

## Bhimani et al Chapter Eleven: ABC

### Suggested solutions to some of the questions

**11.1** *Cost smoothing* describes a costing approach that uses broad averages uniformly to assign the cost of resources to cost objects when the individual products, services or customers in fact use those resources in a non-uniform way.

One way of determining if cost smoothing is occurring is to examine separately how individual products (services, customers, etc.) use the resources of the organisation and to compare the results with the way the accounting system represents that usage.

**11.2** Overcosting may result in competitors entering a market and taking a market share for products, when a company erroneously believes those products to be profitable.

Undercosting may result in competitors selling products on which they are in fact losing money, when they erroneously believe them to be profitable.

**11.3** Costing system refinement means making changes to an existing costing system that results in a better measure of the way that jobs, products, customers and so on differentially use the resources of the organisation.

Three guidelines for refinement are:

- a Classify as many of the total costs as direct costs as is economically feasible.
- b Select the number of indirect-cost pools on the basis of homogeneity.
- c Use cost drivers as the chosen allocation bases.

**11.4** An activity-based approach focuses on activities as the fundamental cost objects. It uses the cost of these activities as the basis for assigning costs to other cost objects such as products, services or customers.

**11.5** Increasing the number of indirect-cost pools does NOT guarantee increased accuracy of product, service or customer costs. If the existing cost pool is already homogeneous, increasing the number of cost pools will not increase accuracy. If the existing cost pool is not homogeneous, accuracy will only increase if the increased cost pools themselves increase in homogeneity *vis-à-vis* the single cost pool.

**11.6** The accountant faces a difficult challenge. The benefits of a better accounting system show up in improved decisions by managers. It is important that the accountant has the support of these managers when seeking increased investments in accounting systems.

Statements by these managers showing how their decisions will be improved by a better accounting system are the accountant's best base when seeking increased funding.

**11.7** The most frequently used allocation bases for manufacturing overhead costs are: (i) direct labour-hours, (ii) direct labour-euros, (iii) units of production, (iv) machine-hours and (v) direct materials euros. This ranking is based on average usage in the five countries reported in the Surveys of Company Practice box in Chapter 11.

**11.8** Four levels of a manufacturing cost hierarchy are:

- 1 Output unit-level costs
- 2 Batch-level costs
- 3 Product-sustaining costs
- 4 Facility-sustaining costs.

**11.9** The purpose for computing a product cost will determine whether unit costs should be based on total manufacturing costs in all or only some levels of the cost hierarchy.

Inventory valuation for financial reporting requires total or only some manufacturing costs (all levels of the hierarchy) to be expressed on a per output-unit basis. In contrast, for cost management purposes, the cost hierarchy need not be unitised as the cost driver is not uniformly allocated to units of output at each level in the hierarchy.

**11.10** An ABC approach focuses on activities as the fundamental cost objects. The costs of these activities are built up to compute the costs of products, services, customers, and so on. The traditional approach seeks to have one or a few indirect-cost pools, irrespective of the heterogeneity in the facility. An ABC approach attempts to use cost drivers as the allocation base, whereas the traditional approach is less clear on this issue.

### 11.11

1.

Direct costs		
Direct materials	€150000	£150000
Indirect costs		
Product support	983000	983000
Total costs		£1133000

Cost per kilogram of chips = €1.133

2

Direct costs	Retail chips	Institutional chips
Direct materials	£135000	€15000
Packaging	<u>180000</u>	<u>8000</u>
	315000	23000
<b>Indirect costs</b>		
Cleaning		
€0.120 x 900000	108000	
€0.120 x 100000		12000
Cutting		
€0.24 x 900000	216000	
€0.15 x 100000		15000
Packaging		
€0.48 x 900000	<u>432000</u>	
€0.12 x 100000		<u>12000</u>
	756000	39000
Total costs	€1,071,000	€62000
Units produced	900000	100000
Cost per unit	£1.19	€0.62

*Note:* The total costs of €1 133 000 (€1 071 000 + €62 000) are the same as those in requirement 1.

### 3 There is much evidence of product-cost cross-subsidisation.

	Retail	Institutional
Current system	€1.133	£1.133
ABC system	€1.190	€0.620

Assuming the ABC numbers are more accurate, retail is undercosted by approximately 5% ( $€1.133 + €1.19 = 0.95$ ) while Institutional is overcosted by 83% ( $€1.133 + €0.620 = 1.83$ ).

The current system assumes that each product uses all the activity areas in a homogeneous way. This is not the case. Institutional sales use far fewer resources in the cutting area and the packaging area. The percentage of total costs for each cost category is:

	Retail	Institutional	Total
<b>Direct costs</b>			
<b>Direct materials</b>	90.0%	10.00%	100.0%
Packaging	95.7	4.3	100.0%
<b>Indirect costs</b>			
Cleaning	90.0	10.0	100.0
Cutting	93.5	6.5	100.0
Packaging	97.3	2.7	100.0
Units produced	90.0%	10.0%	100.0%

McCarthy Potatoes can use the revised cost information for a variety of purposes:

- **Pricing/product emphasis decisions.** The sizable drop in the reported cost of institutional potatoes makes it possible that McCarthy Potatoes was overpricing potato products in this market. It lost the bid for a large institutional contract with a bid 30% above the winning bid. With its revised product cost dropping from £1.133 to €0.620,

McCarthy Potatoes could have bid much lower and still made a profit. An increased emphasis on the institutional market appears warranted.

- **Product design decisions.** ABC provides a roadmap as to how to reduce the costs of individual products. The relative components of costs are:

	Retail	Institutional
<b>Direct costs</b>		
<b>Direct materials</b>	12.6%	24.2%
Packaging	16.8	12.9
<b>Indirect costs</b>		
Cleaning	10.13	19.3
Cutting	20.2	24.2
Packaging	40.3	19.3
<b>Total costs</b>	100.0%	100.0%

Packaging-related costs constitute 57.1% ( $16.8\% + 40.3\%$ ) of total costs of the retail product line. Design efforts that reduce packaging costs can have a big impact on reducing total unit costs for retail.

- **Process improvements.** Each activity area is now highlighted as a separate cost. The three indirect cost areas are over 60% of total costs for each product, indicating the upside from improvements in the efficiency of processes in these activity areas.

### Question 11.12

1

Cleaning activity area		
	1000000 kg x €0.120	€120000
Cutting		
	900000 x €0.24	€216 000
	100000 x €0.15	<u>15000</u>
		€231 000
Packaging		
	900000 x €0.480	€432 000
	100000 x €0.120	<u>12000</u>
		€444 000

2

Cost pool	Costs in pool	Number of driver units	Costs per driver unit
Cleaning	€120000	1200000 raw kilograms	€0.10
Cutting	€231000	3850 hours*	€60.00
Packaging	€444 000	37000 hours**	€12.00

\* (900 000 + 250) + (100 000 + 400) = 3600 + 250 = 3850.

\*\* (900 000 + 25) + (100 000 + 100) = 36000 + 1000 = 37000.

3

McCarthy Potatoes can use information about cost driver rates in several ways:

- Target the high cost rate areas for process improvement. For example cutting has a €60 per hour rate McCarthy Potatoes could seek ways to reduce this by either redesigning processes or employing lower-cost equipment.
- Benchmarking to signal areas capable of improvement. If McCarthy Potatoes has other potato processing plants around the globe, it could compare cost driver rates for the same activity at different plants. It could then seek to transfer knowledge from the most efficient plants to the less efficient plants.
- Use cost driver rates as performance targets when evaluating operating managers. For example, the manager in charge of potato cleaning could be given a target rate of €0.09 per raw kilogram of potatoes cleaned.
- Developing a flexible budget for McCarthy Potatoes. The effect of different product mixes and different output levels can be estimated using the cost driver rates

### 11.13 Activity-based costing, product cost cross-subsidisation.

The idea for Exercise 11.13 came from 'ABC Minicase: Let them Eat Cake', in *Cost Management Update* (Issue No. 31).

1

$$\begin{aligned}\text{Budgeted MOH rate in 2000} &= \frac{\text{€210,800}}{200,000 \text{ units}} \\ &= \text{€1.054 per 1 Kg unit of cake}\end{aligned}$$

	<b>Raisin cake</b>		<b>Layered carrot cake</b>	
Unit direct manufacturing cost				
Direct materials	€0.600		€0.900	
Direct manufacturing labour	<u>0.140</u>	€0.740	<u>0.200</u>	€1.100
Unit indirect manufacturing cost				
Manufacturing overhead (€1.054 × 1, 1)	€1.054	<u>1.054</u>	€1.054	<u>1.054</u>
Unit total manufacturing cost		€1.794		€2.154

**2**

	<b>Raisin cake</b>		<b>Layered carrot cake</b>	
Unit direct manufacturing cost				
Direct materials	€0.600		€0.900	
Direct manufacturing labour	<u>0.140</u>	€0.740	<u>0.200</u>	€1.100
Unit indirect manufacturing cost				
Mixing (€0.04 × 5, 8)	€0.200		€0.320	
Cooking (€0.14 × 2, 3)	0.280		0.420	
Cooling (€0.2 × 3, 5)	0.060		0.100	
Creaming/icing (€0.25 × 0, 3)	0.000		0.750	
Packaging (€0.08 × 3, 7)	0.240	<u>0.780</u>	0.560	<u>2.150</u>
Unit total manufacturing cost		€1.520		€3.250

**3**  
The unit product costs in requirements 1 and 2 differ only in the assignment of indirect costs to individual products. The assumed usage of indirect-cost areas under each costing system is:

	<b>Existing system</b>		<b>ABC system</b>	
		<b>Layered</b>		<b>Layered</b>
	<b>Raisin cake</b>	<b>carrot cake</b>	<b>Raisin cake</b>	<b>carrot cake</b>
Mixing	50%	50%	38.5%	61.5%
Cooking	50	50	40.0	60.0
Cooling	50	50	37.5	62.5
Creaming/icing	50	50	0.0	100.0
Packaging	50	50	30.0	70.0

The ABC system recognises the substantial difference in usage of individual activity areas between raisin cake and layered carrot cake. The existing costing system erroneously assumes equal usage of activity areas by 1 kg of raisin cake and 1 kg of layered carrot cake.

**4**  
Uses of activity-based cost numbers include:

**a Pricing decisions.** Starkuchen can use the ABC data to decide preliminary prices for negotiating with its customers. Raisin cake is currently overcosted while layered carrot cake is undercosted. Actual production of layered carrot cake is 100% more than budgeted. One explanation could be the underpricing of layered carrot cake.

**b Product emphasis.** Starkuchen has more accurate product margins with ABC. Starkuchen can use this information for deciding which products to push (especially if there are production constraints.)

**c Product design.** ABC provides a road map on how a change in product design can reduce costs. The percentage breakdown of total indirect costs for each product is:

	<b>Raisin cake</b>	<b>Layered carrot cake</b>
Mixing	25.6% (€0.20/€0.78)	14.9% (€0.32/€2.15)
Cooking	35.9	19.5
Cooling	7.7	4.7
Creaming/icing	0.0	34.9
Packaging	30.8	26.0
	100.0%	100.0%

Starkuchen can reduce the cost of either cake by reducing its usage of each activity area. For example, Starkuchen can reduce raisin cake's cost by sizably reducing its cooking time or packaging time. Similarly, a sizeable reduction in creaming/icing will have a marked reduction on layered carrot cake costs.

**d Process improvements.** Improvements in how activity areas are configured will cause a reduction in the costs of products that use those activity areas.

**e Cost planning and flexible budgeting.** ABC provides a more refined model to forecast costs of Starkuchen and to explain why actual costs differ from budgeted costs.

#### 11.14 Activity-based costing, under- or overallocated indirect costs.

1

<b>Activity area</b>	<b>Manufacturing overhead incurred</b>	<b>Manufacturing overhead allocated</b>	<b>Under- or over allocated overhead</b>
Mixing	€62,400	€49,600 <sup>a</sup>	12,800 U.A.
Cooking	83,840	67,200 <sup>b</sup>	16,640 U.A.
Cooling	12,416	15,200 <sup>c</sup>	2,784 O.A.
Creaming/icing	36,000	60,000 <sup>d</sup>	24,000 O.A.
Packaging	61,600	73,600 <sup>e</sup>	12,000 O.A.
	€256,256	€265,600	€9,344 O.A.

a  $(€0.040 \times 5 \times 120,000) + (€0.040 \times 8 \times 80,000)$

b  $(€0.140 \times 2 \times 120,000) + (€0.140 \times 3 \times 80,000)$

c  $(€0.020 \times 3 \times 120,000) + (€0.020 \times 5 \times 80,000)$

d  $(€0.250 \times 0 \times 120,000) + (€0.250 \times 3 \times 80,000)$

e  $(€0.080 \times 3 \times 120,000) + (€0.080 \times 7 \times 80,000)$

The five activity areas differ sizably in the extent of under- or over-absorption of overhead. The ratio of actual overhead to allocated overhead for each activity area is:

Mixing	1.25806
Cooking	1.24762
Cooling	0.81684
Creaming/Icing	0.60000
Packaging	0.83696

The ratio of actual overhead to allocated overhead in aggregate is 0.96482 ( $€256,256 \div €265,600$ ).

2 The advantages of using a single total manufacturing overhead cost pool adjustment include:

**a Simplicity** – one adjustment vis-à-vis five adjustments

**b The effect may be immaterial.** If the focus is only on income statement effects and Starkuchen holds minimal inventory (WIP or FG), the effect of using five adjustments may be minimal.

The argument against is a reduction in the accuracy of actual product cost numbers where there are major differences across activity areas in the magnitude and sign of the under- or over-allocation of overhead.

The advantage of making five cost pool adjustments is the greater accuracy of the cost numbers (in both the activity areas and the resultant product costs). The disadvantage is the extra 'paperwork' of making the adjustments.

**3** The 2008 actual unit indirect manufacturing costs for raisin cake and layered carrot cake using the under- or overallocated amounts from requirement 1 are:

	Ratio of actual/ allocated (1)	Raisin cake		Layered carrot cake	
		Budgeted MOH (2)	Actual MOH (3) = (1) × (2)	Budgeted MOH (4)	Actual MOH (5) = (1) × (4)
Mixing	1.25806	€0.200	€0.25161	€0.320	€0.40258
Cooking	1.24762	0.280	0.34933	0.420	0.52400
Cooling	0.81684	0.060	0.04901	0.100	0.08168
Creaming/Icing	1.60000	0.000	0.00000	0.750	0.45000
Packaging	0.83696	0.240	0.20087	0.560	0.46870
			€0.85082		€1.92696

The actual unit product costs in 2008 are:

	<b>Raisin cake</b>	<b>Layered carrot cake</b>
Direct manufacturing cost	€0.740	€1.100
Indirect manufacturing cost (from above)	0.851	1.927
	€1.591	€3.027

#### 4

More accurate product costs lead to more informed pricing decisions. The calculated product costs with a normal activity-based costing system are:

	<b>Raisin cake</b>	<b>Layered carrot cake</b>
Normal costing	€1.520	€3.250
Actual costing (five-activity area adjustment from requirement 3)	€1.591	€3.027
Actual costing (with a single overhead adjustment)*	€1.493	€3.174

\*Had Starkuchen used a single total manufacturing overhead cost pool adjustment for the total overallocated overhead of €9,344, the total allocated overhead costs of each product would be restated to be  $0.9648 \times$  allocated amount ( $€256,256 \div €265,600 = 0.9648$ ). The resulting product cost numbers would have been:

	<b>Raisin cake</b>	<b>Layered carrot cake</b>
Direct costs	€0.740	€1.100
Indirect costs ( $€0.780 \times 0.9648$ )		
( $€2.150 \times 0.9648$ )	0.753	2.074
	€1.493	€3.174

Raisin cake has a higher actual cost with the more accurate five-activity area adjustment, as it makes proportionally more use of the activity areas with underallocated overhead (mixing and cooking). Layered carrot cake has a lower cost under the more accurate five-activity area adjustment, as it makes proportionally more use of the activity area with the largest overallocated cost (creaming/icing).