Chapter 15

Managing costs and time for customer value

LEARNING OBJECTIVES

After completing this chapter, you should be able to:

1. define 'cost management' and explain how it differs from conventional approaches to cost control;
2. use the four steps of activity-based management to reduce costs and increase customer value;
3. identify opportunities for cost reduction by undertaking value analysis;
4. select activity-based performance measures to manage cost, time and other sources of customer value;
5. understand the impediments to implementing activity-based management;
6. understand the four major steps involved in business process re-engineering, to manage costs and other sources of value;
7. analyse life cycle costs and revenues and understand how to use life cycle management to reduce costs;
8. estimate target costs and describe the processes of target costing that lead to cost reduction and enhanced customer value;
9. understand how time-based management can be used to manage time drivers as well as costs and other sources of customer value; and
10. undertake analyses using the theory of constraints and throughput accounting, to manage costs and time.

In earlier chapters, we described the changes that have swept through the business world over the past two to three decades. With the evolution of global markets, the rapid rate of technological innovation, the emerging 'e-environment', and the increasing importance of customer satisfaction, businesses need to offer a wider range of high-quality goods and services, at lower prices, developed in anticipation of customers' requirements and delivered on time. Some businesses have been able to meet this challenge and have prospered. Others have failed.

As well as developing new approaches to performance measurement, management accounting has responded to the changing business environment by paying increased attention to managing resources, in particular, costs, time and quality, which are not only key cost drivers but important sources of customer value. In this chapter, we consider various approaches to reducing costs and managing time. We revisit the Mason & Cox case, from Chapter 8, to illustrate activity-based management, a model that provides information to managers to help reduce costs and improve other sources of customer value. We describe other approaches to controlling and reducing costs, namely business process re-engineering, and life cycle management and the related concept of target costing. We also explore the role that management accounting can play in managing time, both time to develop new products (and services) and delivery time, paying particular attention to the concepts of throughput accounting and the theory of constraints. In Chapter 16 we consider the role management accountants play in managing quality, as part of the broader processes of managing suppliers and customers.

Cost management

LO1
LEARNING OBJECTIVE

cost management the improvement of an organisation's cost effectiveness through understanding and managing the real causes of costs

Conventional management accounting systems include a range of financial performance reports and measures to provide managers with information for *cost control*. Contemporary management accounting systems also include various tools and techniques that provide information for *cost management*. What is 'cost management' and how does it differ from conventional approaches to cost control? **Cost management** is the improvement of an organisation's cost effectiveness through understanding and managing the *real causes* of costs. Although the predominant focus is on costs, most contemporary approaches to cost management also focus on improving other aspects of performance, such as quality and delivery.

The major differences between *conventional* approaches to cost control and *contemporary* cost management are:

- *Drivers of costs* Under the conventional approach, managers control costs by bringing them into line with some predetermined goal, such as budgeted or standard costs. The focus is on cost results or outcomes. Cost management reduces costs by identifying wasted resources and eliminating this waste through identifying the factors that really drive costs.
- *Strategic perspective* The primary focus of conventional approaches is on controlling costs within the organisation, an internal perspective. Contemporary cost management is also concerned with achieving value for the customer, a strategic perspective.
- *Process perspective* Conventional systems control costs by reporting results for responsibility centres based on functional areas of the business, such as production, marketing and administration. Contemporary cost management recognises that customers' needs are met by processes, which flow across the business and may cross functional areas.

A number of separate approaches have evolved to managing costs, including:

- activity-based management;
- business process re-engineering;
- life cycle management; and
- target costing.

As described below, each of these techniques can be used independently to reduce costs, although in some instances they may also be complementary. For example, activities, which are the foundation for activity-based management, can also provide a useful framework for business process re-engineering, life cycle management and target costing. And, target costing reduces costs by applying life cycle management principles.

Activity-based management

In Chapter 8 we described how Mason & Cox implemented an activity-based product costing (ABC) system, and found that their conventional system had distorted product costs and had undermined strategic decision making. The distorted product costs appeared to have eroded the ability of the company to compete successfully. Activity-based product costing helped to solve the problem. But that is only half of the story. We now return to Mason & Cox to examine the role that activity-based costing and activity-based management can play in managing costs and improving business performance.

Returning to Mason & Cox

You will recall that Mason & Cox is Australia's largest independent foundry, producing metal castings for a wide range of local industries and export customers. Production begins with drawing and issuing patterns, which are used to build up moulds. Molten metal is poured into the moulds, and when the metal is set, the castings are knocked out. The castings are 'finished' by smoothing, grinding, welding and heat treating. Mason & Cox had been in business for a long time, but by the 1990s its profits had declined. The cause of the problem was not clear from the company's existing conventional management accounting system. As accounting manager at Mason & Cox, Olivia Shannon knew that an improved product costing system would help with strategic decision making. However, ultimately the company must reduce its costs and improve performance in other key areas to survive.

Mason & Cox had a conventional planning and control system based on standard costing and budgeting. Managers investigated variances between actual and budgeted results and instigated corrective action. This approach to planning and control is similar to that found in many businesses today, and these types of performance reports and measures have changed little since they were first developed in the 1920s. While Shannon provided managers at Mason & Cox with regular variance reports to help them control their costs, she was concerned about the usefulness of this information. She decided to explore the possibility of using activity-based management to improve Mason & Cox's performance.

Activity-based management at Mason & Cox

Exhibit 15.1 shows that activity-based costing can have two dimensions: costing and activity management.[1] Costing is used to calculate the cost of cost objects, such as products. The activity management dimension is a dynamic view that reports what is happening in the business.

When Shannon first encountered the term 'activity-based management' she was not sure how it differed from activity-based costing. Now she understood that **two-dimensional activity-based costing** provides information about activities, cost drivers and performance,

two-dimensional activity-based costing provides information about activities, cost drivers and performance, as well as about the costs of cost objects

[1] The terminology used in this section is based on a glossary of terms about activity-based management prepared for CAM-I and published in Raffish & Turney (1991).

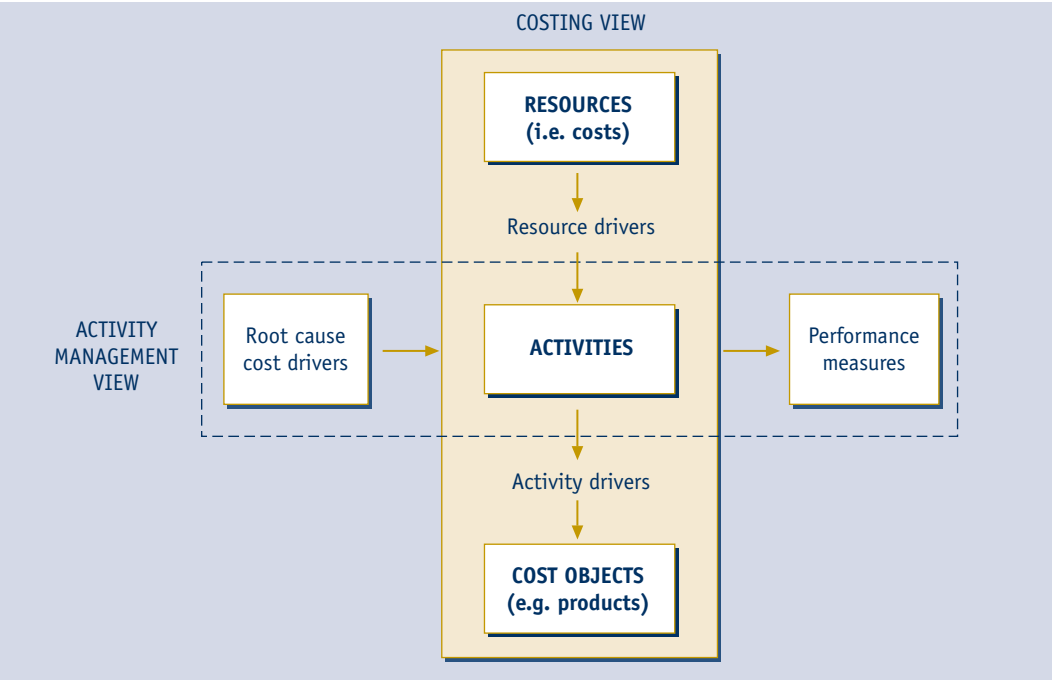
activity-based management (ABM) the process of using information from activity-based costing to analyse activities, cost drivers and performance so that customer value and profitability are improved

customer value the value a customer places on particular features of a product or service

as well as about the costs of cost objects such as products. **Activity-based management (ABM)** refers to the process of using information from activity-based costing to analyse activities, cost drivers and performance so that customer value and profitability are improved. You will remember from Chapter 1 that **customer value** is the value that a customer places on particular features of a product or service. ABM would enable Shannon to reduce costs *and* manage other important aspects of performance.

Let's now consider how this can be achieved.

EXHIBIT 15.1 An activity-based costing model†



†Exhibit 15.1 is adapted from p. 96 of *Common Cents: The ABC Performance Breakthrough* by Dr Peter B. B. Turney, President and CEO of Cost Technology Inc., a management consulting firm specialising in ABC/ABM implementations, Cost Technology Inc., 1991. Reprinted by permission of the publisher. All rights reserved.

Using ABM to reduce costs

LO2 LEARNING OBJECTIVE

To reduce costs, Shannon worked through four steps:

1. Identify the major opportunities for cost reduction.
2. Determine the real causes of these costs.
3. Develop a program to eliminate the causes and, therefore, the costs.
4. Introduce some new performance measures to monitor the effectiveness of cost reduction efforts.

activity a unit of work performed within the organisation

Identifying the major opportunities for cost reduction

LO3 LEARNING OBJECTIVE

The pivotal point of the ABC model is the identification and costing of activities. **Activities** are simply the things that are done in the business. Exhibit 15.2 reproduces Mason & Cox's activities and their costs, which were calculated in Chapter 8.

To identify opportunities to reduce costs, Shannon undertook a **value analysis** (or **activity analysis**), where she classified activities as value-added or non-value-added. **Value-added**

activities provide essential value to the customer, or are essential to the functioning of the business. Exhibit 15.2 shows that the value-added activities included:

- basic production activities that contribute to the final product, such as making moulds and pouring metal; and
- essential administrative activities, such as managing the business and preparing annual reports.

value (or **activity**) **analysis** a method that classifies activities as *value-added* or *non-value-added*

value-added activity an activity that provides essential value to the customer, or is essential to the functioning of the business

EXHIBIT 15.2 Activity costs and value status, Mason and Cox

	Value-added	Non-value-added
Corporate Management		
Manage business (CEO)	$100 000	
Manage business (Board)	200 000	
Prepare annual reports	35 000	
Produce annual reports	55 000	
Administration		
Process receivables	94 900	
Correct invoices		88 000
Process payables	258 100	
Operate IT system	300 000	
Prepare payroll	114 700	
Maintain grounds	51 300	
Sales and Dispatch		
Process sales order	250 000	
Factory Management		
Program production	261 100	
Manage plant	112 900	
Metal Melting		
Pour metal	3 015 000	
Moulding		
Make CT moulds	815 000	
Make job moulds	780 000	
Make cores	175 000	
Move material		245 000
Inspect moulds		200 000
Finishing		
Oxy cut castings	144 250	
Grind castings		401 500
Weld defects		278 000
Operate shot blast machine	732 500	
Set up heat treat furnace	427 000	
Operate heat treat furnace	652 000	
Expedite castings		216 500
Inspect castings		118 250
Pattern Design		
Design method	250 000	
Issue pattern	125 000	
Rework pattern		107 000
Maintenance		
Repair shot blast machine		175 000
Repair heat treat furnace		185 000
Preventative maintenance	167 000	
TOTAL	**$9 115 750**	**$2 014 250**

non-value-added activity an activity which does not add value to a product or service from the customers' perspective or for the business and, therefore, can be eliminated

Non-value-added activities do not add value to a product or service from the customers' perspective or for the business and, therefore, can be eliminated without detriment to either. In many businesses, major sources of non-value-added activity include waiting, inspection, rework and the unnecessary movement and storage of inventories. Exhibit 15.2 shows the non-value-added activities at Mason & Cox, which accounted for 18 per cent of the total activity costs.

The analysis and elimination of non-value-added activities can require considerable resources. Like many businesses, Mason & Cox decided to target their major non-value-added activities. The major non-value-added activities were 'Grind castings', 'Weld defects', 'Move material', 'Expedite castings' and 'Inspect moulds'. These five activities accounted for two-thirds of the cost of all non-value-added activity at Mason & Cox.

Determining the real causes of non-value-added costs

To eliminate non-value-added costs, Shannon began by building activities into processes. Then she analysed those processes to find the causes of the non-value-added activities.

process (or **business process**) a series of activities that are linked together to achieve a specific objective

Building activities into processes Eliminating non-value-added activities requires a clear understanding of the way work is done in an organisation. One way of developing this understanding is to identify, for each activity, the preceding activities that supply its inputs (i.e. its suppliers) and the subsequent activities that consume its outputs (i.e. its customers). This information can be used to link activities together into processes. A **process** (or **business process**) is a series of activities that are linked together to achieve a specific objective. Processes cut across conventional responsibility centres such as functional departments. Exhibit 15.3 illustrates the process of filling a customer order for a custom-made casting at Mason & Cox. Notice:

- the horizontal flow of activities across the business, which crosses functional areas such as product design, manufacturing, sales and administration; and
- the interdependence between activities, where a preceding activity is the supplier of a subsequent activity (or the subsequent activity is the customer for the preceding activity).

The process perspective helps to identify cost drivers and establish relevant performance measures. Also, using processes can simplify activity management as, in many cases, it may be possible to manage fewer aggregated processes rather than many detailed activities. Activities in a process may share common cost drivers and performance measures.

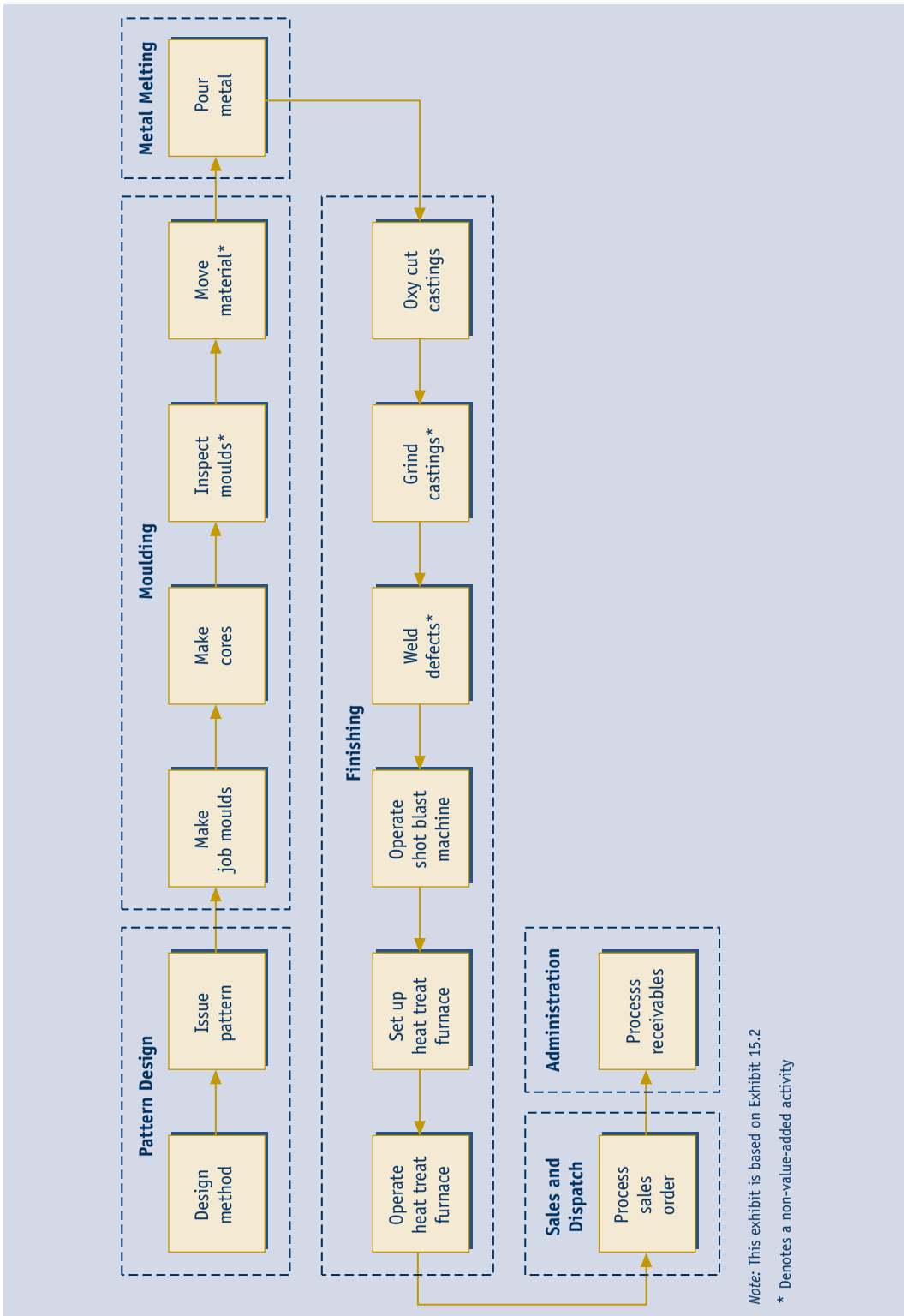
root cause cost drivers the basic factors that cause activities to be performed and their costs to be incurred

Cost driver analysis Once the processes had been identified, Shannon attempted to identify the root cause cost drivers of the five major non-value-added activities at Mason & Cox. **Root cause cost drivers** are the basic factors that cause activities to be performed and their costs to be incurred. For example, the quality of the moulds built up in the Moulding Centre appeared to be a root cause cost driver for the non-value-added activities 'Grind castings' and 'Weld defects' in the Finishing Centre. The poorer the quality of the moulds, the higher was the number of defects in the castings, and the more grinding and welding was required to rectify them.

cost driver analysis a method that identifies root cause cost drivers of activities

Shannon used **cost driver analysis** to identify root cause cost drivers for the major non-value-added activities. The number of defects from oxy cutting castings also *appeared* to drive the activities 'Grind castings' and 'Weld defects'. Each defect must be ground and welded, but is this a root cause cost driver? What causes these defects: is it impurities in the metal? or is it the poor quality of moulds used to make the casting? If metal impurities are a major problem, what causes these impurities? Does Mason & Cox need to seek new metal suppliers or negotiate more stringent quality requirements with its existing

EXHIBIT 15.3 Process of filling a customer order at Mason & Cox



suppliers? The search for root cause cost drivers inevitably involves continually asking why. Exhibit 15.4 lists possible root cause cost drivers for the five major non-value-added activities at Mason & Cox.

EXHIBIT 15.4 Root cause cost drivers, Mason and Cox

Activity	Possible root cause cost drivers
Grind castings	Complexity of the casting Defects in moulds Defects during 'Oxy cut castings' Metal impurities
Weld defects	Complexity of the casting Defects in moulds Defects during 'Oxy cut castings' Metal impurities
Move material	Plant layout Supplier delivery arrangements
Expedite castings	Complexity of casting Poor scheduling, poor IT support Inadequate notice from customers Material unavailable Defects in moulding and casting
Inspect moulds	Complexity of the casting Complexity of pattern design Defects in moulding materials Inadequate employee training in moulding

Developing a program for reducing costs

The next step for Shannon was to develop a program to eliminate the root causes of the major non-value-added activities. This can be a complex task and will involve managers from across the organisation. For example, Shannon identified metal impurities as a primary cause of defects in castings and, therefore, as a major cause of the non-value-added activities 'Grind castings' and 'Weld defects'. She worked with the purchasing manager to improve the quality of metal used in castings. She found the activity 'Expedite castings' was caused by poor scheduling, and worked with the production scheduling staff to improve scheduling methods, the IT staff to improve the IT support for production scheduling, and the sales staff to improve the notice from customers.

Eliminating root cause cost drivers may involve tackling individual activities. Alternatively it may require a fundamental restructure of processes, called *business process re-engineering*, which is described later in this chapter.

Measuring performance

LO4 LEARNING OBJECTIVE

Activity-based performance measures can be used to monitor the effectiveness of cost reduction efforts, as well as other key sources of customer value. Mason & Cox's management identified three aspects of performance that it believed were critical to the achievement of strategies and, therefore, to the success of the business: quality, delivery time and cost. (These are critical success factors for many businesses.)

Shannon identified performance measures that reflected both costs and cost drivers. She also introduced activity-based performance measures to monitor quality and delivery. In some cases these measures were interrelated. For example, a number of the quality and delivery measures, such as defects and cycle time, were also cost drivers. To illustrate this

concept, Exhibit 15.5 lists some performance measures for cost, quality and delivery for each of the activities in the Finishing Centre.

By monitoring the measures over time, managers could obtain feedback on their performance. Targets could be set and corrective actions could be instigated where required. You will notice that by focusing on performance across key sources of customer value, ABM can be used in conjunction with the contemporary approaches to performance measurement described in Chapter 14.

EXHIBIT 15.5 Performance measures in the Finishing Centre, Mason and Cox

Finishing Centre activities	Cost/cost drivers	Quality	Delivery
Oxy cut castings	$48.08/hour No. of defects in moulds	No. of broken castings No. of defects during oxy cut	No. of castings Cycle time: 7.5 min/casting
Grind castings	$25.09/hour No. of defects in moulds No. of defects during oxy cut	No. of spots reground No. of defects during grinding	Cycle time: 5.3/min
Weld defects	$21.38/hour No. of defects in moulds No. of defects during oxy cut	No. of cavities r ewelded No. of defects during welding	Cycle time: 11.2 min/casting
Operate shot blast machine	$228.91/load Cycle time	No. of defects during shot blasting	Cycle time: 180 min/load
Set up heat treat Furnace	$106.75/setup Cycle time	No. of faulty setups	Cycle time: 214 min/setup
Operate heat treat furnace	$0.12/kilogram-hour Cycle time	No. of defects due to heat treatment	Cycle time: 110 min/casting
Expedite castings	$270.63/order No. of defects in moulding and casting	No. of orders that fail to make due date	No set time, depends on reason for expediting
Inspect castings	$11.83/casting No. of defects in welding	No. of customer returns	Cycle time: 2.8 min/casting

The impact of activity-based management at Mason & Cox

The activity-based costing system had been expensive to implement at Mason & Cox. It was more complex than the conventional management accounting system and more expensive to maintain. Nevertheless, even though the new system had not been in place for long, ABC and ABM seemed to be improving profitability at Mason & Cox. Part of the improvement was due to the more accurate product costs, which provided a reliable basis for strategic decision making, as described in Chapter 8. For example, the cost of high volume, relatively simple products was no longer overstated and the cost of low volume, specialty products was no longer understated. Cost-based prices now seemed to fit better with competitors' pricing and customers' expectations. But part of the improvement was due to the company's better cost management. Cost savings had been achieved by targeting the most significant non-value-added activities. Their real cost drivers had been identified, and managers from across the business were working to eliminate them.

Also, part of the improvement was due to increased customer satisfaction. The drop in the price of the high-volume lines had met with customer approval. And, in addition to tracking cost drivers, activity based performance measures enabled the company to

monitor and improve quality and delivery, key sources of customer value. Instead of aggregated, outdated, financial measures of their performance, the new approach provided timely information about factors that were important to customers and factors that employees *could* control.

There was no doubt that ABM was helping Mason & Cox to improve both profitability and customer value! The 'Real lifes' below describe other Australian businesses that have used activity-based management to improve their profitability and customer value.

real life

Some Australian manufacturers' experiences with activity-based management

Anecdotal evidence suggests that the activity management perspective of ABC may offer as much, if not more, promise than the product costing perspective. Lamond (1992) cited three cases of Australian manufacturers that had adopted ABC and discovered the benefits of ABM.

Parke Davis, a major pharmaceuticals manufacturer, attributed better investment decisions, as a result of more accurate product costs, to its ABC system. It also achieved better resource utilisation because of an activity management perspective. Parke Davis expected its ABC system to result in future cost savings and improved quality and service.

Comalco Rolled Products (CRP), a manufacturer of rolled aluminium products, introduced ABC to improve its product costing system. As a result, it was able to drop a product group that had appeared profitable under its conventional system but was shown to be unprofitable under ABC. In addition, CRP found the activity management perspective of ABC invaluable because of its performance measures and its focus on the way work is done.

ICI (now Orica) implemented ABC and ABM in its Film Products division, a major manufacturer of plastic-based film. The business experienced 'clear and measurable benefits' from the improved product costs resulting from the ABC system. The company decided to extend its ABC model to include activity management so that it could support TQM and similar programs.

In reviewing the role of activity-based costing in these three companies, Lamond concluded that ABM is becoming an important force in management accounting—even though most companies are using only some aspects of ABM.

In 1990 the Chemical and Plastics Division of ICI (C&P) also implemented ABM. C&P produced products such as polythene, polypropylene and vinyls, and employed about 3000 people in plants located throughout Australia. The division's ABM implementation focused on activities and processes, to identify cost drivers and understand how customer value was created. The project also provided useful insights into the costs of activities and processes. For example, the cost of the oxy-chlorinator was much higher than existing estimates. ABM also played a role in the identification of performance measures.

Also, in Chapter 8 we described the activity-based product costing experiences of Holden's Engine Company (HEC) at Fisherman's Bend in Victoria. Although HEC initially focused on product costing, it subsequently moved towards a two-dimensional ABC system, to identify non-value-added activities and key performance indicators, as well as for budgeting and benchmarking.

Sources: Lamond (1992); Chenhall & Langfield-Smith (1998a)

Using the costing dimension of ABC to help manage costs

Most of the information for managing costs and improving customer value at Mason & Cox was obtained from the activity management dimension of the ABC model. However, some businesses use information from the costing dimension to reduce costs. For example,

Activity-based management in service organisations

In Chapter 8 we described the real-life experiences of the service organisation Telstra and Victorian local councils, with activity-based product costing. Telstra had implemented activity-based product costing to improve the allocation of overhead costs to products and to provide better information for strategic decisions about products. The company's ABC system also included an activity management dimension. With the deregulation of the telecommunications market, Telstra needed to reduce costs and improve its competitiveness. Management at Telstra used ABM to identify and reduce non-value-added costs and to monitor performance.

Some Victorian local councils had adopted activity-based product costing to increase the accuracy of estimated service costs. Changes to legislation required local councils to open up a minimum of 50 per cent of their operating budget to competitive tendering. To compete in the tendering process, councils required accurate estimates of the complete costs of providing services. In addition, councils were expected to reduce costs by 15 to 20 per cent of gross expenditure. Annual savings to ratepayers were projected at nearly $400 million. Councils turned to ABM to achieve these savings. A study of the corporate services division of one large Melbourne council found that the top five activities consumed 45 per cent of the division's total expenditure and were largely non-value-added. For example, 92 per cent of the costs of the activity 'Mail management' were classified as non-value-added. Bayside City Council examined their accounts payable function, where the two major activities were 'processing invoices' and 'chasing invoices'. Chasing invoices, which involved following up documents that were not returned by other departments, accounted for 40 per cent of the accounts payable total activity time.

Sources: Newbold (1997); Hoban (1995); Lewis (1999)

they may use ABC to obtain information about customer and supplier costs. Or they may use budgeted activity costs as a framework for control.[2]

Impediments to implementing ABM

LO5
LEARNING OBJECTIVE

Unlike activity-based product costing, the benefits from ABM are not limited to organisations with particular cost and product structures. ABM offers any organisation the opportunity to simultaneously manage costs better and to improve customer value. There is limited evidence of the extent of activity-based management in practice, although it is safe to say the adoption rate has been relatively slow (Booth & Giacobbe, 1997). Why is this so?

Perhaps ABM suffers from some of the same impediments as activity-based product costing (described in Chapter 8). These included a lack of awareness, uncertainty over potential benefits, extensive resource requirements, and resistance to change. The activity management dimension requires far more detailed analyses of activities and costs than the product costing dimension, and if ABM results in continuous improvement, activity and cost data may become outdated quickly. The costs of implementing and maintaining such a detailed system are likely to be substantial, although businesses may choose to implement ABM as a one-off exercise rather than an ongoing system. Any new management approach is likely to encounter some resistance. However, the focus of activity-based management on highlighting non-value-added activities and identifying possible labour savings can result in substantial resistance amongst employees. Resistance

[2] Customer and supplier cost analysis is described in Chapter 16 and activity-based budgeting is discussed in Chapter 11.

to change was dealt with in Chapter 8 and you may like to revisit that material at this stage. The 'Real life' below describes some of the impediments that the multinational corporation Dow Chemical Company experienced in implementing ABM.

In Chapter 8 we presented survey evidence to indicate that the adoption rate for ABC is likely to increase in the future, although it is not clear to what extent this applies to activity management, to activity-based product costing, or to both (Booth & Giacobbe, 1997; Chenhall & Langfield-Smith 1998b). However, it is clear that there are still many companies that have not adopted ABC (CPA Australia, 2000).

real life

ABM challenges for Dow

Dow Chemical Company, an international Fortune 100 company, which produces chemicals and plastics, uses activity-based costing both to cost products and services and for cost management. In implementing ABM the company classified departments as service providers and service users. Service providers, such as the human resources department, are required to identify the activities they perform, eliminate non-value-added activities, determine cost drivers, set activity prices to charge users, and benchmark these prices to ensure that they are competitive. In 1997 and 1998 ABC was fully integrated into the budgeting process.

While ABC has brought many benefits to Dow, there have also been many challenges! For example, it was difficult to capture cost driver information without creating additional work. And as the activity analysis became more and more detailed, Dow had to consider whether the benefits from more detailed activity analysis justified the complexities in obtaining and processing activity information. Ultimately the company decided that it should not break activities down to task level, otherwise the resultant activities were too small and too numerous.

Source: Damitio, Hayes & Kintzele (2000)

Business process re-engineering

LO6
LEARNING OBJECTIVE

business process re-engineering (or **BPR** or **process re-engineering**) the radical redesign of business processes to achieve dramatic improvement in critical areas of performance such as cost, quality and delivery

strategic processes those processes that focus on achieving the company's business objectives and strategies

Business process re-engineering is another approach to managing costs and improving customer value that has become popular since the early 1990s. **Business process re-engineering (BPR)** or **process re-engineering** is the fundamental rethinking and radical redesign of business processes in order to achieve dramatic improvement in critical areas of performance such as cost, quality and delivery (Hammer & Champy, 1993, p. 32; Manganelli & Klein, 1994).

BPR should focus on the processes that are essential to achieving the company's business objectives and strategies; that is, its **strategic processes**. Common processes include developing new products, manufacturing products, acquiring customer orders, fulfilling orders and developing human resources, although processes may differ from one organisation to the next. These processes cut across functional or departmental boundaries of the business. (For example, the process of filling a customer order at Mason & Cox, described in Exhibit 15.3, cuts across manufacturing departments, sales and administration.) The aim of BPR is to totally reorganise the way in which work is done by identifying and enhancing the value-added activities and eliminating all the non-value-added activities for a process. For example, re-engineering Mason & Cox's process of filling a customer order would aim to eliminate the non-value-added activities 'Inspect moulds', 'Move material', 'Grind castings' and 'Weld defects'. The value-added activities in the process would also be enhanced.

Once a process has been identified for re-engineering, BPR involves four major steps:

1 *Prepare a business process map.* A flowchart of the activities that make up the business process, called a **business process map**, is prepared. Exhibit 15.3 is an example of a business process map.[3]
2 *Establish goals.* Management establishes clear goals for the re-engineered process, based on the business's sources of customer value. These are likely to include required quality and delivery performance, as well as cost. Depending on the business's strategies they may also include innovation, flexibility, and so on.
3 *Reorganise work flow.* Management works out how to reorganise the flow of work so that these goals can be achieved. For example, in re-engineering the process of filling a customer order at Mason & Cox, it may be possible to develop new, highly reliable moulding techniques to eliminate the need to inspect moulds. It may be possible to develop new oxy cutting techniques that eliminate the need for subsequent grinding and welding of defects. It may be possible to house custom-cast production and dispatch in one area where material movement is minimised, and staff are so highly trained that the need to inspect moulds, grind castings and weld defects is significantly reduced. (Reconfiguring the business around processes rather than functional departments is a common outcome for business process re-engineering.)
4 *Implementation.* The final step is implementation. Of course, you will have realised that business process re-engineering involves substantial change, and our earlier warnings about employees' resistance to change apply here. The behavioural aspects of BPR are best managed through the use of re-engineering project teams that involve employees from all functional areas affected by the process, and from all levels of the organisation.

business process map a flowchart of the activities that make up the business process

The 'Real life' below describes how businesses in Australia and the US have used BPR to reduce costs and improve customer value.

Re-engineering accounting processes

In 1993, Esso Australia rationalised its Sydney, Brisbane and Sale (Victoria) offices into a Melbourne head office. At the same time, it purchased a multimillion dollar computer system for real-time financial reporting. (Real-time reporting is discussed in Chapter 12.) This gave the Controller's Department the opportunity to examine its basic accounting and control processes.

By flowcharting each business process, staff were able to identify and eliminate many non-value-added activities. They concentrated on examining business processes across departments, rather than within departments. For example, the purchases–payables process spans several departments. It starts with ordering goods and ends with paying a cheque to the supplier. Focusing on just the accounts payable department, rather than on the process, would not reveal all the areas of non-value-added activity.

Improvements in the purchases–payables process resulted in the 13 manual steps being reduced to three. Standard payment terms are now used for all suppliers, rather than the wide variety of credit terms previously experienced. Suppliers no longer send invoices to Esso, as handling invoices was a non-value-added activity. Esso is able to pay suppliers by using information from purchase orders and delivery receipts.

Other areas of change included improving the service that the Controller's Department provided to their internal customers. The processes involved in preparing financial reports were analysed, and this resulted in monthly accounting reports being available within 24 hours of month-end, rather than in four days.

These changes reduced overall costs as well as providing better service to both external and internal customers.

continues …

[3] A more complete process map would include inputs, outputs and key aspects of performance.

A key consideration in this exercise was the participation of the accounting staff in the process analysis, particularly when there was a belief that staff redundancies might result. 'Champions' were appointed from within the staff to manage particular projects in order to help reduce the level of staff scepticism.

Esso's results in re-engineering its accounting processes are similar to the experiences of a number of US firms. For example, Richard H. Snyder re-engineered the accounting processes in the US textile firm Latt-Greene. He developed a cost system that helped to reverse a $5 million loss on sales of $65 million to a $3 million profit on sales of $32 million. Snyder was awarded the title of Financial Executive of the Year, in 1997, for his efforts. Also in the late 1990s, the finance group of Cummins Engine Corporation, a Fortune 500 company, re-engineered the company's accounts payable system. As a result, the processing costs per invoice transaction decreased from $3.17 and approached the best practice benchmark of $0.80, error rates decreased and user satisfaction increased.

Courtesy of the Australian Broadcasting Associtioan

Joe Bloggs meets the operator of the year

Sources: Boreham (1994); Snyder (1999); Compton, Hoshower & Draeger (1998)

Is business process re-engineering the same as ABM?

Activity-based costing provides a good foundation for BPR, as it enables the identification of current processes and activities. ABC also provides information about the costs and value status of the activities within the business process. However, the focus of ABM is on **process improvement**, which is the incremental continuous improvement of processes, whereas BPR involves fundamental changes to the way processes are structured.

process improvement the incremental continuous improvement of processes

Life cycle costing

LO7
LEARNING OBJECTIVE

Life cycle costing is an alternative approach to cost management which accumulates and manages costs over a product's life cycle (Adamany & Gonslaves, 1994; Artto, 1994; Susman, 1989). There are two important aspects to life cycle costing: the focus on the product cost and the inclusion of all upstream and downstream costs. A **product life cycle** is the time from the conception of a product through to its abandonment, that is, 'from cradle to grave'. From a production perspective, product life cycles usually cover four stages:

life cycle costing accumulates and manages the costs over a product's life cycle

product life cycle the time from the conception of a product through to its abandonment

1. product planning and initial concept design;
2. product design and development;
3. production; and
4. distribution and customer (or logistical) support.

The length of a product's life cycle varies from one product to the next. For example, clothing and fashion goods tend to have a life cycle of one year or less. Mitsubishi Motors Australia plans on a life cycle of four to five years from the time a new model is conceived to the time its production is discontinued. They allow another 10 years for the production of spare parts for discontinued models.

A **life cycle budget** can be developed to compare planned costs with predicted revenue over each year of the product's life. To complete the planning and control cycle, life cycle costing should be linked to the annual budgeting and performance reporting process to monitor the actual costs and revenues each year over the product's life cycle and compare them with the planned outcomes.

life cycle budget a budget that compares planned costs with predicted revenue over the product's entire life

Life cycle budgeting enables a comprehensive assessment of the profitability of a product over its entire life, which can help managers to decide which products to produce.[4] Conventional costing systems enable product cost and profitability to be

real life

Radical transformation in Australian businesses

When Walker Australia won a $6.3 million contract with General Motors Holden's Automotive to manufacture exhaust systems, it approached the South Australian Government for a one-off industry development grant. Instead of a grant, the government funded a business re-engineering project in Walker's 'bend' section, where exhaust pipes are bent to fit different car models. As a result of BPR, the company reduced costs by $1 million per year, increased productivity by 117 per cent, reduced lead time from 14.4 days to 3 days, cut work in process from 20 700 units to 4590 units, and reduced the distance that materials travel within the section by 60 per cent to 2.6 kilometres. Savings in labour time enabled the section to eliminate one shift. Walker estimated that if the same process redesign principles were applied to the rest of the plant, the company could save $5 to $6 million dollars per year.

Courtesy of the Australian Broadcasting Associtioan

Joe Bloggs meets the operator of the year

The inventory store at Herston Hospital in Brisbane managed with a 15-year-old information system and controlled most inventory movements through complex and time-consuming paper work. Queensland Health used business process re-engineering to turn this 'Dickensian' store into a modern distribution operation serving 450 different locations across the state. In the new single-level store, goods flow smoothly from receival to storage, to order picking, to dispatch. Previously, the store was located in a multilevel building, which impeded the flow of goods. The new site was air-conditioned to reduce problems with maintaining drug quality. A new information system was installed with direct links to 40 hospitals. The lead time between receiving and dispatching an order for medical supplies has been halved, and for dental items has been cut from four weeks to four days. Under the new system, 95 per cent of orders are delivered in full and on time, whereas under the old system, there was no measure of delivery. Because ward staff have confidence in the new store, inventory levels in hospital wards have been reduced. The savings for Queensland Health have been dramatic, with inventory levels falling from $1.6 million to $850 000.

Sources: Roberts (1997); Kennedy (1995)

[4] The introduction of new products should be treated like any other capital investment decision. As described in Chapters 20 and 21, in evaluating these decisions, the expected cash inflows and outflows are identified year by year over the life of the planned project and discounted for the time value of money. For a new product introduction, the cash flows can be used to develop a life cycle budget for the product.

assessed each year, but this approach ignores upstream and downstream costs and the effects of life cycle stages.[5] In cost-plus pricing, cost should be based on the product's cost over its entire life cycle. This is especially important where products have short life cycles and high upstream and downstream costs. In this situation, prices must be set to recover all costs plus make a profit in a relatively short time.

We will illustrate these concepts with Australian CD Players.

Life cycle budgeting: Australian CD Players Pty Ltd

Australian CD Players Ltd (ACDP) manufactures portable CD players. Let's suppose ACDP began the development of a revolutionary compact disc system, CD Super, in 2001. The system was introduced into the market at the beginning of 2002, with an expected life of four more years. Exhibit 15.6 shows the life cycle budget for CD Super. Over its life cycle, CD Super is expected to make a profit of $4.85 million, although it will be unprofitable in 2002, the first year of production. If product profitability was assessed year-by-year, management may have decided to drop CD Super after 2002! The company uses cost-plus pricing, and the life cycle budget helps management to set a price that covers all the costs that are expected to be associated with CD Super over its life.

EXHIBIT 15.6 Life cycle budget, Australian CD Players

	Year					
	2001	**2002**	**2003**	**2004**	**2005**	**Total**
Revenue	$0	$600 000	$4 500 000	$6 750 000	$3 000 000	$14 850 000
Costs:						
Product planning and concept design	300 000					300 000
Design and development	100 000	600 000				700 000
Production		300 000	2 000 000	2 700 000	1 200 000	6 200 000
Distribution and customer support		50 000	750 000	1 000 000	1 000 000	2 800 000
Profit (Loss)*	$(400 000)	$(350 000)	$1 750 000	$3 050 000	$800 000	$4 850 000

* This analysis ignores the time value of money

Managing costs through a life cycle perspective

The life cycle budget provides useful information for managing and reducing costs. For example, it can be used to carefully plan capacity requirements. More importantly, major cost savings can be achieved by recognising the trade-off between costs incurred prior to production and costs incurred once production begins. Exhibit 15.7 shows that nearly all of a product's costs are actually *committed* during the preproduction stages of its life cycle when the product and its production processes are designed. The design of the product, and of the processes that will be used to produce it, is a major determinant of subsequent production costs (and customer support costs). Spending more on the design phase can

[5] As discussed in Chapter 4, some businesses include upstream and downstream costs in their product costing system, but many confine product costs to manufacturing costs to comply with external reporting requirements.

The life cycle costs of compact discs

In 1997, the federal government decided to remove the import restrictions on compact discs. CDs were much cheaper to buy overseas, particularly in the US, and the government argued that unfettered global competition would make the local recording industry more efficient. However, local CD producers argued that this would wipe out their industry as there was no way they could match US prices. Opportunities for local musicians would disappear and the profile of Australian music overseas would degenerate.

Was the local recording industry another example of inefficient producers protected by government legislation? (In 1997, the government had already used these grounds to investigate tariffs on motor vehicles, textiles, clothing and footwear.) In fact, the costs of pressing a CD, approximately $1.80 per unit, accounted for only a small part of its life cycle costs. There were high costs associated with marketing CDs, such as advertising and promotional videos, copyright costs for the music, and the recording artist's fees and royalties. Many of these costs did not vary with the level of production or sales, and had to be spread over the total number of units sold. The market in Australia was much smaller than in the US, so the cost per CD was much higher. According to the local recording industry, removing import restrictions would reduce the market for local products and exacerbate this situation rather than resolve it.

Source: Bradford (1997)

lead to significant savings during the production phase. Target costing, described below, is based on this principle and evaluates alternative product and process designs to identify the most cost-effective design.

Conventional systems, such as standard costing, focus on controlling production costs when they are incurred. However, far greater cost reductions can be achieved by designing efficient and effective production processes than by trying to control the costs of the processes once they are in place. Cost controls applied once production has begun can be expected to have only a relatively minor impact. Moreover, most conventional costing systems tend to treat preproduction (upstream) and post-production (downstream) costs as period costs, rather than recognising and managing them as product-related costs.

Impediments to life cycle costing

Although the concepts of life cycle costing make sound management sense, as yet they are not widely used in practice (Adamany & Gonslaves, 1994). This may reflect lack of awareness, or uncertainty about how to calculate life cycle costs (Booth, 1994). Life cycle budgeting is not easy, particularly for products with longer lives. It is very difficult to predict the effects of changing consumer tastes and the impact of competitors. The effects of inflation must also be considered. There is limited information in conventional budgeting systems for constructing life cycle budgets because conventional systems have a short-term (usually annual) cycle and focus on responsibility centres rather than on products, although the capital budgeting process may support the development of life cycle budgets. Activity-based costs can also play a useful role in estimating budgeted and actual life cycle costs, based on the activities performed in each year of the life cycle.

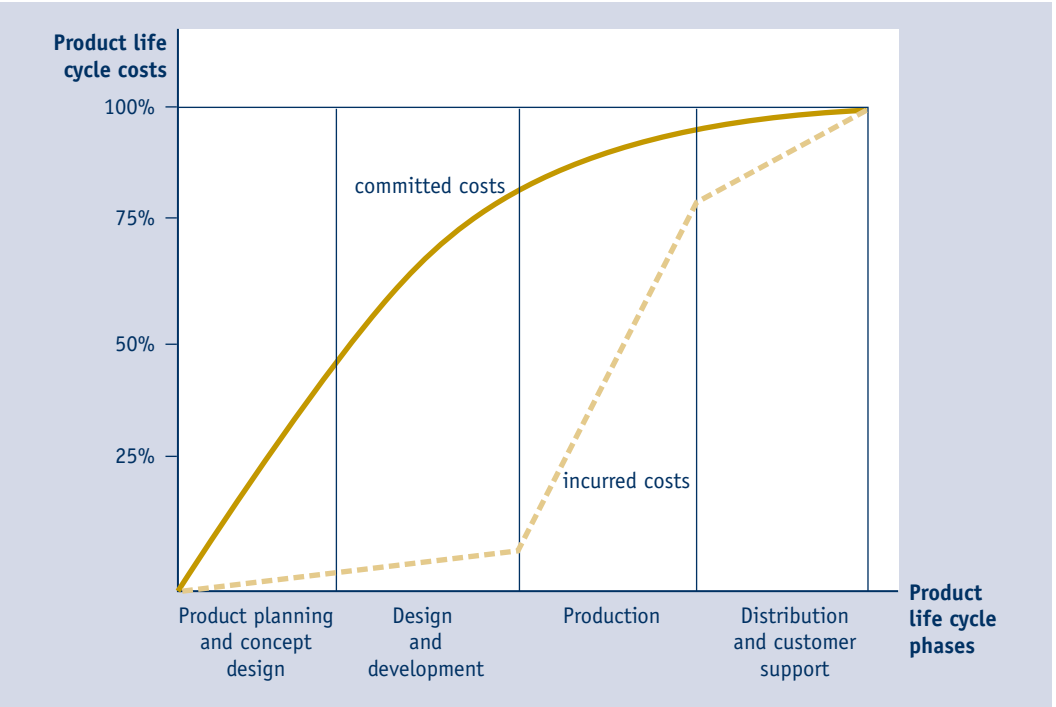
Target costing

LO8
LEARNING OBJECTIVE

Target costing is a system of profit planning and cost management. The required features and performance of the proposed product are established. Then target costing determines the life cycle cost at which the product must be produced, to generate the firm's desired

target costing a system of profit planning and cost management that determines the life cycle cost at which a proposed product must be produced, to generate the firm's desired level of profit, given the product's anticipated selling price

EXHIBIT 15.7 Life cycle costs and cost commitment for a typical product



Source: Adapted from Burstein (1988, p. 261)

level of profit, given the product's anticipated selling price. (Cooper and Slagmulder, 1999, p. 166). Note that target costing is not a method for *product costing*, it is a technique for *cost management*. It was devised in Japan, where it is used widely, particularly in the automobile, electrical and equipment-manufacturing industries (Lorino, 1995). With the effects of globalisation, it is gradually gaining acceptance in the Western world.

Remember the revolutionary compact disc system, CD Super, which Australian CD Players Pty Ltd (ACDP) began developing in 2001 and introduced into the market in 2002? We can extend this example to illustrate target costing. In developing the life cycle budget, shown in Exhibit 15.6, ACDP's management accountant identified the planned selling price for CD Super and the planned number of units to be sold. Let's assume that the budgeted life profit of $4 850 000 assumed sales of 50 000 units, at a planned selling price of $297 and a planned cost, including upstream and downstream costs, of $200 per unit. The selling price was based on the planned cost per unit plus a planned profit mark-up of 48.5 per cent on cost (or 32.65 per cent of selling price). The planned costs were derived from the management accountant's understanding of the current production technology and facilities available to the company.

If the company had used target costing, the preparation of the life cycle budget and the planned level of profit may have been very different. Let's say that market research indicated to ACDP that to sell 50 000 units the CD Super would have to be priced at $190. Given this information we can estimate the target cost for CD Super as:

$$\begin{aligned}\text{Target cost} &= \text{target selling price} - (\text{target profit margin}) \\ &= \$190 - (0.3265 \times \$190) \\ &= \$127.96\end{aligned}$$

Notice that this cost is well below the planned cost of $200 per unit. (Indeed the target selling price is below the planned cost.) Substantial cost reduction would be required before the CD Super would earn a return of 32.65% on selling price.

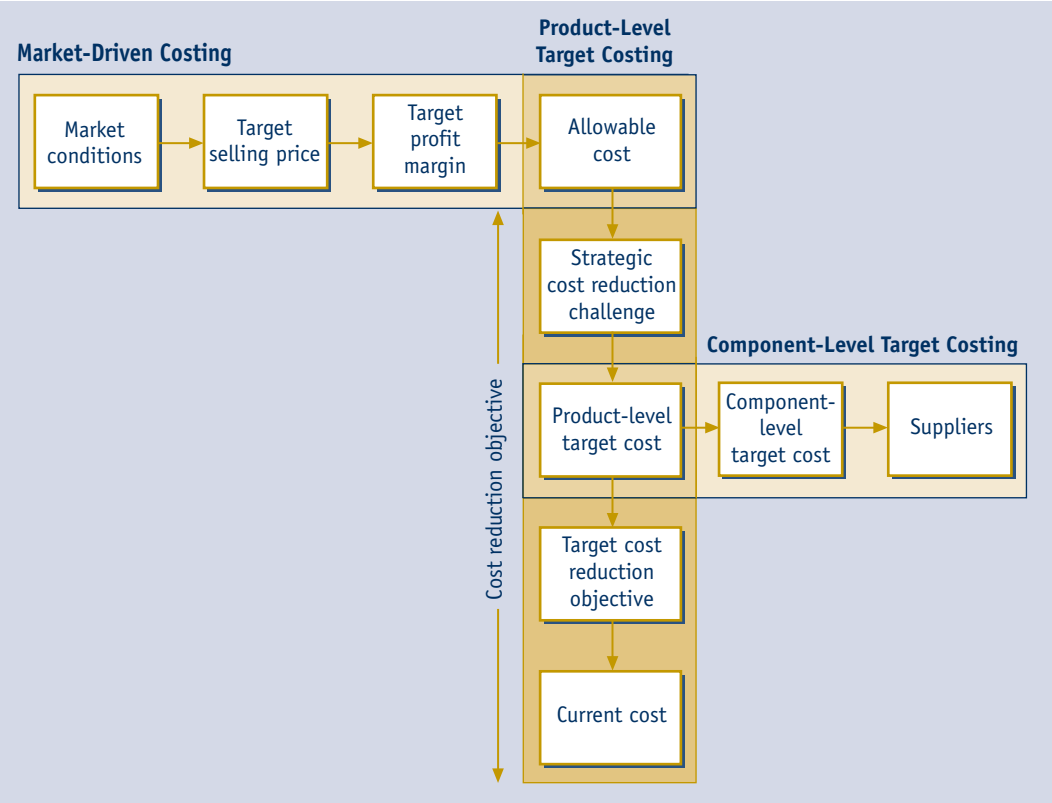
The target costing process

We have used the CD Super to illustrate the basic calculations involved in setting target costs, but it is important that you also understand the *processes* that would be used to drive the current cost down towards the target cost. Exhibit 15.8 describes the three steps to reducing costs through the target costing process (Cooper & Slagmulder, 1999):

1. market-driven costing;
2. product-level target costing; and
3. component-level target costing.

We will continue with the CD Super to illustrate these steps.

EXHIBIT 15.8 The target costing process



Source: Cooper & Slagmulder (1999, p. 166)

Market-driven costing, the target cost in an ideal world

Early in the product planning stage, ACDP would have developed a clear picture of the product features required to meet customers' expectations, and the level of performance required for each feature. This would have involved identifying the size of the CD player, the quality of the sound, the batteries to be used, and so on. The CD Super's **target selling price**, which is the anticipated market price for the product, would be based on market considerations, such as customers' needs and expectations and competitors' behaviour, as well as the business's strategic objectives for the product.

target selling price the anticipated selling price for the product, based on market considerations and the strategic objectives for the product

target profit margin the return on sales that the business requires to make an acceptable profit on the product

allowable cost the target cost at which the product must be produced if it is to be sold at the target selling price and generate the target profit margin

current cost the cost that the new product could be manufactured for, including upstream and downstream costs, given the current design and resources but prior to any cost reduction activities

cost reduction objective the difference between the allowable cost and the current cost

target cost reduction objective the cost reductions that are achievable, based on a *realistic assessment* of the ability of the product designers, production engineers and suppliers to remove cost from the product

product-level target cost the difference between the current cost and the target cost reduction objective

strategic cost reduction challenge the difference between the product-level target cost and the allowable cost

ACDP would then determine its **target profit margin**, based on an assessment of the return on sales required to make an acceptable profit on the CD Super. This would be influenced by the profit performance of similar products and the long-term profit objectives of the business. Based on this information, the CD Super's **allowable cost** can be estimated, which is the target cost at which the product must be produced, if it is to be sold at the target selling price and generate the rate of return required by the business. Thus:

$$\text{Allowable cost} = \text{target selling price} - \text{target profit margin}$$

The target cost of $127.96, identified for the CD Super in our simplified illustration above, is in fact the *allowable cost*.

Product-level target costing: connecting with reality

You will notice that the allowable cost is driven primarily by market considerations. It does not take into account whether or not ACDP has the capabilities to achieve this cost for the CD Super through its product designers, production capabilities, and material and component suppliers. The degree of cost reduction required to achieve the allowable cost is called the *cost reduction objective*. To calculate this objective, ACDP would need to estimate the cost, including upstream and downstream costs, that the CD Super could be manufactured for, given the current design and resources but prior to any cost reduction activities. This is called the **current cost**, which was estimated (in the life cycle budget) at $200. Thus, as indicated in Exhibit 15.8, the **cost reduction objective** is the difference between the *allowable cost* and the *current cost*. At ACDP the cost reduction objective for the CD Super would be $72.04 (i.e. the current cost, $200, minus the allowable cost, $127.96)

To be effective, the CD Super's target cost would need to be challenging but achievable, otherwise the target costing process would lose credibility and targets would not be taken seriously at ACDP.[6] For this reason, some businesses distinguish between the *achievable* and *non-achievable* part of the cost reduction objective. The achievable part is called the **target cost reduction objective** and is determined by making a *realistic assessment* of the ability of the product designers, production engineers and suppliers to remove cost from the product. This task is often undertaken by a cross-functional team, which is set up to manage the target costing process. This team may consist of members representing key activities across the value chain such as production engineering, product design, purchasing, marketing and accounting. In setting the target cost reduction objective, there may be extensive negotiation between team members to locate where in the value chain the cost savings will be found. How much cost reduction can be achieved in product design? How much in the manufacturing process? How much in reduced material and component costs? The **product-level target cost** is then determined, as the difference between the current cost and the target cost reduction objective:

$$\text{Product-level target cost} = \text{current cost} - \text{target cost reduction objective}$$

Let's say that, after an aggressive search for cost savings, ACDP's design engineers estimated that, given the company's current capabilities, cost savings of $50 per unit could be achieved. That is, the CD Super could be produced for $150 per unit, including all upstream and downstream costs. The $50 cost saving becomes the *target cost objective* and the *product-level target cost* for the CD Super becomes $150 (i.e. the current cost, $200, minus the target cost reduction objective, $50).

The unachievable part of the cost reduction objective is the **strategic cost reduction challenge**, which for the CD Super amounted to $22.04 (i.e. the product-level target cost,

[6] The behavioural issues associated with setting target costs are similar to those involved in setting budget targets, as described in Chapter 9.

$150, minus the allowable cost, $127.96). We would hope that this figure is not too high, as it indicates that either the business is less efficient than its competitors, or that its target profit margin is higher than that of competitors. The business will not earn its target profit margin until its product-level target cost is equal to (or less than) the allowable cost. This will only happen when the strategic cost reduction challenge has been eliminated. However, at the start of the target costing process, the *product-level target cost* becomes the target for cost reduction activities, not the allowable cost, as it is an achievable target, although only with considerable effort and creativity.

Once the *target cost reduction objective* had been determined, ACDP would have to find ways of achieving the product-level target cost. Individual targets would be set for various functional departments, product components and materials, and *value engineering* would provide a way of reducing costs while enhancing the functionality of the new product (this is described in the next section). Under target costing, all functions of the business must make a firm commitment to designing, producing and distributing the product with total life cycle costs equal to the product-level target cost.

Component-level target costing: focusing on the detail

The target costing team breaks down the product-level target cost into targets for major subassemblies and components of the new product. For example, at ACDP target costs would be set for the assembly process and the packaging process, as well as for distribution. In this way each major area in the business would have its own target cost and cost reduction objective to achieve. Techniques such as value engineering could be used to find creative ways of achieving some of these targets. **Value engineering (VE)** involves analysing the design of the product and the production process, to eliminate any non-value-added elements to achieve target cost, while maintaining or increasing customer value. VE may involve design engineers modifying the design of some components to make them easier to manufacture and maintain, substituting more cost-effective material which does not reduce customer value, and improving the efficiency of the production processes. Thus, in undertaking VE, it is critical that engineers and product designers have a clear understanding of customer value. Value engineering will also involve working with suppliers to provide components or raw materials that meet target costs.

value engineering a systematic approach to analysing the product and process design to eliminate any non-value-added elements to achieve the target cost, while maintaining or increasing customer value

Most businesses rely on outsourced components, to some degree. In setting **component-level target costs**, the business's product designers may work with suppliers to reduce costs, which may then create a cycle of target costing within supplier organisations. At ACDP this would involve setting target costs for the plastic case, speakers, and battery packs, which are sourced from external suppliers. Given that suppliers will seek to maximise the price they receive and the business will seek to minimise the cost it pays, negotiations between the business and its suppliers are likely to be very intense. The relationship with suppliers needs to be managed carefully so that suppliers do not feel unreasonable pressure. Often the business's and the suppliers' design teams work together to achieve the component-level target cost. As with product-level target costs, component-level target costs need to be demanding but achievable to maintain the credibility of the target costing process.

component-level target costs target costs for product subassemblies and components

Pursuing continuous improvement once production begins

If production of the CD Super commenced before the gap between the current cost and the product-level target cost had been eliminated completely, actual costs would be monitored against the target, and the various approaches to cost management described in this chapter, such as value analysis and cost driver analysis, would be used to drive the actual cost closer to the product-level target cost. During this stage, the emphasis would be on continuous, incremental improvements to production processes.

ACDP would not earn its target profit margin until the product-level target cost is reduced to the allowable cost. The business would continue to seek to meet the strategic cost reduction challenge to narrow this gap.

Target costing for cost management

The key features of target costing are that it:

- is price led (it begins with the expected market price and works backwards to set the target cost);
- focuses on the customer (the product features and quality required to meet customer expectations are established and taken as given, prior to setting the target cost);
- is based on the principles of life cycle management, placing primary emphasis on managing production and downstream costs by focusing on the design and development phase; and
- is cross-functional, involving managers from right across the value chain.

In its initial life cycle budget, ACDP used a cost-plus approach to pricing. The target costing study indicates that the planned level of sales of 50 000 units would not be achievable at this price. Target costing would enable ACDP to plan how to manage costs in order to achieve the desired level of sales.

Like life cycle costing, target costing has a major role to play in developing and managing new products, although it can also be used to manage the costs of existing products, especially product upgrades.

real life

Target costing in Australia

As in Japan, target costing plays a major role in the Australian automotive industry. For example, the major car manufacturers Toyota, in Victoria, and Mitsubishi Motors, in South Australia, use target costing to actively pursue cost reduction. Instead of being based on market price, target costs are set at the component level, based on the component cost in the previous model, adjusted for any changes in the engineering specifications for the new model. For example, a side protector moulding on a new model may be wider than on the existing model, and may include a new reflective strip. To establish the target cost for this component, the costs of the extra material and the extra processing time required to add the reflective strip would be added to the cost of the side protector moulding on the existing model. A target cost for the new model is obtained by adding the target costs for the individual components used to manufacture the vehicle.

Courtesy of the Australian Broadcasting Associtioan

Joe Bloggs meets the operator of the year

At Toyota Australia, target costing is one of a series of cost management tools used by the company. The target costing process is managed by the Cost Planning Team, which consists of 19 people, drawn from the purchasing, engineering, manufacturing, and sales areas of the business. People from these areas are included because each of them can control some aspect of cost. The team is chaired by the National Manager of

continues ...

Management Accounting, and the target costing process is co-ordinated by the Accounting Division of Toyota, as the system interfaces with other major planning and control tools, including long-term business plans, budgeting and performance measurement.

Target costing is a suitable method of cost control for Toyota, as the selling price of new vehicles is determined by a fiercely competitive market, and cost effectiveness needs to be improved to continue viability and to increase market share.

Initially, detailed cost and profit analysis is undertaken for the new product by considering the variations required to produce the new model over the current model. Throughout the product development phase, progressive targets are set for all members of the Cost Planning Team, who are responsible for reducing costs in their particular area of responsibility. For example, the Purchasing Division will be responsible for meeting cost targets for the supply of component parts for the new vehicle. There may be up to 3000 parts used in a motor vehicle. The Cost Planning Team meets monthly to review progress on targets.

Toyota considers that the major opportunities for managing costs occur during the product development phase, before product design and tooling are locked in. The product development phase lasts about 30 months. Major sources of cost reduction are achieved through value engineering.

Once production commences, cost management still takes place. Cost reduction targets are set as part of the budgeting processes. Continuous improvement (or Kaizen) occurs over the production life of the vehicle, using value analysis. Any cost reductions achieved during the production phase will be used when the target costing process is undertaken for the next model.

A similar approach is used at Mitsubishi Motors Australia Ltd in South Australia. During the design phase, target costing teams use value engineering to identify and eliminate any non-value-added aspects of the design. Target costs are also set for purchased parts and materials, and these need to be achieved by suppliers. Once production begins, the emphasis is on process improvements in order to continually narrow the gap between the actual cost and the target cost.

Sources: Langfield-Smith and Luckett (1999); Thorne (1997)

Managing Time

LO9
LEARNING OBJECTIVE

So far our primary focus in this chapter has been on managing costs. However, most managers understand that time is an important driver of both costs and revenue. Time costs money because:

- time dictates the rate at which products and services are produced and revenue is generated;
- time determines how long resources are tied up during processing and unavailable for other profit generating activities;
- time delays often cause a build-up of inventories and associated holding costs; and
- for some businesses, innovation is a critical success factor. They compete on the basis of time to develop new products or to produce existing products, and delays will lead to a loss of current and potential customers.

Not only does effective cost management require effective time management, time itself can be a source of competitive advantage for many businesses.

Time-based management

Managing time focuses on compressing the time it takes to undertake all of the business's processes, from product development through to production and delivery. At the extreme, **time-based management (TBM)** considers time as the primary focus for managers' decisions.

time-based management (TBM) an approach that focuses on compressing the time it takes to undertake all of the business's processes to enhance customer value and reduce costs

Time is a universal characteristic of every activity and process, and, according to TBM, information about time is far easier to obtain and more timely than information about costs. Managers are encouraged to shift from the cost control focus of conventional management accounting to a time management mindset, making the organisation more customer-oriented and responsive. In managing time, as in managing costs, non-value-added activities must be identified and eliminated. Managing time will result in lower costs and better quality, but time remains the fundamental focus. The aim is to reduce new product development time, throughput time, and delivery time (Mouritsen & Bekke, 1999).

Measures of time

Although most businesses do not adopt all of the principles of time-based management and focus on time to the exclusion of other considerations, many businesses do recognise the importance of time, by measuring and managing:

- time taken to develop new products and services; and
- time taken to fulfil customer orders for products and services.

Developing new products and services

Innovation can be a key source of competitive advantage for some businesses. For example, digital camera producers, such as Cannon and Pentax, constantly compete on the basis of new and enhanced product features, such as picture resolution, zoom capability, and image storage capacity. The sooner an innovative product can be released into the market the better, and many businesses measure **new product** (or **service**) **development time** (also known as **time-to-market**), which is the time from the identification of an initial concept through to the release of the product (or service) for sale. (Indeed, this is a common measure for firms that use a balanced scorecard performance measurement system, described in Chapter 14.)

new product (or **service**) **development time** (or **time-to-market**) the time from the identification of an initial concept through to the release of the product (or service) for sale

Break-even time (BET), which measures the time from the identification of an initial concept through to when the product has been introduced and has generated enough profit to pay back the original investment, is another measure of the effectiveness of the new product development process (Kaplan & Norton, 1996).[7] This measure was developed by Hewlett-Packard and emphasises the importance of the speed, efficiency and profitability of the new product development process. However, BET can encourage incremental projects rather than major innovations, as incremental projects are likely to involve lower development costs, and returns that flow more quickly, easily and predictably. In contrast, major innovations are likely to involve longer life cycles with later sales significantly exceeding sales early in the life cycle. Also, the BET measure is not timely, as it cannot be estimated until some time after the product development cycle has been completed.

break-even time (BET) measures the time from the identification of an initial concept through to when the product has been introduced and has generated enough profit to pay back the original investment

Let's explore new product development at Australian CD Players Ltd (ACDP), the business that manufactures portable CD players. The market for portable CD systems is very competitive, with global players such as Sony, Kenwood and Phillips constantly developing products with enhanced features, in terms of sound quality, portability and battery life. To remain competitive ACDP must compete on the basis of innovation as well as cost. Indeed, you will remember that ACDP was in the process of developing a revolutionary compact disc system, CD Super. The sooner this product enters the market, the better, as its superior sound quality and light-weight, long-life battery will give ACDP a definite edge over its competitors. ACDP has a cross-functional team working on the design of CD Super, to develop product and process designs to meet its target cost.

[7] You will notice that BET is very similar to the payback period described in Chapter 20.

It is likely that this team will also have a targeted *new product development time* to ensure that the CD Super is available in the market as soon as possible, and to provide a timeline for planning production and marketing resources. Product planning and concept design for the CD Super commenced at the beginning of 2001 and the life cycle budget for the CD Super, in Exhibit 15.6, indicates that the 'Design and development' phase was completed sometime in 2002. Thus the CD Super was developed during the two years 2001 and 2002, but we would need to know the exact completion date to get a more precise measure of the new product development time.

Exhibit 15.9 shows that the *break-even time* for the CD Super will be 2 years and 6 months (assuming that the product performs according to its life cycle budget, shown in Exhibit 15.6). The original investment in the CD Super consists of the $1 000 000 of costs incurred during the 'Product planning and concept design' and the 'Design and development' phases. Profits of $250 000 and $1 750 000 were forecast for 2002 and 2003 respectively. Assuming that the profit from sales flows evenly during the year, the $1 750 000 profit in 2003 would be earned at approximately $145 830 per month ($1 750 000/12).

EXHIBIT 15.9 Break-even time, CD super

	Cumulative initial investment (during 'Planning and conceptdesign' and 'Design and development')	Profit (Sales revenue – production and distribution costs)	Investment yet to be recovered
2001	$400 000	$0	$400 000
2002	1 000 000	250 000	750 000
Jan 2003	0	145 800	604 200
Feb 2003	0	145 800	458 400
Mar 2003	0	145 800	312 600
Apr 2003	0	145 800	166 800
May 2003	0	145 800	21 000
Jun 2003	0	145 800	0

Time taken to fulfil a customer's order

Another important aspect of time management is the time taken to respond to a customer's order for a product or request for a service, which is measured by **customer response time**. Exhibit 15.10 shows that customer response time is made up of three major elements: order receipt time, production lead (or cycle time) time (which can be divided into waiting time and production time), and delivery time.

Consider, for example, the customer response time at ACDP. When the CD Super enters the market it will be sold to electronic goods distributors as well as direct to major retail chains. To encourage minimal delays, ACDP will measure the time between receiving a customer order and delivering that order to the customer, that is the *customer response time*. When ACDP's sales department receives an order for the CD Super, the time between receiving the order and placing it with the manufacturing department is the **order receipt time**. Once manufacturing receives the order, it may need to wait for various resources to become available, such as materials, components or machine capacity, before production can begin. This delay is the order **waiting time. Production time** refers to the duration of the manufacturing process for the CD Super. **Production lead** (or **cycle**) **time** (or **manufacturing cycle time**) measures the period from when the order for the CD Super enters the

customer response time the time between a customer placing an order for a product or service and receiving that order

order receipt time the time between the sales department receiving a customer order and placing that order with the manufacturing department

waiting time the time between an order being received by manufacturing and production commencing

production time the duration of the manufacturing process

production lead (or **cycle**) **time** (or **manufacturing cycle time**) the period from when the order enters the manufacturing department to when the finished products are ready for delivery

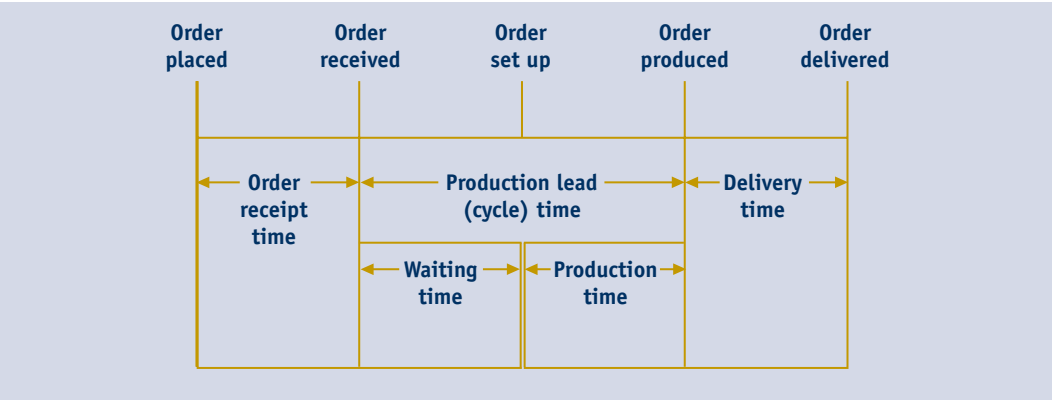
manufacturing department to when the manufacture of CD players is complete, and includes the *waiting time* and *production time*. The production lead (or cycle) time captures all the processes that ACDP must control to produce what the customer expects, which is a quality product in the shortest possible time. (Almost all customers prefer short lead (or cycle) times!) Indeed many businesses estimate **average cycle time**, which is the ratio of total processing time to total good units produced, as a measure of process efficiency. **Delivery time** refers to the time taken to deliver the CD Super order to the customer and reflects the efficiency of ACDP's distribution processes.

average cycle time total processing time/total good units produced]

delivery time taken to deliver the finished order to the customer

While customer response time is of interest to almost all customers, in some industries, such as fast food and banking, customer response time is a key source of competitive advantage. In the late 1990s, McDonald's offered customers their meal free of charge if their order was not filled within two minutes. In South Australia, the Playford Centre, which processes applications from IT start-up businesses for seed funding, measures the time between the receipt and resolution of funding applications.

EXHIBIT 15.10 Customer response time



Reliability in meeting scheduled delivery dates

delivery schedule reliability the extent to which a business meets predetermined delivery schedules

The effectiveness of meeting customer orders can also be measured through **delivery schedule reliability**, which assesses the extent to which a business meets predetermined delivery schedules. For example, Australia Post offers a guaranteed overnight interstate delivery service. One indicator of the effectiveness of Australia Post's time management would be to measure the percentage of packages delivered by the next day. Telstra measures the number of reported service faults remedied within 24 hours (and makes penalty payments to customers for late service!) Airlines, rail services and bus companies measure the percentage of services that arrive on time.

Note that a business can improve its delivery schedule reliability by building longer customer response times into the schedule, but customers may not perceive this as better time management!

Identifying and managing the drivers of time

time driver any factor that changes the duration of an activity

Each of the measures described above monitors the effectiveness of time management. However, managers will only be able to improve time management by understanding and managing the drivers of time. A **time driver** is any factor that changes the duration of an activity. Exhibit 15.11 identifies common time drivers and suggests possible approaches to managing them.

EXHIBIT 15.11 Managing time drivers

Time Drivers	Possible management approaches
Poorly structured order, production and deliveryprocesses	Conduct value analysis to identify and remove non-value-added activities. Implement continuous improvement processes. Use business process re-engineering to completely redesign processes.
Bottlenecks in order, production and delivery processes	Manage throughput by identifying and resolving bottleneck resources. Attempt to minimise 'lumpiness' and unpredictability in customer demand.
Poor quality	Develop a total quality management (TQM) culture, supported by appropriate measures of quality costs and quality drivers.*
Inefficient inventory management	Improve supply chain management to minimise delays caused by inadequate and poor quality supplies.*
Poorly structured R & D processes in developing new products and services	Use target costing to manage the product design and development process. Ensure that value engineering minimises production time as well as cost.

* TQM and supply chain management are described in Chapter 16.

As you work your way through this chapter, you will notice that the many of the approaches used to manage time are the same as those used to manage costs. For example, removing non-value-added activities or re-engineering business processes saves both time and money. Likewise, managing throughput focuses on speeding up the production processes, which results in more rapid revenue generation and lower costs. Managing quality can reduce delays and save costs. And target costing can be used to minimise production time as well as costs.

Some companies even use their cost accounting system to manage time. They allocate overhead costs to business units and products using production lead (or cycle) time as the overhead allocation base. Even though many overhead costs may not be driven by time, this allocation process makes managers aware of the importance of managing time, especially if managerial rewards systems are linked to measures of cost or profit. However, performance can be managed far more effectively using a more comprehensive range of performance measures that acknowledge the causal relationships between cost, time and quality, such as those used in a balanced scorecard performance measurement system, described in Chapter 14.

Managing throughput

LO10
LEARNING OBJECTIVE

Earlier in this chapter we recognised that the effective management of bottlenecks is vital to managing time and costs. There is a school of thought that considers managing bottlenecks, or more generally managing throughput, as the key to profitability. This approach is based on the *theory of constraints*.[8]

[8] E.M. Goldratt pioneered this approach. See, for example, Goldratt (1990) and Goldratt & Cox (1992). For a good summary of the theory of constraints see also Ruhl (1996).

theory of constraints an approach to managing costs and improving quality and delivery performance, by focusing on identifying and removing bottlenecks

The theory of constraints

The theory of constraints is an approach to managing costs and improving quality and delivery performance, by focusing on identifying and removing bottlenecks. According to the **theory of constraints**, the rate of production is limited to the capacity of the constraints (or bottlenecks) that exist in the organisation. Production cannot flow through the plant faster than it can move through the bottlenecks. In the short term, therefore, the rate of production through all areas should be limited to the rate at which products can pass through the bottleneck. Any attempt to improve efficiency in non-bottleneck areas will not improve performance; it will only cause inventory to build up at the bottleneck. While this inventory build-up ensures that the bottleneck does not become idle, it also implies increased holding and handling costs. In the longer term, management efforts should focus on removing bottlenecks. Inadequate labour or machinery can cause bottlenecks. Labour resources can be improved with overtime, hiring and training, but constraints involving plant and equipment are more difficult to rectify. Applying the theory of constraints enables a business to increase revenue, reduce costs and improve customer response time. Removing bottlenecks may also improve quality, as defective units, hidden in the inventory stockpile at the bottleneck, will now be detected more quickly during further processing.

We will continue with our example of the company Australian CD Players to illustrate this concept.

Managing throughput at Australian CD Players

Australian CD Players Ltd (ACDP) manufactures portable CD players. Once again we will focus on ACDP's exciting new product, CD Super, which is now in production and has met with very high demand. Production facilities at ACDP are highly automated, with three separate departments.

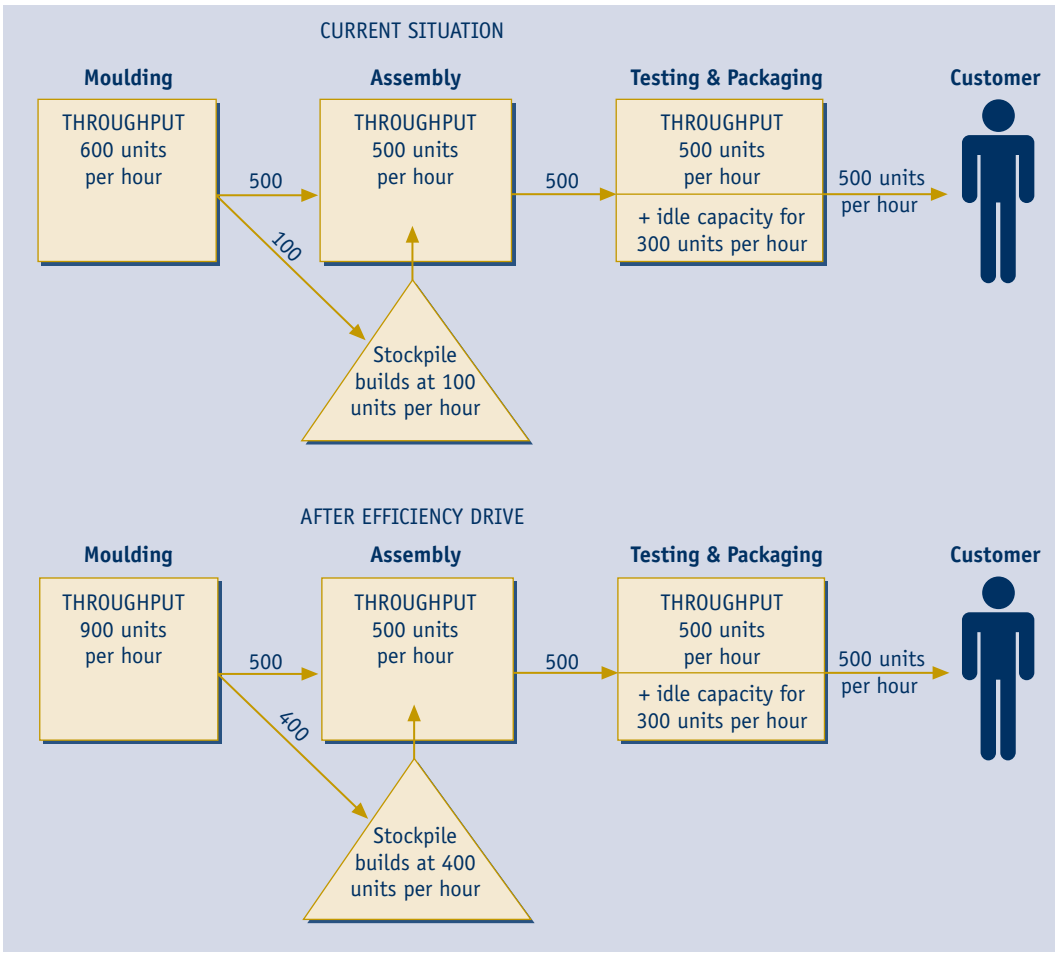
- *Moulding* which uses sophisticated injection moulding machines to produce 600 plastic cases per hour;
- *Assembly* which uses robots to pick and place motors and other components into the plastic cases—the output from Assembly is 500 units per hour; and
- *Testing and Packaging*, which X-rays the completed CD players to identify any defects before packing them ready for sale. This department can process 800 units per hour.

Products are then shipped to customers, who consist of electronic goods distributors and retail chains. Aware of the potential market, the manager of the Moulding Department has just begun a productivity drive to increase the output of his department from 600 to 900 units per hour. As shown in Exhibit 15.12, this proposal will have no effect on the rate at which CD players are shipped to customers, which is limited by the Assembly Department to 500 units per hour. The Assembly Department is the *bottleneck*. If the Moulding Department increases its output, the extra moulded cases will simply pile up in the Assembly Department, waiting to be assembled. Rather than improve profitability, work in process inventory and inventory-related costs will increase. Any attempts to improve the level of production should focus on the Assembly Department.

Throughput accounting

Many of the non-financial performance measures described in Chapter 14, such as machine downtime, setup time and the various measures of cycle or process time, can be used to identify and manage bottlenecks. However, the pioneer of throughput management, Goldratt, recommends managing performance with financial performance measures. This approach has been called *throughput accounting*. According to the

EXHIBIT 15.12 Managing throughput, Australian CD Players



throughput accounting approach, the ultimate business goal is to make money. The relevant performance measures are therefore net profit, return on investment (ROI), and cash flow as an indicator of survival. (Aspects such as customer satisfaction, quality and flexibility do not need to be measured as they are a means of achieving profitability, rather than goals in their own right.) The problem with these conventional financial measures is that they provide no indication of the impact of operational decisions on profitability. The solution, according to **throughput accounting**, is to measure the effects of bottlenecks and operational decisions using *financial* measures of throughput, inventory and operating expense. *Throughput* measures the rate at which a business generates money through sales. *Inventory* measures all the money the business spends in buying things that it intends to sell. *Operating expense* measures all the money that the business spends in turning inventory into throughput.

throughput accounting a method of measuring the effects of bottlenecks and operational decisions using financial measures of throughput, inventory and operating expense

The impact on profit of a change in any one of these three measures can be identified easily. When throughput is increased with no change in inventory or operating expense, then net profit, ROI and cash flow will increase. Likewise, when operating expense decreases with no change in throughput or inventory, then profit, ROI and cash flow will increase. Decreases in inventory will also increase profit, ROI and cash flow. Therefore, these measures can be used to guide decision making and assess performance. The

problem of linking operational measures to business profitability does not exist because the operational measures are financial.

Throughput accounting concentrates on the short term. Constraints are often short-term problems and, once identified, can be overcome. Many critics of throughput management argue that performance should not be guided and assessed solely by short-term considerations. As explained in Chapter 14, to survive, a business must identify strategic objectives, which should form the basis for identifying critical success factors and related performance measures. While throughput accounting has a role to play in the identification and elimination of constraints, clearly it has some limitations over the longer term.

Chapter summary

Management accounting has responded to the changing business environment by paying increased attention to managing resources, in particular, costs, time and quality, which are not only key cost drivers but important sources of customer value. In this chapter we considered various approaches to reducing costs and managing time. Key points include:

- Many organisations have moved from controlling costs to managing them. Cost management improves an organisation's cost effectiveness through understanding and managing the real causes of costs.
- Activity-based management (ABM) can be used to manage costs, as well as other sources of customer value. Reducing costs through ABM involves four steps:
  - identifying the major opportunities for cost reduction;
  - determining the real causes of these costs;
  - developing a program to eliminate the causes and, therefore, the costs; and
  - introducing some new performance measures to monitor the effectiveness of cost reduction efforts.
- Value analysis can be used to identify opportunities for cost reduction. Costs can be reduced (and customer value increased) by identifying non-value-added activities, which are activities that do not add value to a product or service from a customer's perspective or for the business.
- The real causes of costs, called root cause cost drivers, can be identified through cost driver analysis, which involves an in-depth search for the underlying reasons that activities are performed. A good starting point for cost driver analysis is to link activities into business processes, to identify the supplier of and customer for each activity.
- Cost reduction programs should focus on reducing and eventually eliminating the root causes of major non-value-add activities.
- Performance measures can be identified for each activity or business process to monitor improvements in cost, cost drivers, and other sources of customer value such as quality and delivery.
- Despite the benefits offered by activity-based management, it is not widespread in practice. Impediments to its implementation include a lack of awareness, uncertainty over potential benefits, extensive resource requirements, and resistance to change.
- Business process re-engineering (BPR) can also be used to reduce costs and improve other sources of customer value. Unlike ABM, BPR involves *radical* changes to the way an organisation works. The four steps involved in BPR are:
  - prepare a process map;
  - establish goals;
  - reorganise the work flow; and
  - implement the re-engineered process.
- A product's costs will vary with the stage in its life cycle. Life cycle costing and budgeting accumulates the revenues and costs associated with a product over the its entire life cycle. The life cycle perspective helps management to minimise total product cost by recognising the trade-off between costs incurred

prior to production, in design and development, and costs incurred during production and in post-production.

- Another approach to cost management, target costing, is based on this trade-off. A product's target cost is based on the difference between its expected selling price and the firm's target profit margin. The design phase of a product's life cycle is driven towards meeting a target cost, as well as the usual specifications about product form and performance. In managing their costs, some firms differentiate between this target cost, called the allowable cost, and an achievable target cost given the firm's current capabilities, called the product-level target cost.
- Time is a cost driver and it can also be a significant source of customer value. Some businesses compete on innovation and therefore need to manage the duration of the innovation process. Duration measures include new product development time and break-even time (BET). Most customers also value speedy delivery and businesses can benefit by managing the duration of their order, production and delivery processes. Useful measures include customer response time and its components, order receipt time, order waiting time, production time and delivery time. Many businesses also measure delivery schedule reliability.
- Bottlenecks can have a major impact on the duration of processes. The theory of constraints provides a framework for identifying and managing bottlenecks. Throughput accounting focuses on measures of throughput, inventory and operating expenses, to speed up production and improve the management of revenue, costs and time.

In Chapter 14 we introduced broad frameworks for managing performance. In this chapter we have explored two key facets of performance in more detail, costs and time. In Chapter 16 we will consider more important aspects of managing performance, namely customers, suppliers and quality. In each case, you will notice that these approaches are designed to help an organisation to develop strategies and achieve its objectives.

Key terms

activity
activity-based management (ABM)
allowable cost
average cycle time
break-even time (or time to market)
business process map
business process re-engineering (BPR) (or process re-engineering)
cost driver analysis
cost management
cost reduction objective
current cost
customer response time
customer value
delivery schedule reliability
delivery time
life cycle budget
life cycle costing
new product (or service) development time (or time-to-market)
non-value-added activity
order receipt time
process (or business process)
process improvement
process perspective
product-level target cost
product life cycle
production time
production lead (or cycle) or manufacturing lead (or cycle) time
strategic processes
target cost reduction challenge
target cost reduction objective
target costing
target profit margin
target selling price
theory of constraints
throughput accounting
value-added activity
value (or activity) analysis
value engineering
waiting time

cybersearch

Cybersearch

1 Look for web sites of consulting firms that offer activity-based costing and activity-based management services.
   (a) Do the concepts of ABC and ABM fit with those described in the chapter? If not, describe any differences.
   (b) What benefits do the consultants suggest may be expected from ABC and/or ABM?
   (c) Do the consultants acknowledge any impediments to the implementation of ABC/ABM?

2 Find the web site of an organisation that uses target costing to manage costs and profitability.
   (a) Compare the organisation's approach to target costing with that described in the chapter.
   (b) Outline the advantages that target costing has provided for the organisation.

3 Locate web sites that contain examples of businesses that measure and manage customer response time.
   (a) Compare their approach to managing customer response time with that described in the chapter.
   (b) From your search, what industries seem particularly interested in this aspect of time management?

For a list of useful web sites to help you with these exercises visit the Online Learning Centre at www.mhhe.com/au/langfield

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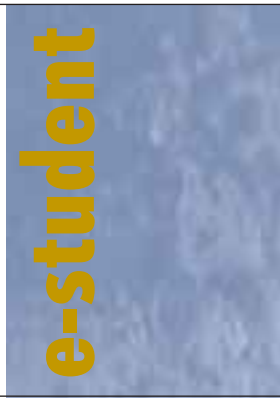

self-study

Self-study problems and solutions

Self-study problem 1 Activity-based management

PJ Rogers Ltd manufactures timber bookcases in two production processes: cutting and assembly. The company has adopted an activity-based costing system and has identified the following activities:

- Inspect incoming timber.
- Dispose of substandard timber.
- Store timber.
- Move timber to production.

- Set up circular saw.
- Operate circular saw.
- Inspect sawn planks.
- Recut planks that are too long.
- Dispose of planks that are too short.
- Move sawn planks to assembly area.
- Sand planks.
- Assemble bookcase.
- Paint bookcase.
- Inspect bookcase.
- Move finished bookcase to shipping.

Required:

1 Explain why the activities 'Inspect sawn planks' and 'Recut planks that are too long' can be classified as non-value-added activities.

2 Suggest possible root cause cost drivers for these two activities.

3 Identify the other non-value-added activities at Rogers Ltd.

Solution to Self-study problem 1

1 The activities 'Inspect sawn planks' and 'Recut planks that are too long' can be classified as non-value-added activities because they do not add value for the customer. If the planks had been cut properly in the first place, they would not require inspection or rework.

2 Possible root cause cost drivers for these two activities might include the following:
   - 'Inspect sawn planks': circular saw not set up properly; poor workmanship in the use of the circular saw.
   - 'Recut planks that are too long': poor training in setup procedures for the circular saw; poor training in the operating procedures for the circular saw; inadequate procedures for recruiting skilled trades employees.

3 Other non-value-added activities include the following:
   - Inspect incoming timber.
   - Dispose of substandard timber.
   - Store timber.
   - Move timber to production.
   - Dispose of planks that are too short.
   - Move sawn planks to assembly area.
   - Inspect bookcase.
   - Move finished bookcase to shipping.

Self-study problem 2 Life cycle management and target costing

Hiliters Ltd manufactures fluorescent marking pens at North Ryde, a suburb of Sydney. One of its top-selling lines is the Hilite pen, which is fluorescent yellow and has a special tip that does not dry out when the cap is left off. Earlier this year, a Korean company entered the market offering a similar pen at a price 25 per cent below the Hilite price of $2.00 per unit. Company policy requires a profit margin equal to 30 per cent (on sales) on each of its products.

Required:

1 What allowable cost would have to be set for the Hilite pen to remain competitive and still meet the target profit margin of the company?

2 Explain how the company could apply the principles of life cycle management to achieve this cost.

3 Assume that Hiliters examines the current cost for the Hilite pen and its existing capabilities, and decides that the allowable cost is not achievable. Explain how the company could persist with target costing by adjusting the allowable cost, and assess the implications of this situation for the company's target profit margin.

Solution to Self-study problem 2

1 The allowable cost for the Hilite pen to remain competitive and meet the company's target profit margin would be $1.05.

Target price to remain competitive = $2.00 − 25% of $2.00 = $1.50
Allowable cost to achieve a 30% profit margin = $1.50 − (30% × $1.50) = $1.05

2 Hiliter could examine the distribution of expected costs over the remainder of Hilite pen's life cycle. The aim should be to examine each stage of the life cycle in order to identify ways in which non-value-added activities can be removed. It may be possible to spend more money in the design phase and reduce costs in subsequent stages, such as manufacturing and selling costs. It may also be feasible to spend more money during manufacturing, for example to improve quality, and to reduce subsequent costs such as customer complaints.

3 If Hiliter establishes that the cost reduction objective is not achievable, given the company's capabilities, it could identify the level of cost savings that is achievable (the target cost reduction objective), and set a product-level target cost which is based on the difference between the current cost and the target cost reduction objective. Hiliter would then work towards achieving this cost. If the pen includes externally purchased components, Hiliter could work with the component supplier to reduce component costs.

As long as the product-level target cost is greater than the allowable cost, Hiliter will not earn its target profit margin on the Hilite pen.

Questions

15.1 Describe the conventional approaches to controlling costs, used by many Australian businesses. How does cost management differ from these approaches?

15.2 Outline the key features of the two-dimensional activity-based costing model described in the chapter.

15.3 What is *activity-based management*? What is its relationship to *activity-based costing*?

15.4 How can an organisation use activity-based management to identify opportunities to reduce costs?

15.5 What role can cost driver analysis play in the management of a business?

15.6 What role can value analysis play in the management of a business?

15.7 What are *value-added activities* and *non-value-added activities*? Give three examples of each for a university department that teaches management accounting.

15.8 Explain the role of activity-based performance measures in reducing costs.

15.9 'Measuring performance in ABM involves more than managing costs.' Explain.

15.10 Activity-based management is not widespread in practice. Why?

15.11 What is *business process re-engineering*? How does it differ from *process improvement*?

15.12 What is a *product life cycle*? Describe the four stages of a product's production life cycle.

15.13 Select three products, state whether each would be expected to have a long life cycle or a short life cycle, and explain your answers.

15.14 Why is it important to assess product profitability using a life cycle approach?

15.15 Explain the trade-off between preproduction and production costs over the product life cycle. How can understanding this trade-off help a business manage its costs?

15.16 What is *target costing*? How can a business use target costing to reduce costs and plan profits?

15.17 Explain the difference between an *allowable cost* and a *product-level target cost*? Why do some businesses use the product-level target cost instead of allowable cost as their target cost?

15.18 Explain the meaning of the *strategic cost reduction challenge* in target costing and its implications for the *target profit margin*.

15.19 Why is it important for a business to manage time?

15.20 What is time-based management (TBM)? Do you agree that it makes more sense to manage time than costs?

15.21 Describe two measures of new product development performance. Are these measures relevant to all firms?

15.22 Using an example, explain the meaning of customer response time and its four components. Are these measures relevant to a service firm?

15.23 Explain the theory of constraints. What implications does this theory have for managing costs?

15.24 According to throughput accounting, how should performance be measured at the operational level? What advantages and disadvantages do these measures offer?

Exercises

E15.25 Conventional costing systems; activity-based costing; activity-based management

Classify each of the following statements as *true* or *false*. In each case, give reasons for your answer.

1. Conventional standard costing systems are useful for controlling manufacturing costs.
2. Conventional costing systems do not provide any useful information for controlling other critical sources of value, such as quality or delivery performance.
3. ABC estimates activity costs, while ABM involves identifying the root cause cost drivers of activities
4. ABC and ABM identify cost drivers, but so do conventional costing systems.
5. ABM focuses on processes, but so do conventional management accounting systems.

E15.26 Non-value-added activity: service firms

Non-value-added activities also occur in service firms. Identify four potential non-value-added activities in:

1. an airline;
2. a bank;
3. a hotel.

Give your reasons.

E15.27 Activity-based management; non-value-added activity; cost drivers; performance measures: manufacturer

Fash Ltd manufactures high-impact plastic bike helmets. The A-1 helmet is produced in two processes: plastic extruding and assembly. The company has adopted an activity-based costing system. For 2003, the following activities have been defined:

- Design A-1 helmet
- Store materials
- Move raw materials to production
- Set up extruding machine
- Operate extruding machine
- Move product to assembly area
- Assemble helmet
- Label helmet
- Inspect and test helmet
- Package helmet
- Move finished helmet to shipping
- Advertise A-1 helmet

Required:

1. Identify the non-value-added activities at Fash Ltd.
2. Select three non-value-added activities and identify two possible root cause cost drivers for each one.
3. Use a process (i.e. supplier, customer) perspective to suggest a possible performance measure for the activity 'Inspect and test helmet'.

E15.28 Activity-based management; cost driver analysis; performance measures: manufacturer

Teskor Pty Ltd manufactures paintbrushes at Lonsdale. The management accountant, Mary Malone, has developed an activity-based costing system for the company. The activities in the timber handle area are as follows:

Activity	Description
Set up saw	Saw set up to cut timber into designated lengths
Operate saw	Timber cut into lengths
Set up lathe	Lathe set up to produce a designated handle shape
Operate lathe	Timber lengths shaped into handles
Inspect handles	Handles inspected to identify faults
Rework handles	Faulty handles reworked
Move handles	Handles moved to assembly area

From the cost assignment module in her ABC system, Malone knows that the activities 'Inspect handles' and 'Rework handles' are costly. She considers both to be non-value-added and therefore candidates for elimination.

Required:

1 Explain why the activities 'Inspect handles' and 'Rework handles' can be classified as non-value-added activities.

2 Suggest possible root cause cost drivers for these two activities.

3 Suggest possible performance measures for the activity 'Operate lathe' which might help eliminate the activities 'Inspect handles' and 'Rework handles'.

E15.29 Life cycle costing

Classify each of the following statements as *true* or *false*. In each case give reasons for your answer.

1 Life cycle budgeting is impossible because of the problems in predicting the sales and costs for a product many years into the future.

2 Per unit product costs are likely to be stable across all stages of a product's life cycle.

3 Life cycle costing is relevant only to products with short product life cycles.

4 The biggest impact on reducing costs can be achieved by using tight cost controls during production. That is why standard costing is so important.

5 Product mix decisions should be based on a life cycle assessment of product profit.

E15.30 Target costing

Classify each of the following statements as *true* or *false*. In each case give reasons for your answer.

1 Target costing is relevant only to new products.

2 Target costing is not relevant to service entities.

3 Target costing has an internal focus rather than a customer focus.

4 Target costing is consistent with Japanese culture but will not work in the Western economies.

5 It is the product designers' job to achieve the target cost for a product.

E15.31 Life cycle costing: manufacturer

Integral Data Dynamics Ltd manufactures components for personal computers. It is planning to develop a new CD ROM drive, CDII, to improve the quality of data retrieval. On the basis of its current product range, the company expects CDII to have prime costs (i.e. direct material and direct labour costs) of $150 and applied manufacturing overhead costs of $100. The marketing manager estimates that CDII will sell for around $400, with sales of around 10 000 units per year for three years, but will then become technically obsolete.

Required:

1 Should Integral Data Dynamics Ltd introduce CDII?

2 What costs, other than the manufacturing costs, should be considered in assessing the profitability of CDII? How high would these costs need to go to deter the company from introducing CDII?

E15.32 Life cycle budgeting; product profitability: manufacturer

Frenzied Fashions Pty Ltd produces clothes for the teenage market. The design department is currently working on two potential product lines: elegant evening wear and casual country wear. The marketing department is keen to introduce both, but currently, the company has only enough surplus production capacity to introduce one new product line. Both product lines are estimated to have a life cycle of three years—one year for design and development and two years on the retail market. The company accountant reviewed the budget estimates for both of the product lines and estimated their profitability for each year in the retail market as follows:

	Evening Wear	Country Wear
Sales revenue	$350 000	$650 000
Cost of goods sold	250 000	450 000
Gross margin	$100 000	$200 000

The marketing manager, whose performance is evaluated on sales, is keen to introduce the Country Wear and uses the profitability analysis to support this view. However, the company accountant is concerned about some of the other costs he has uncovered. The Evening Wear will be sold in a limited exclusive market and involve relatively little promotion and distribution cost. In contrast, the Country Wear, a higher-volume line, will be distributed to a large number of retailers and require substantial support costs.

	Evening Wear	Country Wear
Design costs*	$20 000	$100 000
Promotion costs*	4 000	40 000
Distribution costs#	6 000	120 000
	$30 000	$260 000

* These costs are to be incurred in the year prior to the products' release on the market.

\# These costs will be spread equally over the two years in which the products are sold.

Required:

1 Which product line appears the more profitable, using the conventional profitability analysis?

2 Prepare a profit statement for each product using the life cycle approach. Which product appears the more profitable now? Why?

3 If Frenzied Fashions uses a cost-plus pricing system, which approach to costing—life cycle costing or conventional costing—would be more useful in setting product prices? Explain your answer.

E15.33 Life cycle management and target costing: manufacturer

Solarcare Ltd manufactures plastic lenses for sunglasses at Queanbeyan in New South Wales. One of its top-selling lines is the XRP Lens, which has a scratch-resistant polarised surface. Earlier this year, a Taiwanese company entered the market offering a similar lens at a price 20 per cent below the XRP price of $1.50 per unit. Solarcare's parent company has a target profit margin equal to 40 per cent (on sales) on each of its products.

Required:

1 What allowable cost would have to be set for the XRP to remain competitive and meet the requirements of Solarcare's parent company?

2 Explain how Solarcare could apply the principles of life cycle management to achieve this cost.

3 Under what circumstances would Solarcare identify a product-level target cost, and how would this impact on the target profit margin?

E15.34 Delivery schedule reliability and customer response time

Hungry Jills (HJs) makes and delivers burgers for the takeaway market. Its home delivery service is a source of competitive advantage for the company, as most other fast food burger restaurants cater to the take away market but do not offer home delivery. Because speedy, reliable delivery is a critical success factor for HJs, the company measures its customer response time on all deliveries. At the beginning of 2002, HJs advertised that 50 per cent of orders would be delivered in 15 minutes, and 95 per cent within 30 minutes. The following data relate to the first quarter of 2002:

Time from receipt of order to delivery	January	February	March	Total
Orders delivered within 15 minutes	1200	1300	1350	3850
Orders delivered between 16 and 30 minutes	800	900	1200	2900
Orders delivered between 31 and 45 minutes	400	300	50	750
Total orders	**2400**	**2500**	**2600**	**7500**

Required:

1 Did HJs achieve its advertised delivery reliability over each month?

2 Did the company's delivery performance improve over the quarter?

3 Suggest ways in which HJs could improve its delivery performance.

E15.35 Customer response time

The Magic Mushroom Company (MMC) manufactures a range of designer T-shirts, which it produces to order for major department stores. On 5 March the sales department at MMC received an order from retail company, David Jones, for 5000 glitter Ts. The sales department at MMC forwarded the order to its manufacturing department on 12 March. On receiving the order the manufacturing department placed an order with its supplier of glitter fabric. This fabric was received by the manufacturing department on 28 March but there was no spare capacity on the T-shirt pattern and cutting machines until 5 April, when MMC commenced the

order. This order was completed on 14 April and delivered to the warehouse. The warehouse accumulated this order, with others from David Jones. The MMC delivery, including the glitter Ts, was received by David Jones, on 1 May.

Required:

1 What is the customer response time for the glitter Ts order, in days?

2 Estimate order receipt time, waiting time, production time, production lead (or cycle) time and delivery time for the glitter Ts order.

3 Suggest steps that MMC might take to improve its customer response time.

E15.36 The theory of constraints: manufacturer

Life is simple at the ABC Company. The business produces a single product in a straightforward production process involving machines A, B and C, each run by a separate department. The process begins at machine A, where raw material is converted into a single component. The component passes through machine B where it is converted into the finished product. The completed product passes to machine C where it is tested and packaged. It is then shipped to the customer. The demand for this product is unlimited. Aware of the potential market, the manager of Department B has just begun an efficiency drive to increase the rate of output of his department by 50 per cent.

Required:

Assess the effectiveness of the Department B manager's proposal for each of the following situations. In each case, identify the current rate of output for the company, and the effect of the proposed efficiency drive on this rate; where appropriate, suggest an alternative approach to increase ABC's rate of output.

1 Machine A completes 120 units per hour, machine B completes 70 units per hour, machine C completes 110 units per hour.

2 Machine A completes 120 units per hour, machine B completes 140 units per hour, machine C completes 130 units per hour.

3 Machine A completes 120 units per hour, machine B completes 140 units per hour, machine C completes 100 units per hour.

E15.37 The theory of constraints: fast(?) food outlet

Mick and Donald run a fast food outlet on the road between Hay and Narrandera in New South Wales. This road is one of the main transport corridors between Adelaide and Sydney. For most of the day, Mick and Donald are able to keep up with demand and serve customers quickly. However, from 4 pm to 8 pm, the shop is inundated with truck drivers, most of whom want one of Mick's famous 'hamburgers with the lot'. Queues build, tummies rumble and truck drivers grumble.

Mick decided to solve this problem by setting up a hamburger production line from 4 pm to 8 pm each day. His wife, Minnie, would take over the sales counter. He would cut, toast and butter the bread rolls (he can complete 20 per hour). Donald would cook the meat patties, eggs, bacon and onions (he can complete 40 serves per hour). Donald's wife, Daisy, would chop the lettuce and tomato and place it in a toasted bread roll along with the meat patty, egg, bacon, onion, and, of course sauce (she can complete 25 hamburgers per hour).

The new system was put in place, and the next day, an average of 30 customers per hour ordered 'a hamburger with the lot' between 4 pm and 8 pm.

Required:

1 Draw a diagram similar to that shown in Exhibit 15.7 to identify the number of customers per hour who received their orders.

2 How many customers were unfed by 8 pm?

3 Identify the bottlenecks in Mick's production process and suggest how they might be overcome to meet the customers' requirements.

Problems

P15.38 Key features of activity-based costing and activity-based management: manufacturer

You are the management accountant for Runmoe Springs Ltd, a company that manufactures suspension components for the automotive industry. Currently, costing in the manufacturing area is based on a standard costing system using overhead applied on direct labour hours. Departmental budgets are used to monitor costs in the non-manufacturing areas. The company is contemplating switching to activity-based costing (ABC). The senior managers have just attended a one-day course on ABC, run by a large management consulting firm, but Runmoe's managing director is feeling frustrated.

'It's always the same. We pay a fortune to attend these courses. The consultants pedal their wares, and no matter what the new gimmick is, they tell us that our business is likely to fail without it. They used to talk about using ABC to improve our product costing. Now they talk about using ABM to improve our control. They see activity-based management as a cure for all ills. I don't understand why we need a new costing system or how activity-based costing works.

'Even the terminology has got me beaten. What's the difference between activity-based costing and activity-based management? What are these things called activity attributes, root cause cost drivers, non-value-added activities, activity performance measures and processes? How could I use them to improve control at Runmoe?'

Required:

Write a clear and concise report to Runmoe's managing director, explaining:

1 the potential problems with Runmoe's existing system for control;

2 the key features of the two-dimensional activity-based costing model;

3 the difference between activity-based costing and activity-based management; and

4 how ABM could be used to improve Runmoe's control.

P15.39 Basic elements of a production process; non-value-added activities; business process re-engineering: bakery

Bagels Ltd manufactures a variety of bagels, which are frozen and sold in supermarkets. The production process consists of the following steps:

1 Ingredients, such as flour and raisins, are received and inspected. Then they are stored until needed.

2 Ingredients are carried on handcarts to the mixing room.

3 Dough is mixed in 40-kilogram batches in four heavy-duty mixers.

4 Dough is stored on large boards in the mixing room until a bagel machine is free.

5 A board of dough is carried into the bagel room. The board is tipped and the dough slides into the hopper of a bagel machine. This machine pulls off a small piece of dough, rolls it into a cylindrical shape, and then squeezes it into a doughnut shape. The bagel machines can be adjusted in a setup procedure to accommodate different sizes and styles of bagels. Workers remove the uncooked bagels and place them on a tray, where they are kept until a boiling vat is free.

6 Next, the trays of uncooked bagels are carried into an adjoining room, which houses three 50-litre vats of boiling water. The bagels are boiled for approximately one minute.

7 Bagels are removed from the vats with a long-handled strainer and are placed on a wooden board. The boards full of bagels are carried to the oven room, where they are kept until an oven rack is free. The two ovens each contain eight racks that rotate but remain upright, much like the seats on a Ferris wheel. A rack full of bagels has finished the baking process after one complete revolution in the oven. When a rack full of bagels is removed from the oven, a fresh rack replaces it. The oven door is opened and closed as each rack completes a revolution in the oven.

8 After the bagels are removed from the oven, they are placed in baskets for cooling.

9 While the bagels are cooling, they are inspected. Misshapen bagels are removed and set aside. (Most are eaten by the staff!)

10 After the bagels are cool, the wire baskets are carried to the packaging department. Here the bagels are dumped into the hopper on a bagging machine. This machine packages six bagels in each bag and seals the bag with a twist-tie.

11 Then the packaged bagels are placed in cardboard boxes, each box holding 24 bags. The boxes are placed on a forklift and driven to the freezer, where the bagels are frozen and stored for shipment.

Required:

1 Draw a diagram of the production process for bagels.

2 Identify the non-value-added activities that might be present in the process. Explain each choice.

3 Suggest ways in which the process could be re-engineered.

P15.40 Non-value-added activities; business process re-engineering: manufacturer

Skybolt Corporation manufactures special, heavy bolts used in aircraft. The production process consists of the following operations:

(a) Metal rods are cut to the proper length in a cutting machine.
(b) A heading machine flattens the end of the cut rod to form a head.
(c) A slotting machine cuts a slot in the bolt's head.
(d) The bolt is run through a threading machine, which cuts the bolt's thread.
(e) The bolt is washed to remove metal shavings and other foreign particles.
(f) The bolt is heat-treated, for hardness, in a salt-bath.
(g) The bolt is inspected.
(h) The bolt is wrapped and packaged.

The salt-bath operation is very expensive because of the electricity requirements. Another expensive operation is the central oil filtration system, used to provide oil to all the cutting and threading machines. The oil acts as a lubricant and coolant. After passing through a cutting machine, the oil is pumped back to a central oil filtration station, which filters foreign particles from the oil.

Required:

1 Draw a diagram for the process 'Manufacture bolts'.

2 Identify the non-value-added activities that might be present in Skybolt's plant layout and production process. Explain each choice.

3 Suggest ways in which the process could be re-engineered.

4 Explain the difference between process re-engineering and process improvement.

P15.41 Non-value-added activities; throughput management: manufacturer

Pickwick Paper Company's Mount Gambier plant manufactures paperboard. Its production process involves the following operations:

(a) Harvested trees arrive by rail in the wood-yard and are stored outside.
(b) Logs are moved, by a forklift truck, into the plant where they are passed through a debarker and are cut up into chips.
(c) The chips are stored in large bins near the chipping machines.
(d) The chips are then transported by small trucks to another building and placed in a digester—a large pressure cooker where heat, steam and chemicals convert the chips into moist fibres.
(e) The fibres are stored near the digester.
(f) In the next step, the fibres are loaded by workers onto a conveyor belt, which carries the fibres to a depressurised blow-tank. This operation separates the fibres.
(g) The separated fibres are placed on wooden pallets and are stored next to the blow-tank.
(h) Forklifts are used to carry the separated fibres to the refining area, where the fibres are washed, refined and treated with chemicals and caustic substances until they become pulp.
(i) The wood pulp then enters the paper machines through a headbox, which distributes pulp evenly across a porous belt of forming fabric.
(j) Water is removed from the pulp by passing it over a wire screen.
(k) Additional water is removed from the pulp in a series of presses.
(l) Dryers then remove any remaining water from the pulp.
(m) The thin, dry sheets of pulp are then smoothed and polished by large rollers called 'calenders'.
(n) The paperboard is wound into large rolls, and workers place the rolls on wooden pallets.
(o) Forklifts are used to move the rolls of paperboard to the labelling building.
(p) There, the rolls are labelled and stored for shipment.
(q) The rolls of paperboard are shipped to customers from the loading dock in the labelling building.

The partially-processed product is sometimes stored between production operations for two to three days. This delay can be caused either by a faster production rate in the earlier processes than in the later processes, or by breakdowns in the production machinery.

Required:

1 Identify the non-value-added activities that might be present in Pickwick Paper's plant layout and production process. Explain each choice.

2 What criteria did you use to assess whether an activity was valued-added or non-value-added?

3 Explain why the theory of constraints appears to be relevant to managing costs at Pickwick Paper. Besides costs, what other aspects of performance could be improved with better throughput management?

P15.42 Business process re-engineering; throughput management; time-based management: manufacturer

Refer to the data for Pickwick Paper Company in Problem 15.40.

Required:

1 Draw a diagram of the current production process.

2 Suggest ways in which the process could be re-engineered.

3 Select some specific time-based performance measures that could be used by Pickwick Paper. How might these benefit the company?

4 Throughput management has been criticised for its short-term perspective. Does your re-engineered process reflect a short-term perspective or a strategic perspective? Explain your answer.

P15.43 Non-value-added costs; root cause cost drivers; activity-based performance measures: manufacturer

Kiefer Autoworks Company manufactures a variety of small parts for the automotive industry. The company's manufacturing overhead cost budget for 2003 is as follows:

Supervision	$192 000
Machine maintenance: labour	78 000
Machine maintenance: materials	20 000
Electrical power	50 000
Natural gas (for heating)	30 000
Factory supplies	40 000
Setup labour	30 000
Lubricants	10 000
Property taxes	25 000
Insurance	35 000
Depreciation on manufacturing equipment	105 000
Depreciation of trucks and forklifts	70 000
Depreciation on material conveyors	15 000
Building depreciation	160 000
Grinding wheels	5 000
Drill bits	2 000
Purchasing	80 000
Waste collection	4 000
Security staff wages	40 000
Telephone service	5 000
Engineering design	70 000
Inspection of raw materials	20 000
Receiving	20 000
Inspection of finished goods	30 000
Packaging	60 000
Shipping	30 000
Wages of parts clerks (find parts for production departments)	60 000
Wages of material handlers	70 000
Fuel for trucks and forklifts	30 000
Depreciation on raw materials warehouse	50 000
Depreciation on finished goods warehouse	60 000
Total budgeted manufacturing overhead	**$1 496 000**

The budgeted amount of direct labour in 2003 is 20 000 hours.

Required:

1 Which of the overhead costs are candidates for elimination as non-value-added costs?

2 Suggest four non-value-added activities that are likely to occur in this company, and identify two possible root cause cost drivers for each one.

3 Suggest four value-added activities and recommend two possible performance measures for each one.

4 How could Kiefer's management use activity-based management to help reduce or eliminate some of the overhead costs? Be specific.

P15.44 Break-even time

Zambang Ltd manufactures toys and games. The table below shows the costs and revenues of a toy called Dragon Mouth, which is a plastic monster that swallows and regurgitates miniature animals, over the first five years of its life.

	Year				
	2001	**2002**	**2003**	**2004**	**2005**
Revenue	$0	$200 000	$350 000	$450 000	$300 000
Costs:					
Product planning and concept design	20 000				
Design and development	80 000	80 000			
Production		110 000	200 000	260 000	180 000
Distribution and customer service	—	50 000	70 000	90 000	60 000
Profit (Loss)	**$(100 000)**	**$(40 000)**	**$80 000**	**$100 000**	**$60 000**

Required:

1 What is the break-even time (BET) for Dragon Mouth?

2 How can Zambang's management use the BET to better manage the business?

3 What problems may be encountered when BET is used to monitor new product development?

4 Why is the time taken to develop new products an important consideration in Zambang Ltd? Is it an important consideration in all companies? Explain your answer.

P15.45 The theory of constraints; business process re-engineering: service organisation

In a recent state government budget, the Motor Registration and Licensing Office suffered substantial cutbacks. As a result, each department has been asked to submit a cost budget for the coming year that is 10 per cent lower than the costs for the current year.

The Licensing Department, which employed 50 people, issues driver's licences to qualified applicants. On average the department processes 250 licences per hour. To achieve the required cost saving, the branch manager has decided to re-engineer the process. The proposed process will consist of five consecutive activities and require a staff of 45 people:

- Area A would have a staff of five people and be responsible for receiving each application and checking that it is complete. They could process 250 applicants per hour.
- Area B would have a staff of eight people who confirm that the applicant is qualified to drive. They could process 350 applicants per hour.
- Area C would have a staff of 10 people who take the applicant's photo. They could process 150 applicants per hour.
- Area D would have a staff of 17 people, who complete the licence card, by adding the photo and a driver's licence number to the card. They could process 140 applicants per hour.
- Area E would have a staff of five people who issued the licence to the applicant and processed their payment. They could process 280 applicants per hour.

Required:

1. How many driver's licence applicants would be processed per hour using the re-engineered process?
2. Identify the bottlenecks that would have to be removed to reach the current level of output.
3. Make recommendations on the number of staff that are required for each area in order to achieve the current level of output. Remember that to achieve the required cost savings, the maximum staff size is 45.

P15.46 Life cycle costing; time-based management: manufacturer

Elton Electronics Ltd produces speakers for high-fidelity sound systems. Because of the rapid rate of technological innovation in the hi-fi market, most of the company's products have short life cycles. The marketing manager, Jean Wills, believes that new product introductions are the key to Elton's success. However, the managing director, Joseph Iacopetta, is concerned that the frequent changes in product lines are eroding the company's profitability. He believes that many of the new products have such short life cycles that they never fully recover their costs. He asks the management accountant, Stan Willox, to help him.

Willox decides to review the profitability of the Easy Ear Speaker System (EESS), which has just been phased out after only three years on the market. First, Willox prepares a conventional analysis of the profitability of the EESS:

	Year 1	Year 2	Year 3
Sales revenue	$50 000	$95 000	$35 000
Less Cost of goods sold:			
Direct materials	10 000	19 000	7 000
Direct labour	5 000	9 500	3 500
Applied manufacturing overhead	7 500	14 250	5 250

* The company uses a JIT system, which means that inventories are minimal and all manufacturing costs flow directly to cost of goods sold.

In addition to these manufacturing costs, Willox is able to isolate the following costs associated with the EESS:

	Year 0	Year 1	Year 2	Year 3
Research and development	17 000			
Product design	10 000			
Process design	15 000	5 000	3 000	
Tooling costs	20 000			
Marketing costs	8 000	12 000	6 000	8 000
Warranty claims		10 000	4 000	1 000
After-sales service		3 000	5 500	2 000

Required:

1. Assess the profitability of the EESS in years 1, 2 and 3, using the conventional approach, which includes manufacturing costs only.
2. Assess the profitability of the EESS based on its life cycle costs.
3. Given this information, what action should Iacopetta take when considering future products?

4 Discuss the advantages and disadvantages of developing life cycle budgets for proposed new products.

5 Estimate the break-even time for the EESS.

6 What other performance measures might the company introduce to manage its new product development more effectively?

P15.46 Life cycle budgeting; life cycle management; target costing: manufacturer

The marketing department of Bream Hot Water Ltd has recommended that the company introduce a new solar hot water system, to be called the Sunstruck. To compete effectively with existing models offered by other companies, the Sunstruck would need to be priced at $800. The company requires a target profit margin on sales for all new products of at least 30 per cent of sales. The technology in solar energy is developing rapidly, and therefore the Sunstruck is expected to be obsolete within three years of entering the market. Initial estimates of the Sunstruck's cost of manufacture per unit are:

Direct material	$250
Direct labour	125
Manufacturing overhead*	125
	$500

* Manufacturing overhead is applied at 100 per cent of direct labour cost.

The Marketing Department is keen to introduce the Sunstruck as soon as possible. However, the management accountant is concerned about the non-manufacturing costs likely to be associated with the new product. He asks the departments that are upstream and downstream of manufacturing to estimate the costs in their departments associated with the development, production and sale of the Sunstruck. He receives the following information:

Estimated Costs Associated with the Proposed Sunstruck (in $'000s)

Department	2001	2002	2003	2004	2005
Research and Development	1500				
Product and Process Design	3000	700			
Marketing	1000	800	500	400	
Customer Support		250	800	750	200

The forecast sales of the Sunstruck are as follows:

2002	10 000 units
2003	15 000 units
2004	5 000 units

Required:

1 Calculate the allowable cost for the Sunstruck that will meet the target selling price of $800 and the target profit margin of 30 per cent on sales. Compare this with the estimated manufacturing cost. On this basis, would you recommend the development and introduction of the Sunstruck model?

2 Sunstruck considers the allowable cost is unachievable given its capabilities. Describe how the company could establish a product-level target cost that it considers achievable.

3 Prepare a life cycle budget for the Sunstruck that covers each year from 2001 to 2005.

4 What is the estimated average unit cost of the Sunstruck over its entire life cycle? On this basis, would you recommend the development and introduction of the Sunstruck model?

5 Explain how Bream could use life cycle management to reduce the manufacturing cost of the Sunstruck solar hot water system. Which part of the value chain may warrant additional expenditure? Explain.

Cases

C15.48 Activity-based costing; activity-based management; non-value-added costs; target costing: manufacturer

Schmidtke's Meat Pty Ltd manufactures smoked meat products in the Barossa Valley, using processes that have been handed down from one generation of Schmidtkes to the next. Recently, one of the company's major high-volume-selling products, mettwurst, has come under intense pressure from an Adelaide manufacturer that uses modern manufacturing processes. Schmidtke's mettwurst sells for $7 per 500-gram stick, based on a cost-plus pricing system. (The company applies manufacturing overhead using a plantwide overhead rate based on the number of direct labour hours worked. Prices are based on absorption cost plus a 40 per cent mark-up.) The Adelaide competitor sells its mettwurst for $4.90 per 500-gram stick. The owner and manager of Schmidtke's, Hans Schmidtke, is not particularly worried about the problem, but his wife Freida, the marketing manager, is concerned.

Freida: Hans, you are putting your head in the sand. The Adelaide mettwurst has the potential to destroy our business. All our years of work will be lost. By the time our children, Wolfgang and Heidi, finish university there will be no more Schmidtke's Meat! Where will they work?

Hans: Freida, stop worrying. The Adelaide mettwurst will disappear from the market after a while. There is no way they can be making a profit at that price. Just think about it. They're located in the city where the rates and taxes are very high. They've got all that fancy new machinery to pay for. They're playing games, trying to get a share of our market. To survive in the longer term, they'll have to increase their price. Anyway, they don't have a recipe like ours that has been in the family for years. And they don't have our reputation for quality.

Heidi: Dad, I'm not sure you're right. You should taste this Adelaide mettwurst. There's no problem with their recipe or their quality. The customers know this already and that's why our mettwurst sales are down. At the university, we've been learning about a new costing system, called 'activity-based costing'. I'd like to use it to work out what our problem is.

Hans: I've told you, I've told your mother, we don't have a problem, or we won't in the longer term. In the meantime, if you want to waste your vacation playing around with a new costing system that we don't need, go right ahead!

Heidi developed an activity-based costing system and identified the following bill of activities for the production of mettwurst:

Mettwurst: Bill of Activities Annual volume: 5000 sticks Batch size: 250 sticks			
Activity	**Quantity of activity driver used**	**Cost per unit activity driver**	**Annual cost**
Inspect meat	20 inspections	$15/inspection	$300
Dispose of substandard meat	500 kilograms	$1/kilogram	500
Move to mincing room	60 barrow-loads	$8/barrow	480
Load mincer*	40 loads	$27/load	1 080
Operate mincer	3000 kilograms	$0.50/kilogram	1 500
Unload mincer*	40 loads	$21/load	840
Move to mixing room	40 barrow-loads	$9/barrow	360
Load mixer*	60 loads	$20/load	1 200
Operate mixer	60 loads	$40/load	2 400
Unload mixer*	60 loads	$16/load	960
Move to packing room	60 barrow-loads	$5/barrow	300
Pack meat into skins	5000 skins	$0.50/skin	2 500
Move to smokehouse	100 trolley-loads	$4/trolley	400
Move to truck	100 trolley-loads	$5/trolley	500
Annual cost of all direct labour and manufacturing overhead activities			**$13 320**
Activity cost per unit			$2.664
Direct material cost per unit			1.336
Cost per unit			**$4.00**

* These activities have to be performed more than once per batch because of the limited capacity per machine.

Required:

1. Suggest some reasons why the Adelaide company may be able to sell its mettwurst at $4.90 over the longer term.
2. Calculate the cost per stick of mettwurst under the existing absorption costing system.
3. Hans is convinced that Heidi's activity-based cost for the mettwurst is wrong. Identify the likely causes of the difference between the absorption cost and the activity-based cost per unit and explain to Hans why the absorption cost is likely to be wrong. (*Hint:* If you have problems with this you should revisit Chapter 8.)
4. What target cost would Schmidtke's have to set for its mettwurst if it wished to match the Adelaide price and maintain its existing mark-up?
5. Review the activities included in the bill of activities and identify any candidates for elimination as non-value-added activities. For each activity, explain why you consider it to be non-value-added.
6. Suggest possible root cause cost drivers for each of the non-value-added activities.
7. Does Schmidtke's need business process re-engineering or process improvement to eliminate its non-value-added activities? Explain.
8. Assume that by the next year of operations, the company has been able to reduce the cost of the following non-value-added activities by 30 per cent:
   - Inspect meat
   - Dispose of substandard meat
   - Move to mincing room

- Load mincer
- Unload mincer
- Move to mixing room
- Load mixer
- Unload mixer
- Move to packing room
- Move to smokehouse
- Move to truck

What will be the activity-based cost per unit (including direct material)?

9 Assuming the activity-based cost calculated in requirement 8, will the company be able to add its 40 per cent mark-up and compete effectively with the Adelaide mettwurst? If not, what would you recommend?

C15.49 Conventional approaches to control; activity-based management; performance measures: manufacturer

Refer to the data for Schmidtke's Meat Pty Ltd in Case 15.48.

Schmidtke's Meat Pty Ltd has a conventional approach to planning and control. The company is divided into three departments: Manufacturing, Marketing and Administration. Each month, Hans Schmidtke checks a report which compares actual costs for the departments with budgeted costs. The budgeted costs are based on the costs for the previous year, adjusted for any major changes planned for the coming year. He also looks at actual versus budgeted revenue for the Marketing Department. When his father was running the business, he was able to 'keep his finger on the pulse' without any formal performance reports. Even in those days, the business had a reputation for fine quality and reliable delivery performance. However, the company has grown since then, and the existing approach to planning and control simply evolved.

In her first year at university, Hans's daughter, Heidi, learned about standard costing. She extolled the virtues of the standard costing variances and the principles of management by exception, and advised Hans to update his planning and control system. If he did not, she warned that he would never have effective control of his costs and Schmidtke's Meat would eventually fall to its competitors. Hans discussed Heidi's ideas with his long-time accountant, Otto Werner, but they decided it would involve a lot of effort setting standards for each of the company's products. The business seemed to be reasonably profitable and costs appeared to be under control.

In her second year at university, Heidi learned about activity-based costing and activity-based management. At about this time, the company experienced problems with sales of its mettwurst, described in the preceding case, and Heidi spent her summer vacation implementing an activity-based costing system. Initially, she used the system to cost products, but she also used the activity management dimension to identify and reduce the non-value-added activities associated with the production of mettwurst. But she was still not completely happy with the company's information for planning and control. She had identified non-value-added activities but she wanted to be sure that these were being eliminated as planned. Also, she wanted information to manage other critical aspects of performance, for each activity, on an ongoing basis.

Hans was not convinced. Only a year ago Heidi was insisting that he throw out the existing system and implement standard costing. Now she was brutal in her condemnation of standard costing and was insisting on masses of activity-based information. 'Ah!' he said to himself, 'The impetuosity of youth knows no bounds but nor does it understand that conservatism is the essence of good business.'

Required:

1. Identify the major weaknesses of the existing approach to planning and control at Schmidtke's Meat Pty Ltd.
2. If Hans had implemented a standard costing system, would it have given him a sound basis for planning and control? Explain your answer. (You may find it useful to revisit Chapters 10 and 11 to help answer this question.)
3. What aspects of performance do you think that Heidi would like to monitor at Schmidtke's Meat? Explain.
4. How could these requirements be met through activity-based management?
5. Identify a root cause cost driver for the activity 'Dispose of substandard meat' and use the process (i.e. supplier, customer) perspective to suggest a suitable performance measure for the preceding activity 'Inspect meat'.
6. When Hans hears that Heidi wants to measure several aspects of performance, for each activity, he is horrified. 'We will spend all our time measuring rather than making mettwurst!' How could Heidi's approach be simplified?
7. (*Only attempt this question if you have completed Chapter 14.*) How does Heidi's proposal differ from the balanced scorecard approach to performance measurement described in Chapter 14?