

Chapter 14 Activity Based Costing

Traditional absorption costing systems share overheads across all products based on a single cost driver (usually machine or labour hours).

It is argued that a modern manufacturing environment requires a more sophisticated and intelligent costing system.

Under ABC costing, overhead costs are given greater attention and visibility because they are assigned to different products based on the extent to which each product ‘drives’ or causes that cost. This costing system can be relatively time-consuming and costly to implement but can be useful, if manufacturing overhead expenditure is significant and a diverse product range exists. ABC can also be applied to costing within service industries

Steps in ABC

1. Identify the major ‘activities’ that give rise to overheads (e.g. quality testing, ordering costs etc)
2. Determine what causes the cost of each activity – **the cost driver** (e.g. number of inspections, number of orders)
3. Calculate the total costs for each activity – the **cost pools**.
4. Calculate a cost per cost driver.
5. Allocate the overhead costs to products based on their usage of cost driving activities.
6. Calculate the overhead cost per unit for each item of output

These are some examples of cost pools and cost drivers

Cost pools	Cost drivers
Purchasing department cost	Number of purchase orders
Materials handling	Number of material requisitions
Setup costs	Number of machine setups
Inspection costs	Number of inspection
Supervisors	Number of direct labour hours

Advantages of ABC

- ✓ ABC provides more reliable information for product costing, i.e. it is based on activity cost driver.
- ✓ ABC facilitates pricing decision
- ✓ ABC recognizes that overhead costs are not all related to production and sales volume.

Disadvantages of ABC

- ✗ It is time consuming to implement ABC
- ✗ Determining the cost driver may be difficult.
- ✗ It is not possible to attribute all costs to activities

- ✗ Measuring the quantity of each cost driver consumed may be difficult.
- ✗ It is costly because it may be necessary to employ a specialist to implement the ABC system

Worked example

1. Una manufactures three products: A, B, and C.

Data for the period just ended is as follows:

	A	B	C
Production (Units)	20000	25000	2000
Sales price (per unit)	\$20	\$20	\$20
Material cost (per unit)	\$5	\$10	\$10
Labour hours (per unit)	2	1	1

(Labour is paid at the rate of \$5 per hour)

Overheads for the period were as follows:

Set-up costs	90,000
Receiving	30,000
Dispatch	15,000
Machining	<u>55,000</u>
	<u>\$190,000</u>

Cost driver data:

	A	B	C
Machine hour per unit	2	2	2
Number of set ups	10	13	2
Number of deliveries received	10	10	2
Number of orders dispatched	20	20	20

Required

- (a) Calculate the cost (and hence profit) per unit, absorbing all the overheads on the basis of labour hours.
- (b) Calculate the cost (and hence profit) per unit absorbing the overheads using an Activity Based Costing approach.

Past Paper Questions

Q # 1 Jumal Limited manufactures two products, Alpha and Beta. The following budgeted information is available.

	Alpha	Beta
Production and sales (units)	1 000	5 000
Machine hours	5 000	25 000
Direct materials (cost per unit)	\$80	\$48
Direct labour (cost per unit)	\$150	\$60

Fixed production overhead is \$540 000 and is allocated to the products by machine hours.

REQUIRED

- (a) Calculate for each product:
 (i) Total budgeted production cost [2]
 (ii) Budgeted unit cost. [2]

Additional information

The directors of Jumal Limited will add 50% on to the total production cost to set the selling price for each product.

REQUIRED

- (b) Calculate the unit selling price of **each** product. [2]

Additional information

Meena is a management accountant newly recruited by Jumal Limited. She suggests that the company should adopt activity based costing to allocate production overheads. She has identified that the production comprises four major activities. The cost of each activity and the activities consumed by each product are as follows:

	Production overheads \$	Alpha	Beta
Machine set-up	110 000	12 times	8 times
Machine maintenance	180 000	90 maintenance hours	110 maintenance hours
Materials handling	90 000	20 deliveries	10 deliveries
Product inspection	<u>160 000</u>	200 inspection hours	120 inspection hours
	<u>540 000</u>		

REQUIRED

- (c) State **one** benefit of adopting activity based costing. [1]

(d) Prepare a table to show the allocation of the **total** budgeted production overheads between Alpha and Beta if Jumal Limited changes to activity based costing. [4]

(e) Calculate the budgeted unit cost and budgeted unit selling price of Alpha and Beta if activity based costing is adopted. [5]

(f) Discuss the factors the directors of a business should consider before possibly changing the selling price. [6]

(g) Recommend whether or not the directors of Jumal Limited should change the selling price of the products. Justify your answer. [3]

March 2016

Q # 2 Chetna runs a business printing logos on sweatshirts. The sweatshirts come in two types, Standard and Superior. The selling price is set at cost plus 30%.

The following information is available for the year.

	Standard	Superior
Number of sweatshirts sold	22 500	9 000
Purchase cost per sweatshirt	\$5	\$8
Printing materials per sweatshirt	\$0.50	\$0.50
Labour time to print each sweatshirt	5 minutes	5 minutes

Overheads were as follows:

	\$
Machine set up costs	18 900
Other production overheads	5 850
Selling and administration	<u>17 250</u>
Total	<u>42 000</u>

REQUIRED

(a) Calculate an overhead absorption rate based on labour hours. [2]

Additional information

Staff printing the logos are paid \$10 an hour

REQUIRED

(b) (i) Calculate the total cost allocated to each type of sweatshirt. [4]

(ii) Calculate the selling price for **each** sweatshirt. [2]

Additional information

Chetna has suggested that it would be better to allocate the machine set up cost to each product based on the number of times the machine is set up. The machine has to be set up each time there is a different logo.

During the year the machine was set up 600 times for Standard sweatshirts and 975 times for Superior sweatshirts. Other overheads are still allocated on the basis of labour hours.

REQUIRED

(c) (i) Calculate the total costs allocated to **each** type of sweatshirt when machine set up costs are allocated using the number of set up times. [4]

(ii) Calculate the revised selling price for **each** type of sweatshirt. [2]

(iii) Calculate the change in selling price for **each** type of sweatshirt. [2]

(d) Explain **three** differences between activity based costing and absorption costing. [6]

(e) Advise Chetna which method she should use. Justify your answer. [3]

June 2016

Q # 3 Explorer Limited produces two products, Y and Z, and has always used absorption costing to allocate overheads to each product. The directors are now considering adopting activity based costing (ABC).

REQUIRED

(a) Compare how overheads are apportioned using absorption costing and ABC. [4]

Additional information

The budgeted data for the two products for the year ending 31 December 2017 is as follows:

	Y	Z
Raw materials used (kilo)	2	3
Direct labour hours	0.75	1
Unit selling price	\$19	\$25
Annual production and sale	2500	4000

The cost of raw materials is \$2.50 per kilo and the labour force are paid \$8 per hour.

Annual overheads are as follows:

	\$
Machine maintenance overheads	8 500
Purchasing overheads	17 000
Selling and distribution overheads	18 750

REQUIRED

(b) Calculate the cost per unit for **each** product using absorption costing. [7]

Additional information

	Y	Z
Number of production runs	20	16
Number of purchase orders	55	65
Number of sales deliveries	85	160

REQUIRED

(c) Calculate the cost per unit for **each** product using ABC. [7]

(d) (i) Compare the total profit per product using absorption costing and ABC. [4]

(ii) Comment on the results. [1]

(e) Advise the directors whether or not ABC should be adopted. Justify your answer. [2]

June 2016

Q # 4 “The idea behind this method of costing is that it is the cause of a cost which is important and not whether it is fixed or variable.”

REQUIRED

(a) Identify the costing method described in the quotation. [1]

Additional information

Haruka Limited produces a single product.

The factory is operational 5 days a week for 50 weeks a year. It produces one batch of 200 units each day.

Overheads amount to \$79 000 a year

REQUIRED

(b) Calculate the overhead cost per unit to **two** decimal places. [2]

Additional information

These overheads comprised:

	\$
Machine set-up costs	2 000
Production quality inspections	5 000
Production stoppage costs	4 000
Machine maintenance	8 000
Machine running costs	60 000

The machines were set up at the start of each working day.

There was a quality inspection every week.

The machines were maintained each day.

Production was stopped on average once every 4 weeks for unexpected maintenance.

Samir, the finance director, asks Sara, the factory accountant, to analyse the overhead cost per unit across each of the five overheads incurred.

REQUIRED

(c) Prepare an analysis showing how the total overhead cost per unit (from part b) is split between each of the individual overheads. [12]

Additional information

Sara has complained to Samir that producing this analysis is not worthwhile.

REQUIRED

(d) Advise Samir whether or not he should continue to ask for this analysis in the future years. Justify your answer by considering the benefits and drawbacks of this costing method. [10]

Nov 2016

Q # 5 Ahmed manufactures two products. He has recently started using Activity Based Costing (ABC) for allocating the overhead costs to these products. The budgeted data for one month is available as follows:

	Product X	Product Y
Demand (units)	10 000	14 000
Number of orders	20	60
Number of production runs	12	36
	Per unit	Per unit
Direct labour hours	0.75	1.5
Machine hours	2.5	0.5
Direct costs (\$)	100	50
Total factory overhead costs		\$
Machine maintenance costs		264 000
Ordering costs		54 000
Production run costs		<u>24 000</u>
		<u>342 000</u>

Required

(a) Calculate the full cost per unit for product X and product Y using ABC [10]

Additional Information

Ahmed previously used direct labour hours as a basis to charge overheads to each product.

Required

(b) Calculate the overhead charged to each product using the direct labour hour rate. [3]

(c) Explain the effect that changing the method has had on the overhead cost of each product. [4]

Additional information

A customer requires 50 units of Product X and has offered to pay Ahmed a total of \$8450 for them. Ahmed uses 40% mark-up on all his products.

Required

(d) Recommend whether or not Ahmed should accept the offer. Justify your decision using appropriate calculations and considering **both** financial and non-financial factors. [6]

(e) State **two** reasons why a business may use ABC for allocating overhead costs. [2]

June 2017

Q # 6 PMW Limited produces and sells two products, A and B. It provided the following information for a year:

	Product A	Product B
Sales	20 000 units	18 000 units
Selling price per unit	\$12	\$20
Direct material per unit	\$3.20	\$4.90
Direct labour per unit	\$1.80	\$2.10

Total overheads amounted to \$300000. These are currently apportioned to the two products on the basis of total sales value.

REQUIRED

(a) Calculate the value of overheads apportioned to each product. [3]

(b) Calculate the profit or loss per unit for each product. [5]

Additional information

Beryl, the accountant, has analysed the overheads. She discovered that the total of \$300000 included costs for delivery to customers and order processing costs. The following information was available.

1 Analysis of orders received

	Product A	Product B	Total
Orders received for more than 100 units	17	23	40
Orders received for 100 units or fewer	<u>664</u>	<u>446</u>	<u>1110</u>
Total orders received	<u>681</u>	<u>469</u>	<u>1150</u>

2 Costs of delivery amounted to \$30 per order for orders received for more than 100 units, and \$20 per order for orders of 100 units or fewer.

3 Order processing costs amounted to \$25 per order irrespective of size.

4 Remaining overheads should now be apportioned to sales units.

REQUIRED

(c) Calculate the total overheads apportioned to each product in accordance with the accountant's analysis. [5]

(d) Calculate the revised profit or loss per unit for each product. [5]

Additional information

Beryl believes that her method of apportioning overheads is more realistic than the current method. She has recommended to the directors that the method be changed in the future.

REQUIRED

(e) Discuss whether or not the directors should change the method of apportioning overheads. Justify your answer using both financial and non-financial factors. [5]

(f) State what is meant by the terms 'cost driver' and 'cost pool'. [2]

Nov 2017

Q # 7 B Limited manufactures two products Alpha and Omega. The following budgeted figures are available.

	Alpha	Omega
Budgeted production and sales units	20 000	8 000
Direct materials used per unit	5 kilo	11 kilo
Direct materials cost per kilo	\$20	\$11
Labour hours per unit	2	1
Direct labour cost per hour	\$12	\$6

The fixed overheads are forecast as \$396 000 and are allocated on the basis of labour hours.

- (a) Calculate for each product:
 (i) The total production costs [3]
 (ii) The production cost per unit [1]

Additional information

The sales price per unit is calculated by adding 50% to the cost.

- (b) Calculate the selling price per unit for each product. [2]

Additional information

The directors of the company have been advised that they should adopt activity based costing to allocate the production overheads. They have identified the four major activities involved in the production cycle as machine set-up, materials handling, maintenance of machinery and production inspection and packing. The costs of each activity have been established and the overheads apportioned between the activities as follows:

	Production Overheads	Alpha	Omega
	\$		
Machine set-up	90 000	15 times	10 times
Materials handling	80 000	6 receipts	14 receipts
Machine maintenance	46 000	130 hours	100 hours
Inspection and packing	<u>180 000</u>	40 hours	20 hours
	<u>396 000</u>		

- (c) State two disadvantages to a business of adopting activity based costing. [2]
 (d) Calculate the total production overhead to be allocated to each product using activity based costing. [4]
 (e) Recalculate the cost per unit and selling price of each product maintaining the 50% mark-up. [3]
 (f) Explain three reasons why B Limited should change the method of allocating overheads to using activity based costing. [6]

Additional information

It has been suggested that customers will not accept the increase in price of Omega. The directors are therefore considering changing the profit margins to 60% on Alpha and 30% on Omega.

- (g) (i) Calculate the new total profit for each product if this change is adopted. [2]
 (ii) Give two reasons why B Limited should adopt this change. [2]

June 2018

Q # 8 F Limited was planning to introduce two new products, Product X and Product Y. The relevant data were as follows.

	Product X	Product Y
units to be produced and sold each month	4000	1000
direct labour per unit	2 hours at \$8 per hour	4.8 hours at \$10 per hour
direct materials per unit	5 kilos at \$1.50 per kilo	6 kilos at \$4 per kilo
average number of hours to be worked by each production worker per month	200 hours	120 hours
average number of kilos of direct material in each order to be placed by the purchasing department	4000 kilos	1500 kilos
selling and distribution costs to be incurred by each product	\$19200	\$6400

Total factory overheads arising from the introduction of Product X and Product Y are expected to be:

	\$
purchasing costs of direct material	9360
employment overheads for direct labour	10080
other factory overheads	<u>42000</u>
	<u>61440</u>

The directors' policy is to set a selling price based on a mark-up of 50% on total cost per unit.

The directors asked two employees, Abdul and Brian, each to prepare a calculation of the selling price which should be set.

Abdul decided to apportion the purchasing costs of direct material on the basis of the number of kilos purchased, and to apportion the employment overheads for direct labour on the basis of hours worked.

Abdul decided to apportion other factory overheads on the basis of units produced.

Required

(a) Prepare a statement to work out the proposed selling price per unit for both Product X and Product Y as calculated by Abdul. [11]

Additional information

Brian decided to apportion the purchasing costs of direct material on the basis of the number of orders being made, and to apportion the employment overheads for direct labour on the number of employees working in production.

Brian also decided to apportion other factory overheads on the basis of units produced.

(b) Prepare a statement to work out the proposed selling price per unit for both Product X and Product Y as calculated by Brian. [9]

(c) Explain to the directors how to proceed with the setting of the selling price. Support your answer with reference to your calculations in parts (a) and (b) together with any other factors. [4]

(d) State one reason why selling and distribution costs are not included in a valuation of inventory suitable for inclusion in a statement of financial position. [1]

Nov 2018

Q # 9 B Limited produces two products – Premier and Standard. The budgeted cost information for the month of June 2019 is as follows:

	Premier	Standard
Units produced and sold	500	800
Direct materials per unit	\$80	\$50
Direct labour hourly rate	\$30	\$25
Direct labour hours per unit	3	2

Budgeted fixed overheads \$480000 for 2019 are allocated to products based on 40 000 budgeted total direct labour hours.

(a) Calculate the cost per unit for each product using absorption costing. [3]

Additional information

A newly recruited management accountant suggests that B Limited should adopt activity based costing (ABC). He has provided an analysis of fixed overheads as follows:

	Cost \$	Cost driver	Annual quantity
Materials requisition	90 000	Number of material requisitions	75
Machine set up	240 000	Number of setups	60
Inspection	150 000	Number of inspection hours	5000
	<u>480 000</u>		

Budgeted use of cost driver for each product for June 2019 is as follows:

	Premier	Standard
Number of material requisitions	2	6
Number of setups	2	3
Number of inspection hours	120	320

- (b) Explain the meaning of the term 'cost driver'. [2]
- (c) State two advantages and three disadvantages of ABC. [5]
- (d) Calculate the cost per unit for each product if ABC is adopted. [8]

Additional information

The selling price of each product is cost plus 40%.

- (e) (i) Calculate the selling price of each product using absorption costing. [2]
- (ii) Calculate the selling price of each product using ABC. [2]
- (iii) Explain, using suitable calculations, why your answers in (i) and (ii) are different. [3]

March 2019

Q # 10 Young manufactures two products, Product X and Product Y. The following budgeted information is available

	Product X	Product Y
Production units	5 000	5 000
Machine hours	10 000	20 000
Labour hours	5 000	7 500
Direct materials (per unit)	\$60	\$75
Direct labour (per hour)	\$25	\$30

Total production overheads, \$180 000, are to be allocated to each product on the basis of machine hours. A 50% mark-up will be added to the production cost of each product to set the selling price

- (a) Calculate for each product the unit production cost and unit selling price. [7]

Additional information

On the advice of the management accountant, Young is considering using activity based costing (ABC) to allocate the production overheads to both products. The following information is available

	\$	Product X	Product Y
Machine set up	120 000	20 times	10 times
Materials handling	45 000	10 receipts	5 receipts
Inspection	15 000	150 hours	100 hours
	<u>180 000</u>		

- (b) State what is meant by 'Activity Based Costing (ABC)'. [1]
- (c) Recalculate for each product the unit production cost and the unit selling price using ABC. [7]
- (d) (i) Calculate the difference between the unit production overhead charged to Product X and to Product Y using each method. [3]
- (ii) Calculate the difference between the unit selling price using the two costing methods for Product X and Product Y. [2]
- (e) Advise Young whether or not he should change the method of allocating production overhead costs to ABC. Justify your answer. [5]

Nov 2019