduction effects**

Basic Foods: Revised revenue

First 4 weeks = 70% of \$ 800

Next 4 weeks = 80% of \$ 800                      \$ 1,920 × 4 = \$7,680

Third 4 weeks = 90% of \$800  
 10% lost due to price reduction = \$768  
 Canned Foods:  
 Revised revenue  
 First 4 weeks = 70% of \$ 2,400  
 Next 4 weeks = 80% of \$ 2,400      \$ 5,760 × 4 = \$ 23,040  
 Third 4 weeks = 90% of 2,400  
 10% lost due to price reduction = \$ 2,304  
 Total Price reduction effect = \$ 3,072

**Total Relevant Costs**

	\$
Redecoration costs (W1)	2,500
Loss of profit due to sales reduction (W2)	6,360
Loss in sales revenue (W5)	3,072
Loss of profit during shutdown (W3)	10,600
Savings in Freezer power costs (W4)	(400)
<b>Total relevant Costs</b>	<b><u>22,132</u></b>

It is assumed that general overheads will still be incurred during the shutdown.

Option Two

(1) Revised Floor area

Floor area in total is reduced to 40% of 400m<sup>2</sup> = 160 m<sup>2</sup>

Distribution of reduced floor area:

Basic foods	50 (unchanged)
Newspaper and Magazines	50 (unchanged)
	100

Remaining Floor area to be divided between other area = 60m<sup>2</sup>

(2) Distribution of remaining floor area

Profitability per m<sup>2</sup> of floor area (using gross margin)

Frozen Foods = 950/100 = \$9.50 per m<sup>2</sup>

Canned Foods = 1200/200 = \$6 per m<sup>2</sup>

Floor area allocation

As frozen foods give a high profit per m<sup>2</sup>, as much floor space as possible should be allocated to this range.

Floor space per freezer = 100m<sup>2</sup>/4 = 25 m<sup>2</sup>

Of the 60m<sup>2</sup> remaining 50m<sup>2</sup> should be allocated to frozen foods. Which is enough

for two freezers? The remaining 10m<sup>2</sup> should be allocated to canned foods.

**Floor area proportions**

	Original	revised
	%	%
Basic Foods	50/400 = 12.5	80/160 = 31.25
Newspaper and Magazines	80/400=2.5	50/160 = 31.25
Frozen Foods	100/400 = 25	50/106 = 31.25
Canned Foods	200/400=50	10/160 = 6.25

Reduction in floor area%

Basic Foods: Newspaper and Magazines = 0

$$\text{Frozen Foods} = \frac{100-50}{100} = 50\%$$

$$\text{Canned Foods} = \frac{200-10}{200} = 95\%$$

(3) Freezer cost savings

Two freezers will be non-operational for the six weeks of reduced operations

$$\text{Total savings for this period} = 6 \times 2 \times \frac{\$100}{4} = \$300$$

Four Freezers will be non-operational for the 0.5 weeks shutdown

$$\text{Therefore, total savings for this period} = 0.5 \times \$ 100 = \$ 50$$

Total Freezer cost savings = \$350.

(4) Reduction in gross profit (For six weeks of reduced operating)

		\$
Frozen Foods	\$950 × 6 × 50%	2,850
Canned Foods	\$1,200 × 6 × 95%	6,840
Total reduction		<b><u>9,690</u></b>

As Basic foods and Newspapers and Magazines are not suffering reduced floor space, sales revenue and gross profit will be unaffected for these areas.

(5) Reduction in gross profit for 0.5 weeks shutdown

$$\begin{aligned} \text{Total Gross Profit for all areas} &= (\$200 + 300 + 950 + 1,200) \times 0.5 \\ &= \$2,650 \times 0.5 \\ &= \$1,325 \end{aligned}$$

**Total Relevant Costs**

	\$

Redecoration	3,500
Product Movement costs	1,000
Freezer cost savings (W3)	(350)
Reduction in gross profit for 6 weeks reduced operations (W4)	9,690
Lost profit from shutdown (W5)	1,325
	15,165

As option 2 results in lower losses, the retail outlet should continue to operate at reduced capacity during the redecoration period.



**Question 57:-** Melody is a manufacturer of musical instruments. The company specializes in manufacture of Piano and Electronic Key board instruments. They are both labour-intensive products. Therefore, Melody follows absorbed its production overheads based on direct labour hours.

### Piano

Melody's Pianos are of very high quality. Client patronage include professional Piano musicians. Some of these instruments are sold in its standard form. However musicians particularly the concept players require their pianos to be customized to certain specifications. Customization primarily relates to the acoustic quality of the piano sound. Quality of sound is of paramount importance to musicians as it determines the power and warmth of tone. Each musician has a preference to achieve a special quality of sound. Therefore no two customized Pianos can be the same. Due to its reputation, Melody receives numbers requests for customization from its customers. Ability to provide customization service sets Melody apart from its competitors.

Customization requires the services of professional craftsman. They are hired as subcontractors for such work based on the need. These craftsmen perform their services within the factory premises. For this a special work, space is maintained by Melody. Melody charges its customers extra for sub-contracting cost plus 10%. This would cover the actual cost of subcontracting and any incidental overheads incurred. The Board of Melody accepts that this method of billing is very simplistic. It is unsure if the company is recovering the entire cost of providing this customization service.

### Electronic Keyboard Instruments

These are instruments manufactured by Melody are home Keyboards that are targeted at young music enthusiasts who are beginning to learn music. They come in standard sizes, comprised of standard components. No customizations are done to keyboards.

As a performance management expert, the Board wants your advice. The extract below provides the most recent management accounts for the Piano and Keyboard Division.

				Figure in `
Sr. No.	Particulars	Piano	Keyboard	Total

1	Number of items manufactured	1,000	10,000	
2	Sale Price per unit	2,50,000	15,000	
3	Revenue	25,00,00,000	15,00,00,000	40,00,00,000
4	Materials	7,50,00,000	3,75,00,000	11,25,00,000
5	Direct Labour	8,00,00,000	6,75,00,000	14,75,00,000
6	Subcontracting Cost	3,75,00,000	-	3,75,00,000
7	Production Overheads	4,50,00,000	65,00,000	5,15,00,000
8	Total cost of Production (4+5+6+7)	23,75,00,000	11,15,00,000	34,90,00,000
9	Gross Profit (3-8)	1,25,00,000	3,85,00,000	5,10,00,000

### Production Overhead

	Figures in `
Particulars	Amount
Inspection and Testing	3,45,00,000
Space Maintenance cost for Subcontracting Work (Rent, Utilities, 2 support staff to maintain storage)	50,00,000
Other Production Overheads (Rest of the utilities, Rent, Salary of support staff at storage)	1,20,00,000

### Required

- Discuss the difference in treatment of production overheads under absorption costing and activity based costing.
- List the steps to implement activity based costing within Melody.
- ASSESS whether activity based costing would be suitable for the Piano and Keyboard Divisions.
- Advise Melody about the activity based management and ways to improve business performance.

### Solution:-

- Product cost under absorption costing method includes all manufacturing costs that are incurred to produce a product (direct material, labour, and overheads (both fixed and variable)). The allocation of overheads is determined by a single cost driver based on volume of production (popular ones are machine hours or direct labour hours). This driver is applied to the entire production overhead to arrive at the production overhead rate. For example in the given problem, labour hours are being

used to allocate overheads to Pianos and keyboards. All production overheads are allocated to products based on this driver irrespective of where this resource was used by the product or not. For example, production overheads include maintenance cost relating to space for subcontracting work. This cost is incurred for the manufacture of Piano alone. This portion of the maintenance cost gets clubbed with other production costs. Eventually, an overhead absorption rate is calculated using the ratio of direct labour hours for each product. Absorption costing would ignore the fact that the manufacture of keyboards does not utilize the space allocated for subcontracting work. This skews the product costing by erroneously inflating the cost of Keyboards. Some portion of the cost of manufacturing Pianos passes onto the product cost for Keyboards. Application of a single cost driver may not be the most appropriate way of allocating costs between products. For example, in the given problem, factory rent that is clubbed with total overheads and applied to the product cost as part of the overhead rate. Absorption costing ignores that direct labour may not be the most appropriate basis to allocate factory rent overheads to the products.

Activity based costing identifies the cost of each activity and assigns cost to units produced based on the number of activities used by each unit. Instead of being clubbed as a single overhead cost, costs for each activity are captured in their respective cost pools. The most appropriate cost driver is selected. Cost drivers could be volume based (machine hours/direct labour) or transaction based (# of purchase orders). This cost driver is used as the basis to allocate costs to various products based on the utilization of the resource related to that activity. Overhead costs are assumed to be variable, determined (or driven) by the selected cost driver. Here, the cost of maintaining space for subcontracting relates entirely to the manufacture of Pianos. Using ABC method, this cost will be allocated only to Piano products since allocation is now based on utilization of the resource to manufacture the product. Again, under this method, factory rent could have space utilization as the cost driver. Therefore, using ABC method, the allocation of rent overhead to the products will be made on a more logical basis as compared to absorption costing.

To conclude, product costing using absorption costing is relatively simpler a method regularly followed for financial accounting purposes. Product costing using ABC method results in more detailed yet accurate figures. It highlights the cost/benefits of various activities that helps management focus on eliminating non-value added activities.

**(ii) Implementation of ABC Method within Melody would include the following steps:**

**Activity Mapping:** Production process has to be first broken down into various activities. Based on their nature; activities must then be clubbed to form activity pools. Activity pools must then tie in with the products or services.

**Cost pools:** Overhead costs are then identified to each activity pool. This gives the cost pool for each category of activity.

**Cost driver:** Identify the activity that brings the cost. For example space utilization would be a standard cost driver for factory rent. Cost drivers could be volume based or transaction based.

**Overhead rate:** Once the cost pool and cost driver are identified, the cost per unit of cost driver (overhead rate) is determined.

**Overhead cost allocation:** Depending on how much of the resource (cost driver) the product utilizes, the cost is allocated accordingly to that product.

**Product Cost:** The allocated overhead cost is added to the cost of direct materials and labour to arrive at the full cost of production for the unit.

**(iii) Appropriateness of ABC Method for the Keyboard and Piano Divisions**

The Piano Division receives numerous requests for customization from its customers. While it produces only 1,000 Pianos in a year, no two customizations are the same. Therefore, the range of Pianos manufactured by Melody can be considered varied. Production overheads cost, including subcontracting work, from 35% of the total production cost (₹ 3,75,00,000 + ₹ 4,50,00,000 ÷ 23,75,000). Therefore, overheads form a substantial portion of product cost. Due to the variety in customization, it is important to price each customization at a rate that will yield an acceptable profit margin to Melody. To do this, manufacturing process has to be segregated into various activities and cost pools. Depending on utilization of resources for each activity, each Piano can be sold at an appropriate price. If a Piano requires more of a resource from an activity, this can be included in the product cost and factored into the selling price, such that even with customization an acceptable profit margin can be earned. Thus ABC method can help Melody arrive at a more accurate cost of production as compared to absorption costing.

While overhead cost is one aspect of ABC analysis, the other information that an organization gets from this framework is that it can identify the activities that add value to the product. At the same time, non-value adding services can be identified (for example storage) and measures can be taken to minimize them. This helps it partner better with its customers and gain a competitive edge.

The Keyboard Division produces 10,000 keyboards annually, all sold as a standard product with no customization. Activities are standardized, with no variation in the process between the keyboards. Production overhead forms only 6% of total cost of production (₹ 65,00,000 ÷ 11,15,00,000). Implementation of ABC method is time consuming and complex. Here due to the standardized nature of production and low quantum of production overheads, ABC method may not be justified for the time and effort involved. In this case, absorption costing may seem to be a more practical approach to arrive at product price.

**(iv) Activity based Management** to help Melody improve business performance

Activity based management can help Melody to meet the customer needs while using the lowest possible resource or cost. ABM can be used at an operational or strategic

level.

### Product Pricing

The would be especially in case of the Piano Division. As explained above, ABC method would enable Melody calculate a more accurate cost of production for each Piano. Currently the cost of subcontracting work used for customizing Pianos is ` 3,75,00,000. This is being charged to the customers with a 10% mark-up to cover for any incidental overhead. However, this is very simplistic. As such the mark-up that can be earned under this method will be ` 27,50,000. However, the cost of maintenance of the area for subcontracting work is higher at ` 50,00,000. Therefore, it can be concluded that Melody is not recovering the entire portion of the incidental overheads incurred by providing the subcontracting work.

By identifying the cost pools relating to the subcontracting work, Piano Division can determine that it is making a loss on the subcontract work as a whole. It could therefore adjust the price of customized Piano such that it earns an acceptable margin on each sale. This is at an operational level. At a strategic level, Melody can determine which type of customizations are most profitable. Customizations that are not very frequent, too complex, and costly may be avoided as it takes away resources from Melody in terms of labor, space etc. At the same time, careful consideration should be given to such decisions since it is this customization service that gives Melody an edge over other competitors. Therefore Melody should take decisions that help it balance the customer base, while keeping the costs low and processes as standardized as possible.

### Analysis of Activities

Implementation of ABC method forces the company to take a more detailed look at its activities that comprise of its manufacturing process. It may be found that certain activities can be performed in more efficient manner. Also activities can be identified as that that add value to the product and those that are not value adding. For example in the given example, storage is not a value adding activity. Melody can work on a system where it optimizes the production process such that storage requirements are lower. The inventory turnover of Piano can also be improved, since quicker the Piano is shipped to the customer, lower the space requirement. Inspection is another non-value adding activity. For example, Melody switch to a standardized procurement system for its raw materials from reputed suppliers. While it may be a costlier option, this may lead to lower defects in the product, therefore requiring lesser need for inspection.

### Performance Measurement

Employee resource should be used more towards value adding activities. Proper training would be required to ensure acceptable quality of work. This would automatically reduce non-value adding activities, and inspection. There has to be proper information system in place that captures such data. This is facilitated through the implementation of ABC costing method and use of ABM. However to have a successful system, senior management need to be committed to this model, proper communication and training has to be given to employees. To implement such a performance system the management has

to commit sufficient time and effort. Cost benefit considerations of having such systems should also be taken into consideration. To conclude, implementing ABM should not take up productive time of employees and become a non-value activity in itself!



## CASE STUDY: KAIZEN COSTING

Zen Limited is a leading mobile manufacturing company and sells its mobile phone across the world. In a fast-changing technological environment, Zen has been able to maintain its leadership in smartphones segment for third year in a row now. Though the revenues have grown year on year, the costs have increased at a higher rate in the mobile phone industry as a whole.

“We have been leaders in revenue. We must lead in cost reduction front as well. I believe we can achieve this with improvements overtime, however minor they might be!”

– This is what the CEO of Zen has told its directors in a recently concluded board meeting.

The net profit margins of the company has fallen from 10% in 2016 to 8% in 2017 owing to rise in raw material & repair cost. Another significant rise in the cost was on account of repairs of mobiles which are under warranty. There was an increase in these repair costs by 1.5 crores which represents 1% of the total turnover of the company.

The process of repairs/replacement of under warranty product is outlined below:

- The company own 200 repair centres in various cities in India.
- A customer whose phone is under warranty and requires replacement/repair visits any of the 200 centres to deposit the faulty mobile phone.
- The technician at service centres examines the phone and the service centre sends the phone to a centralised repair centre at Mumbai. The phones are sent to Mumbai even for minor repairs which can be done locally if requisite infrastructure is provided to the service centres.
- The phones are sent in batches. Each service centre creates 3-4 batches of mobile phones in a day. (A recent study showed that the batches could be combined into a single batch per day)
- The phones are repaired in Mumbai’s centralized centres and sent back to the respective service centres for handing them back to the customer. The phones which are repaired are sent in separate batches and those which are replaced are sent in separate batches.

### Required

You are working as a Finance Manager in Zen. The finance director has approached you to understand whether the minor improvement would be useful given the size of the company. The Finance Director has asked you to examine the process of warranty repairs and replacement and submit a report covering the following aspects:

- (i) What is the CEO referring to when he says “minor improvements”?
- (ii) What are the benefits of such minor improvements?

- (iii) Apply the above process to the warranty claim process and explain how the process can be improved.
- (iv) Any other matter which you consider relevant.

### Solution

#### Issue

Zen limited is a leader in manufacturing of mobiles and is concerned about increasing costs. The increase in warranty related costs has been significant in the current year as compared to previous year. This has reduced the net profit of the company by 1% of sales.

#### Applicability of Kaizen Costing

“Kaizen” is a Japanese word which means “Change for Better”. In business parlance, Kaizen is used to refer to small and continuous improvement across all functions, processes and employees. Kaizen costing is a cost reduction system. YashihuroModen defines Kaizen Costing as "the maintenance of present cost levels for products currently being manufactured via systematic efforts to achieve the desired cost level.

Toyota Production System is considered as a pioneer in Kaizen Costing. Though the model was used for eliminating wastage from production at factory initially, the concept can be applied in any of the processes in a business. Since Kaizen is a continuous improvement process, a radical change or disruptive innovation is not expected in Kaizen costing.

#### The following are the key features of Kaizen -

- Kaizen processes focus on eliminating waste in the systems and processes of an organisation, improving productivity and achieving sustained continual improvement.
- Application of small, incremental changes routinely applied and sustained over a long period can lead to significant improvements.
- It aims to involve workers from multiple functions and levels in the organisation.
- A value chain analysis helps to quickly identify opportunities to eliminate wastage
- Although incremental changes can often be too small to be seen, Kaizen can be very effective in the long run. An airline which identified that 75% of its flyers would leave the olive from salad, the airline decided to remove it from its servings. This saved the airline \$ 40,000 per year. Another example is where an airline stopped printing its logo in the rubbish bags as it did not add value saved over \$ 300,000 per year.

The CEO is referring to Kaizen costing when he mentions minor improvements to save costs over time. Kaizen costing takes into consideration various costs such as costs of supply chain, manufacturing costs, marketing, sales, distribution costs etc.

### Benefits of Kaizen Costing

- Kaizen reduces waste in areas such as employees waiting time, transportation, excess inventory etc., which leads to improved efficiency in overall business processes and systems.
- A company applying Kaizen philosophy can achieve cost reduction through small incremental improvements and cost savings.
- Kaizen looks at functions and processes at all levels of organisation and requires participation of all employees and massive as well as open communication system. This participative approach improves teamwork across the organisation.
- Product improvement using Kaizen is likely to result in less number of defective products leading to customer satisfaction and reduction in warranty related costs.
- The reduction in wastage, improved efficiency and cost reduction improves the overall profitability of the company.

### Implementation of Kaizen in the Current Case

The implementation of Kaizen as a cost reduction techniques can take several forms. The key question to ask for implementation is - “Can we eliminate waste?”. The waste can take several forms like—

- Unnecessary movement of material and men - Travelling for meeting in cases where a video conferencing could help.
- Unwanted part in a product which if removed is not likely to impact the performance of the product. (Nano sim card has reduced a significant portion of use fibre boards as compared to the traditional sim cards.)
- Defects which involve extra cost in terms of reworks.
- *Waiting time* - A simple example could be locating for files in your computer which has not be arranged properly. This leads to waste of time.

The above is just an indicative list where improvements can be made. However, an important point to note is that reduction of waste should not be done by compromising the quality of product. Apple launched iPhone 5c as a budget phone by using plastic material instead of Aluminum. The market did not like the product as it was considered to be an inferior product as compared to iPhone 5s.

### Another way of looking at Kaizen is asking following questions -

- Can we eliminate functions from the production process without compromising the quality and utility of end products? - Removing unnecessary movements of material and men.
- Can we eliminate some durability? - Use of unbreakable plastic for producing disposable glasses would be waste of resources

- Can we minimise design? - e.g. use of Nano Sims.
- Can we substitute parts of the product being manufactured? – Can we take supplier's assistance to get better quality parts?
- Is there a better way? - This is a question which must be asked continuously to ensure that the improvement is not a one-time exercise.

**(The above questions also form a part of the Value Engineering Process)**

### **Application of Kaizen at Zen Limited**

The current warranty claim process at Zen involves movement of mobile phones from various service centres across the country to a centralised centre in Mumbai. The possible improvements in the claim process is explained below -

- The company needs to analyse whether it requires to own 200 centres by itself across the country. The company can evaluate closing down centres with less customer footfalls or outsource the ones which are not located at the strategic location. This would save some cost to the company.
- The current process requires each service centre to send the faulty mobile phones back to Mumbai for repair or replacement. This is done even in case of minor repairs which can be handled locally. The company can provide necessary infrastructure to the service centres to carry out minor repairs locally. This would save logistics cost of sending the phones to Mumbai and back to service centre. The company should analyse the past data to understand the proportion of phones which require minor repair. Repairing the phones locally would also reduce the turnaround time and the customer will get back the phone faster.
- The current process is to send phones in 3-4 batches in a day. This effectively means creating 3-4 consignments, documents for dispatches and incurring extra costs for transportation. Combining the phones in a single batch would reduce the cost of transportation and administrative cost as well.
- The phones can be sent back from Mumbai in single batch instead of creating multiple batches to save transportation costs.

The above improvements must be revisited continuously to derive required benefit from Kaizen process.

Apart from eliminating waste in the warranty claim process, the company must also identify root causes of increase in warranty claims in the current year as compared to previous year. Every phone being sent back for repair/replacement involves avoidable cost. The company must also revisit the manufacturing process and quality control processes to eliminate wastage in production process and improve quality.

- Zen can consider producing better quality mobiles at the manufacturing process to reduce the warranty claims.

- The pattern of warranty claim must be analysed to understand whether there is certain common problem related to repair claims. If the issue has some relation with parts used in mobile, the issue can be taken up with supplier of such parts



### CASE STUDY: BALANCED SCORECARD

**Fair Limited** manufactures and sells motor vehicles in India and different parts of the world. The company has its head office in New Delhi and three regional offices. The manufacturing plants are situated in Pune and Bhubaneshwar. The company has over 10,000 employees who are paid a fixed salary and a performance related pay (PRP).

The PRP is determined using the financial performance as a measure. The performance of departments which are profit centers is based upon the revenues and profits the departments generate. The performance of cost centers is based upon the cost savings against the budget.

Of late, the company has identified critical issues with the motor vehicles manufactured and sold in the market. In the last one year, itself, the company has recalled more than 2 lakh vehicles owing to quality issues like faulty gearbox, issues with axle, braking systems etc. The company was also penalized for selling vehicles which does not meet the emission norms.

The board of directors carried out an internal review of these frequent recalls and issues with the vehicles. In most of the cases, it appeared that the recall of vehicles was on account of lower quality of material and parts used. A couple of critical quality and emission checks were ignored to dispatch more vehicles in the limited time, leading to higher sales and profits.

The board is concerned with the reputational risk with the issue related with recalls. The company was consumer's most trusted brand for last three years in a row. It is unlikely to win the award this year due to negative feedback from customers. The board wants to win the trust of the customers back and be profitable as well.

#### **Required**

You are the advisor to the board. The board seeks your advice on the following aspects:

- (i) Advantages and disadvantages of using financial measure as a performance measure.
- (ii) SUGGEST an alternative performance measure which includes non-financial measures as well.
- (iii) IDENTIFY 2 critical success factors and 2 Key Performance Indicators for the performance measure chosen in (ii).

#### **Solution**

##### **What is the issue?**

Fair limited is into manufacturing of motor vehicles. The company has used financial measures for performance. Of late, the company has faced quality related issues leading

to vehicle recalls. The company has also been penalized for violating emission norms. Since the company has been using financial measures only, it appears that non-financial aspects related to quality have been ignored. The company has adopted the principle of profit at any cost which can be seen from use of low quality materials and parts as well as skipping key quality checks.

### **Financial Performance Measure**

Financial performance measures focus on financial results or aspects. These measures focus on the profits made by a business or a unit of business. They also include costs saved against budgets. Various financial performance indicators include – growth in revenue, profitability, variance from budget, Return on Capital Employed etc.

In the case of Fair limited, the performance of employees is done on the basis of financial performance indicator. When performance is evaluated on financial parameters, the employees and managers tend to focus only on profitability in anticipation of higher bonuses and pays.

The problems related to quality issues in vehicles produced by Fair limited might be linked to the use of financial performance measure. Low quality parts are used to save costs and improve profitability. The quality checks prior to sales were also skipped to sell more vehicles with limited resources. This is an apparent case of compromise in quality for seeking higher profits and revenues. In light of above, the advantages and disadvantages of financial performance measures are given below.

### **Advantages**

- Focus on financial objectives and is linked to the overall objective of wealth creation of shareholders.
- Such measures are objective.
- Quantification of results is possible.
- The measures are comparable across companies of a particular industry.
- The framework to measure financial performance is established in most of the cases.

### **Disadvantages**

- Focus on short term profits and Ignores long term sustainable growth. As can be seen in the case of fair limited, the company has compromised quality for short term profits. This is harmful to the company in the longer run.
- This measure can be distorted by inflation. A 5% growth in sales might be good but if the inflation is 6%, the real growth is negative.
- Financial information might be manipulated to show a better performance.
- Non-financial performance measures use measures other than financial to measure performance of employees and departments. The advantages of non-financial measures are Non-financial measures help business to measures every area whether financial or non-financial. Financial measure would not be able to suitably measure areas like performance of IT department.
- It focuses on qualitative aspects as well.
- These measures take a long-term view unlike financial measures where

employees tend to take a short term view.

**The disadvantages of Non-Financial measures are:**

- These require huge amount of information to measure each area of performance and might lead to shift of focus from core goals and values.
- These can be subjective as non-financial measures cannot be generally quantified.
- Non-financial measures like measures of quality are difficult to measure.

**Balanced Scorecard**

An alternative performance measure which focuses on both financial and non-financial measures is the Balanced Scorecard. It outlines four key areas in which company and divisional performance should be measured to focus on both the short and long term needs of the organisation. The key idea is that managers are to be appraised on a variety of measures which include non-financial measures so that their focus is both long and short term.

As discussed earlier, it appears that managers at Fair limited have ignored long term sustainable growth and qualitative factors and focused on short term profits and sales. This is one of the key disadvantages of a financial measure of performance. The company can start measuring performance both on financial as well as non-financial aspects. This would ensure that employees are not short sighted on profits alone.

**The four areas or perspectives in a Balanced Scorecard are –**

- **Financial Perspective**  
Financial perspective focuses on financial performance of the business and divisions. The various financial measures used by companies are profitability, revenue growth, cost control etc. This is currently being used in Fair limited to measure performance.
- **Customer Perspective**  
This perspective views organizational performance from the point of view the customer or other key stakeholders that the organization is designed to serve. These could include measures like customer satisfaction index, percentage of returns, percentage of goods delivered on time etc.
- **Internal Business Perspective**  
This perspective views organizational performance through the lenses of the quality and efficiency related to product or services or other key business processes. The measures under internal business perspective could be number of defective products produced, production performance per unit of time etc.
- **Training and Development/ Learning and Growth Perspective**  
This perspective views organizational performance through the lenses of human capital, infrastructure, technology, culture and other capacities that are key to breakthrough performance. The key measures could be number of new products produced, amount invested in training and development etc.

In each category/Perspective, the organisation must follow through from the business strategy, to ensure they are focused on the long-term direction of the business. Clear objectives should be set under each category according to the SMART criteria (Specific, Measurable, Achievable, Relevant and Time-bound), measured at the end of the period, and lessons learnt from actual results to help to improve performance in future periods and keep the organisation on track to achieve its strategic goals.

### Applying Balanced Scorecard to Fair Limited

The issues related to quality have arisen at Fair Limited as the managers and divisions focused on profits at the cost of quality. The recall of vehicles was primarily on account of use of sub-standard parts. The company should consider using non-financial measures as well as a performance measure. Balance scorecard can be an effective tool to apply financial and non-financial measures.

The company must take steps to put focus on quality related aspects as well as financial aspects. A proper application of various Key Performance Indicators under the respective Critical Success Factors can help the company overcome the current issue.

Critical success factor (CSF) is a management term for an element that is necessary for an organization or project to achieve its mission. It is a critical factor or activity required for ensuring the success of a company or an organization. These are the key areas in which the organisation has to do well if they are to remain competitive and profitable. The critical success factors have to be linked with the overall strategy of the organisation.

Key Performance Indicators (KPIs) are the ways in which the organisation's performance for the CSF can be measured. It is a measurable value that demonstrates how effectively a company is achieving key business objectives. Organizations use KPIs to evaluate their success at reaching targets.

The Critical Success Factors and Corresponding KPIs for Fair limited for each of the perspective in the balanced scorecard is given below:

Perspective	Critical Success Factors	Key Performance Indicator
Financial	<ul style="list-style-type: none"> <li>Be the Most Profitable Company in Motor Vehicle Industry.</li> <li>Become the No.1 Company by in terms of Market Share in five years.</li> </ul>	<ul style="list-style-type: none"> <li>Profitability ratios.</li> <li>Revenue growth.</li> <li>Variance to budget.</li> <li>Number of vehicles sold.</li> </ul>
Customer	<ul style="list-style-type: none"> <li>Be No.1 Choice of Customers.</li> <li>Implement Zero Recall Policy.</li> </ul>	<ul style="list-style-type: none"> <li>Number of vehicles sold vis-à-vis those sold by competitors.</li> <li>Number of recalls of vehicles.</li> <li>On time delivery of vehicles.</li> </ul>

Perspective	Critical Success Factors	Key Performance Indicator
Internal Business	<ul style="list-style-type: none"> <li>Total Quality Management.</li> <li>Zero Idle Time at Factory.</li> </ul>	<ul style="list-style-type: none"> <li>Number of defective cars produced.</li> <li>Number of cars returned by customers as faulty.</li> <li>Number of hours spent in waiting by labours at assembly line.</li> </ul>
Training and Development	<ul style="list-style-type: none"> <li>Upto Date Technology used in Manufacturing Facilities.</li> <li>Skill Development for Labour and Supervisors.</li> </ul>	<ul style="list-style-type: none"> <li>Amount spent in research and development year on year.</li> <li>Number of training hours undergone by workers and supervisor.</li> <li>Number of new model of vehicles launched.</li> </ul>



### CASE STUDY: Value Chain Analysis, Balanced Scorecard, KPI

You are the Finance Manager of DP Limited which is in the business of manufacturing wire rods. A division in the company manufactures copper wire rods from a single manufacturing plant in Central India. The division purchases raw material (copper cathodes) from various suppliers across the country. The cathodes are melted and wire rods of various dimensions are produced. Each batch of wire rods produced are tested for quality and strength.

The wire rods are stored in rolls in the warehouse and dispatched in company owned trucks as per the requirement of the customers. The customers are required to pay 50% of invoice value as advance and balance 50% within 30 days of delivery of goods. The company prices its copper wire rods based on the price prevailing on London Metal Exchange after adjusting it with a factor to cover conversion costs and profits.

The company explores newer markets by advertising in national dailies and participating in various industrial events in India as well as abroad. An annual conference of customers is conducted by the company to improve customer relationships and attract newer customers. The customers have right to return the material if quality specifications are not met. There is a separate team to handle such complaints. The following email was sent by the Chief Financial Officer of the company to you.

**From: Chief Financial Officer**

**To: Finance Manager**

### Subject – Commodity Price Fluctuation

The board is quite aware of foreign exchange fluctuation related risks. However, they are not much aware of risks related to fluctuation in commodity prices. The prices of copper which are used to manufacture copper wire rods have fallen down by over 20% in the last six months owing to global factors.

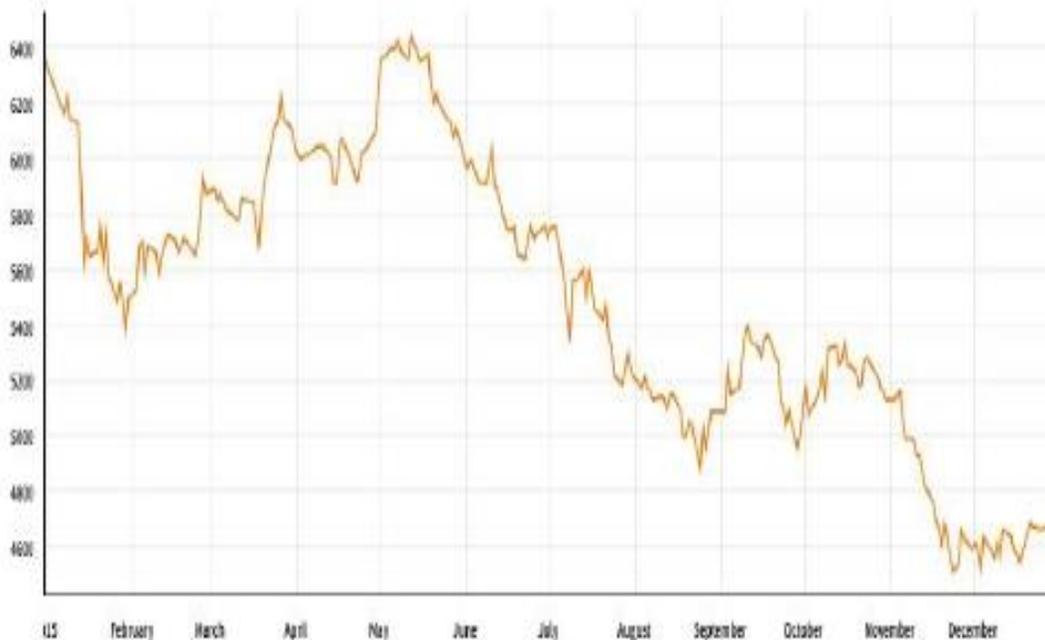
The procurement team of Copper Wire Division has been waiting for the right time to buy these metals as they expect the prices to fall down further. However, we are at a verge of stock-out of these metals as no purchase was made in the last one month.

The bonus of procurement team largely depends on the annual savings as compared to the budgeted cost of purchase. I am not happy with the approach of speculation and making profits out of price fluctuation in raw materials. Could you highlight the issues related with our performance measurement mechanism and suggest how it could be improved?

### Regards

Chief Financial Officer

Copper Prices Quoted on LME



### Required

- (i) EXPLAIN and IDENTIFY the various primary activities of Copper Division
- (ii) DISCUSS the issues with performance measure in force in the company.
- (iii) ADVISE an alternate performance measure and Identify Key Performance Indicators(KPI).

### Solution:-

**1.(i)** Value chain is defined as “a chain of value added activities; products pass through the activities in a chain, gaining value at each stage”. Value chain focuses on systems,

and how business inputs are changed into business outputs purchased by customers. The entire set of activities that a business undertakes to convert inputs to outputs are interlinked to each other.

Porter's value chain classifies activities into primary activity and secondary activity.

### **Primary Activities**

Primary activities are those activities that are directly related with creating and delivering a product to the end customers. The following activities are considered as primary activities:

### **Inbound Logistics**

Inbound logistics involves arranging inbound movement of materials from suppliers to the manufacturing plants. The activities related to inbound logistics in the case of copper division of DP limited would involve transporting copper cathodes from multiple suppliers across the country and storing them in the warehouse. The cathodes stored in warehouse would be issued to the production facilities depending on the requirement of the production plants.

### **Operations**

Operations involve those activities which are concerned with conversion of input into outputs in case of manufacturing companies. The activities under operations would include those related to melting of copper cathode and converting the copper cathodes into wire rods. The quality tests carried out for wire rods would also be included as a part of operations.

### **Outbound Logistics**

These include planning and dispatch, distribution management, transportation, warehousing, and order fulfillment. This includes warehousing of finished goods (copper wire rods) and distribution of copper wire rods to its customers. The company uses its own trucks to distribute finished goods to its customers. The scheduling of trucks and dispatch of material would also be a part of outbound logistics.

### **Marketing & Sales**

Marketing and sales are the means whereby consumers and customers are made aware of the product which is ultimately sold to them. The activities include selling products to the end customers covering activities like product management, price management, promotion and marketing management. DP limited uses advertisement in national dailies

and holds conferences as a part of its marketing and sales efforts. The company also holds annual customer conference to improve customer relations and attract new customers.

### Service

In case of manufacturing industry, service generally refers to the after sales service which are required to maintain the value of product and includes activities like installation, repair etc. The service team is also expected to handle customer returns on account of poor quality of copper wire rods.

#### **(ii) What is the issue?**

A procurement team is generally a cost centre and the most appropriate way to evaluate performance of cost centre is the comparison between actual cost and budgeted cost (also called variance). A large portion of bonus (performance measurement) is dependent on the savings in actual purchases.

The company has adopted variance analysis as a measure of performance. If the team is able to reduce the actual cost of purchase as compared to the budgeted cost, a higher bonus is paid. The procurement team has stopped purchase of copper cathodes to save on the purchase budget which ultimately would translate into higher payout of bonus.

The commodity prices of copper have fallen by about 20% in the last six months. The speculation of fall in price has resulted in halting of procurement process. It is very difficult to time the market and such speculation could lead to losses to the company. There could be a stock-out situation if the procurement is not resumed and the situation could hamper the production and overall delivery schedules. The procurement team appears to have taken a short- term view of price movement.

The team is focused on earning higher bonus and hence is waiting to buy at lower prices. There is a larger impact of not being able to deliver product on time which could damage the reputation of the company. This has been ignored by the procurement team. Managers must be encouraged to consider the impact on the company as a whole and not on just the own department.

The company is using just a financial measure to measure performance. This can result in lopsided view of the goals and objectives of the company. Managers tend to look at short term profits and ignore the long- term growth.

### Optimum Performance Measurement

A performance measurement is most effective when the goals of the respective departments are aligned with that of the company. This ensures that each employee within the company works towards the overall objective of the company. The company manufactures wire rods and the objective of the copper division is to manufacture copper wire rods as per the requirement of the customers.

The profit flows from the main business of the company. If a department focuses on an objective which is not aligned with the main goal, the company as a whole suffers. A stock-out like situation would hamper the image of a company, if wire rods are not delivered as per schedule to the customers.

Another aspect to be considered is that managers and employees are evaluated only on those parameters which are controlled by them. If for example, the procurement team is able to purchase copper at a discount to market price because of their efforts, it could be considered as saving.

The prices of copper are determined by the prices on commodity exchanges and are not in the control of procurement managers. The performance of managers and employees should not be impacted by global change in prices of commodities as they are not controlled by the concerned employees.

### (iii) Alternate Performance Measure

The issue with financial performance measures alone is that managers tend to have a short-term view as can be seen in our case. In order to overcome possible short-termism of financial measures Kaplan and Norton developed the Balanced Scorecard which outlined four key areas in which company and divisional performance should be measured to focus on both the short and long term needs of the organisation.

The key idea is that managers are to be appraised on a variety of measures which include non-financial measures so that their focus is both long and short term. The four perspectives used to measure performance measure in a Balanced Scorecard is given below:

**Financial Perspective:** This measures the financial performance which is linked to the overall objective of maximizing shareholder's wealth. We already use financial measures to measure performance. The weight age could be reduced to include other measures. Also, factors beyond the control of managers like commodity prices should be excluded.

**Customer Perspective:** This includes focusing on customers and meeting their needs. Measures could include quality of material produced, optimum levels of inventory maintained, number of stock-out instances, etc.

**Internal Business Perspective:** This includes measures to evaluate the performance of business processes with particular emphasis on productivity and efficiency. Measures could include procurement lead time, number of defective purchases etc. The company could use measures like JIT to reduce the procurement lead time.

**Training and Growth:** This includes focusing on innovating in processes and developing and learning for the future. Trainings could be given to procurement managers to identify best quality of copper cathodes, aspects related to purity etc.

