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INTRODUCTION TO MANAGEMENT ACCOUNTING

LEARNING OBJECTIVES After studying this chapter, you should be able to:

- distinguish between management accounting and financial accounting;
- identify and describe the elements involved in the decision-making, planning and control process;
- justify the view that a major objective of commercial organizations is to broadly seek to maximize future profits;
- explain the important changes that have taken place in the business environment that have influenced management accounting practice;
- outline and describe the key success factors that directly affect customer satisfaction;
- identify and describe the functions of a cost and management accounting system.

There are many definitions of accounting, but the one that captures the theme of this book is the definition formulated by the American Accounting Association. It describes accounting as:

the process of identifying, measuring and communicating economic information to permit informed judgements and decisions by users of the information.

In other words, accounting is concerned with providing both financial and non-financial information that will help decision-makers to make good decisions. In order to understand accounting, you need to know something about the decision-making process, and also to be aware of the various users of accounting information.

During the past two decades many organizations in both the manufacturing and service sectors have faced dramatic changes in their business environment. Deregulation and extensive competition from overseas companies in domestic markets have resulted in a situation in which most companies now operate in a highly competitive global market. At the same time there has been a significant reduction in product life cycles arising from technological innovations and the need to meet increasingly discriminating customer demands. To succeed in today's highly competitive environment, companies have made customer satisfaction an overriding priority. They have also adopted new management approaches and manufacturing companies have changed their manufacturing systems and invested in new technologies. These changes have had a significant influence on management accounting systems.

The aim of this first chapter is to give you the background knowledge that will enable you to achieve a more meaningful insight into the issues and problems of cost and management accounting that are discussed in the book. We begin by looking at the users of accounting information and identifying their requirements. This is followed by a description of the decision-making, planning and control process and the changing business environment. Finally, the different functions of management accounting are described.

THE USERS OF ACCOUNTING INFORMATION

Accounting is a language that communicates economic information to various parties (known as **stakeholders**) who have an interest in the organization. Stakeholders fall into several groups (e.g. managers, shareholders and potential investors, employees, creditors and the government) and each of these groups has its own requirements for information:

- Managers require information that will assist them in their decision-making and control activities; for example, information is needed on the estimated selling prices, costs, demand, competitive position and profitability of various products/services that are provided by the organization.
- Shareholders require information on the value of their investment and the income that is derived from their shareholding.
- Employees require information on the ability of the firm to meet wage demands and avoid redundancies.
- Creditors and the providers of loan capital require information on a firm's ability to meet its financial obligations.
- Government agencies such as the Central Statistical Office collect accounting information and require such information as the details of sales activity, profits, investments, stocks (i.e. inventories), dividends paid, the proportion of profits absorbed by taxation and so on. In addition, government taxation authorities require information on the amount of profits that are subject to taxation. All this information is important for determining policies to manage the economy.

The need to provide accounting information is not confined to business organizations. Individuals sometimes have to provide information about their own financial situation; for example, if you want to obtain a mortgage or a personal loan, you may be asked for details of your private financial affairs. Non-profit-making organizations such as churches, charitable organizations, clubs and government units such as local authorities, also require accounting information for decision-making, and for reporting the results of their activities. For example, a tennis club will require information on the cost of undertaking its various activities so that a decision can be made as to the amount of the annual subscription that it will charge to its members. Similarly, municipal authorities, such as local government and public sector organizations, need information on the costs of undertaking specific activities so that decisions can be made as to which activities will be undertaken and the resources that must be raised to finance them.

As you can see, there are many different users of accounting information who require information for decision-making. The objective of accounting is to provide sufficient information to meet the needs of the various users at the lowest possible cost. Obviously, the benefit derived from using an information system for decision-making must be greater than the cost of operating the system.

The users of accounting information can be divided into two categories:

- 1 internal users within the organization;
- 2 external users such as shareholders, creditors and regulatory agencies, outside the organization.

It is possible to distinguish between two branches of accounting, which reflect the internal and external users of accounting information. **Management accounting** is concerned with the provision of information to people within the organization to help them make better decisions and improve the efficiency and effectiveness of existing operations, whereas **financial accounting** is concerned with the provision

of information to external parties outside the organization. Thus, management accounting could be called internal reporting and financial accounting could be called external reporting. This book concentrates on management accounting.

DIFFERENCES BETWEEN MANAGEMENT ACCOUNTING AND FINANCIAL ACCOUNTING

The major differences between these two branches of accounting are:

- *Legal requirements.* There is a statutory requirement for public limited companies to produce annual financial accounts, regardless of whether or not management regards this information as useful. Management accounting, by contrast, is entirely optional and information should be produced only if it is considered that the benefits it offers management exceed the cost of collecting it.
- *Focus on individual parts or segments of the business.* Financial accounting reports describe the whole of the business, whereas management accounting focuses on small parts of the organization; for example, the cost and profitability of products, services, departments, customers and activities.
- *Generally accepted accounting principles.* Financial accounting statements must be prepared to conform with the legal requirements and the generally accepted accounting principles established by the regulatory bodies such as the Financial Accounting Standards Board (FASB) in the USA, the Financial Reporting Council (FRC) in the UK and the International Accounting Standards Board (IASB). These requirements are essential to ensure uniformity and consistency, which make intercompany and historical comparisons possible. Financial accounting data should be verifiable and objective. In contrast, management accountants are not required to adhere to generally accepted accounting principles when providing managerial information for internal purposes. Instead, the focus is on the serving management's needs and providing information that is useful to managers when they are carrying out their decision-making, planning and control functions.
- *Time dimension.* Financial accounting reports what has happened in the past in an organization, whereas management accounting is concerned with *future* information as well as past information. Decisions are concerned with *future* events and management, therefore, requires details of expected *future* costs and revenues.
- *Report frequency and less emphasis on precision.* A detailed set of financial accounts is published annually and less detailed accounts are published semi-annually. Management usually requires information more quickly than this if it is to act on it. Managers are often more concerned with timeliness rather than precision. They prefer a good estimate now rather than a precise answer much later. Consequently, management accounting reports on various activities may be prepared at daily, weekly or monthly intervals.

THE DECISION-MAKING, PLANNING AND CONTROL PROCESS

Information produced by management accountants must be judged in the light of its ultimate effect on the outcome of decisions. It is therefore important to have an understanding of the *decision-making, planning and control process*. Figure 1.1 presents a diagram of the decision-making, planning and control process. The first four stages represent the decision-making or planning process. The final two stages represent the **control process**, which is the process of measuring and correcting actual performance to ensure the alternatives that are chosen and the plans for implementing them are carried out. We will now examine the stages in more detail.

REAL WORLD VIEWS 1.1

Chartered Institute of Management Accountants (CIMA) – activities and skills

What is management accounting?

Management accounting combines accounting, finance and management with the leading edge techniques needed to drive successful businesses. Chartered management accountants:

- Advise managers about the financial implications of projects.
- Explain the financial consequences of business decisions.
- Formulate business strategy.
- Monitor spending and financial control.
- Conduct internal business audits.
- Explain the impact of the competitive landscape.
- Bring a high level of professionalism and integrity to business.

Management accounting skillset

Our members are qualified to work across an organization, not just in finance. In addition to strong

accounting fundamentals, CIMA teaches strategic business and management skills:

- Analysis – they analyse information and using it to make business decisions.
- Strategy – they formulate business strategy to create wealth and shareholder value.
- Risk – they identify and manage risk.
- Planning – they apply accounting techniques to plan and budget.
- Communication – they determine what information management needs and explain the numbers to non-financial managers.

Question

- 1 Provide more detailed illustrations for each of the first four items in the first category of the above list of how the management accountant can be of assistance in an organization with which you are familiar.

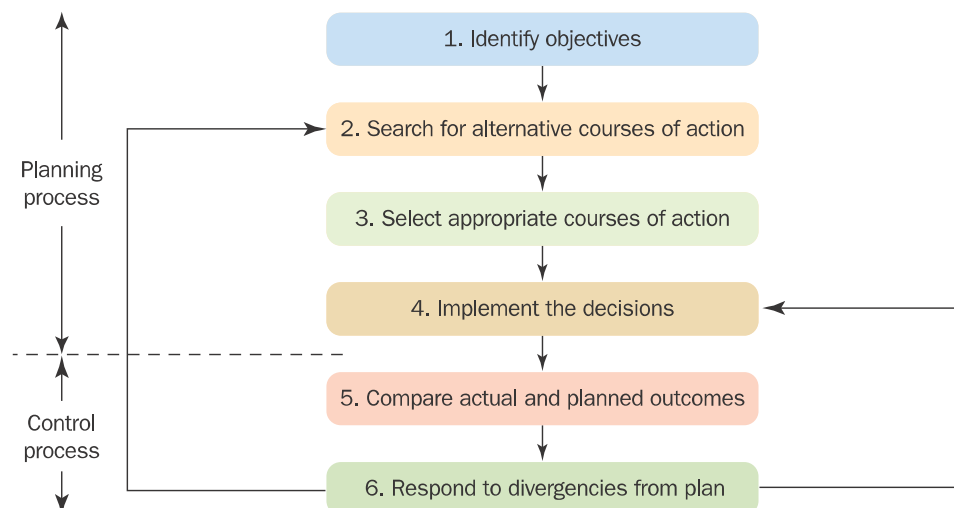
Reference

Extracted from the website of Chartered Institute of Management Accountants (www.cimaglobal.com/About-us/What-is-management-accounting/)

Identifying objectives

Before good decisions can be made there must be some guiding aim or direction that will enable the decision-makers to assess the desirability of choosing one course of action over another. Hence, the first stage in the decision-making process should be to specify the company's goals or organizational objectives.

FIGURE 1.1
The decision-making, planning and control process



This is an area in which there is considerable controversy. Economic theory normally assumes that firms seek to maximize profits for the owners of the firm or, more precisely, the maximization of shareholders' wealth, which, we as shall see in Chapter 13, is equivalent to the maximization of the present value of future cash flows. Various arguments have been used to support the profit maximization objective. There is the legal argument that the ordinary shareholders are the owners of the firm, which therefore should be run for their benefit by trustee managers. Another argument supporting the profit objective is that profit maximization leads to the maximization of overall economic welfare. That is, by doing the best for yourself, you are unconsciously doing the best for society. Moreover, it seems a reasonable belief that the interests of firms will be better served by a larger profit than by a smaller profit, so that maximization is at least a useful approximation. Some writers (e.g. Simon, 1959) believe that many managers are content to find a plan that provides satisfactory profits rather than to maximize profits.

Cyert and March (1969) have argued that the firm is a coalition of various different groups – shareholders, employees, customers, suppliers and the government – each of whom must be paid a minimum to participate in the coalition. Any excess benefits after meeting these minimum constraints are seen as being the object of bargaining between the various groups. In addition, a firm is subject to constraints of a societal nature. Maintaining a clean environment, employing disabled workers and providing social and recreation facilities are all examples of social goals that a firm may pursue.

Clearly it is too simplistic to say that the only objective of a business firm is to maximize profits. Some managers seek to establish a power base and build an empire. Another common goal is security, and the removal of uncertainty regarding the future may override the pure profit motive. Organizations may also pursue more specific objectives, such as producing high-quality products or being the market leader within a particular market segment. Nevertheless, the view adopted in this book is that, *broadly*, firms seek to maximize future profits. There are three reasons for us to concentrate on this objective:

- 1 It is unlikely that any other objective is as widely applicable in measuring the ability of the organization to survive in the future.
- 2 It is unlikely that maximizing future profits can be realized in practice, but by establishing the principles necessary to achieve this objective you will learn how to increase profits.
- 3 It enables shareholders as a group in the bargaining coalition to know how much the pursuit of other goals is costing them by indicating the amount of cash distributed among the members of the coalition.

The search for alternative courses of action

The second stage in the decision-making model is a search for a range of possible courses of action (or **strategies**) that might enable the objectives to be achieved. If the management of a company concentrates entirely on its present product range and markets, and market shares and profits are allowed to decline, there is a danger that the company will be unable to survive in the future. If the business is to survive, management must identify potential opportunities and threats in the current environment and take specific steps now so that the organization will not be taken by surprise by future developments. In particular, the company should consider one or more of the following courses of action:

- 1 developing *new* products for sale in *existing* markets;
- 2 developing *new* products for *new* markets;
- 3 developing *new* markets for *existing* products.

The search for alternative courses of action involves the acquisition of information concerning future opportunities and environments; it is the most difficult and important stage of the decision-making process. We shall examine this search process in more detail in Chapter 15.

Select appropriate alternative courses of action

In order for managers to make an informed choice of action, data about the different alternatives must be gathered. For example, managers might ask to see projected figures on:

- the potential growth rates of the alternative activities under consideration;
- the market share the company is likely to achieve;
- projected profits for each alternative activity.

The alternatives should be evaluated to identify which course of action best satisfies the objectives of an organization. The selection of the most advantageous alternative is central to the whole decision-making process and the provision of information that facilitates this choice is one of the major functions of management accounting. These aspects of management accounting are examined in Chapters 8 to 14.

Implementation of the decisions

Once the course of action has been selected, it should be implemented as part of the budgeting and long-term planning process. The **budget** is a financial plan for implementing the decisions that management has made. The budgets for all of the various decisions a company takes are expressed in terms of cash inflows and outflows, and sales revenues and expenses. These budgets are initially prepared at the departmental/responsibility centre level (i.e. a unit or department within an organization where a manager is held responsible for performance) and merged together into a single unifying statement for the organization as a whole that specifies the organization's expectations for future periods. This statement is known as a **master budget** and consists of budgeted profit and cash flow statements. The budgeting process communicates to everyone in the organization the part that they are expected to play in implementing management's decisions. We shall examine the budgeting process in Chapter 15.

Comparing actual and planned outcomes and responding to divergencies from plan

The final stages in the process outlined in Figure 1.1 involve comparing actual and planned outcomes and responding to divergencies from plan. The managerial function of **control** consists of the measurement, reporting and subsequent correction of performance in an attempt to ensure that the firm's objectives and plans are achieved.

To monitor performance, the accountant produces **performance reports** and presents them to the managers who are responsible for implementing the various decisions. These reports compare actual outcomes (actual costs and revenues) with planned outcomes (budgeted costs and revenues) and should be issued at regular intervals. Performance reports provide feedback information and should highlight those activities that do not conform to plans, so that managers can devote their limited time to focusing mainly on these items. This process represents the application of **management by exception**. Effective control requires that corrective action is taken so that actual outcomes conform to planned outcomes. Alternatively, the plans may require modification if the comparisons indicate that the plans are no longer attainable.

The process of taking corrective action or modifying the plans if the comparisons indicate that actual outcomes do not conform to planned outcomes is indicated by the arrowed lines in Figure 1.1 linking stages 6 and 4 and 6 and 2. These arrowed lines represent 'feedback loops'. They signify that the process is dynamic and stress the interdependencies between the various stages in the process. The feedback loop between stages 6 and 2 indicates that the plans should be regularly reviewed, and if they are no longer attainable then alternative courses of action must be considered for achieving the organization's objectives. The second loop stresses the corrective action taken so that actual outcomes conform to planned outcomes. Chapters 15 to 18 focus on the planning and control process.

THE IMPACT OF THE CHANGING BUSINESS ENVIRONMENT ON MANAGEMENT ACCOUNTING

During the last few decades, global competition, deregulation, declines in product life cycles, advances in manufacturing and information technologies, environmental issues and a competitive environment requiring companies to become more customer driven, have changed the nature of the business environment. These changes have significantly altered the ways in which firms operate, which in turn, have resulted in changes in management accounting practices.

Global competition

During the last few decades reductions in tariffs and duties on imports and exports, and dramatic improvements in transportation and communication systems, have resulted in many firms operating in a global market. Prior to this, many organizations operated in a protected competitive environment. Barriers of communication and geographical distance, and sometimes protected markets, limited the ability of overseas companies to compete in domestic markets. There was little incentive for firms to maximize efficiency and improve management practices, or to minimize costs, as cost increases could often be passed on to customers. During the 1990s, however, organizations began to encounter severe competition from overseas competitors who offered high-quality products at low prices. Manufacturing companies can now establish global networks for acquiring raw materials and distributing goods overseas, and service organizations can communicate with overseas offices instantaneously using internet and digital technologies. These changes have enabled competitors to gain access to domestic markets throughout the world. Nowadays, organizations have to compete against the best companies in the world. This new competitive environment has increased the demand for information relating to quality and customer satisfaction and cost information relating to cost management and profitability analysis by product/service lines and geographical locations.

Changing product life cycles

A **product's life cycle** is the period of time from initial expenditure on research and development to the time at which support to customers is withdrawn. Intensive global competition and technological

REAL WORLD VIEWS 1.2

The internet of things – new products and services

The internet of things (IoT) refers to an ever-growing network of physical objects which are connected to the internet. This includes household devices and many business and industrial applications. The IoT has given way to a vast array of new products and services. Take for example fill-level sensors developed by smartbin™. These products can be placed inside industrial bins and send data on the fill level and bin location back to the waste collection firm via an internet connection.

The sensors also allow the waste collection firm to optimize the waste collection routes.

Question

- 1 Can you think of any barriers to entry for a business entering the market for IoT sensors or similar?

Reference

www.smartbin.com/solutions/iot-level-sensors/



innovation, combined with increasingly discriminating and sophisticated customer demands, have resulted in a dramatic decline in product life cycles. To be successful companies must now speed up the rate at which they introduce new products to the market and constantly develop new products and services. Being later to the market than the competitors can have a dramatic effect on product profitability.

In many industries a large fraction of a product's life cycle costs are determined by decisions made early in its life cycle. This has created a need for management accounting to place greater emphasis on providing information at the design stage because many of the costs are committed or locked in at this time. Therefore, to compete successfully, companies must be able to manage their costs effectively at the design stage, have the capability to adapt to new, different and changing customer requirements and reduce the time to market of new and modified products.

Advances in manufacturing technologies

Excellence in manufacturing can provide a competitive weapon to compete in sophisticated worldwide markets. In order to compete effectively, companies must be capable of manufacturing innovative products of high quality at a low cost, and also provide a first-class customer service. At the same time, they must have the flexibility to cope with short product life cycles, demands for greater product variety from more discriminating customers and increasing international competition. World-class manufacturing companies have responded to these competitive demands by replacing traditional production systems with **lean manufacturing systems** that seek to reduce waste by implementing just-in-time (JIT) production systems, focusing on quality, simplifying processes and investing in advanced manufacturing technologies (AMTs). The major features of these new systems and their implications for management accounting will be described throughout the book.

The impact of information technology

During the past two decades the use of information technology (IT) to support business activities has increased dramatically and the development of electronic business communication technologies known as **e-business**, **e-commerce** or **internet commerce** have had a major impact. For example, consumers are more discerning in their purchases because they can access the internet to compare the relative merits of different products and services. Internet trading also allows buyers and sellers to undertake transactions from diverse locations in different parts of the world. E-commerce (such as bar coding) has allowed considerable cost savings to be made by streamlining business processes and has generated extra revenues from the adept use of online sales facilities (such as ticketless airline bookings and internet banking). The proficient use of e-commerce has given many companies a competitive advantage.

The developments in IT have had a significant impact on the work of management accountants. They have substantially reduced information gathering and the processing of information. Instead of managers asking management accountants for information, they can access the system on their personal computers to derive the information they require directly and do their own analyses. This has freed accountants to adopt the role of advisers and internal consultants to the business. Management accountants have now become more involved in interpreting the information generated from the accounting system and providing business support for managers.

Environmental and sustainability issues

Increasing attention is now being given to making companies accountable for ethical, social and environmental issues and the need for organizations to be managed in a sustainable way. There is now a general recognition that environmental resources are limited and should be preserved for future generations.

Customers are no longer satisfied if companies simply comply with the legal requirements of undertaking their activities. They expect company managers to be more proactive in terms of their social responsibility, safety and environmental issues. Environmental management accounting is becoming increasingly

REAL WORLD VIEWS 1.3

Changing product life cycles – consumer medical sciences

Medical devices are normally associated with use by hospitals and medical practices. Some devices are used by normal consumers and, according to an article on the Medical Device and Diagnostic Industry website (www.mddionline.com), are proliferating. The market for devices such as insulin pumps and blood pressure monitors has become more consumer-driven and is putting pressure on manufacturers to design better products and get them to the market faster.

According to the article, ‘patients want their medical devices to have the same kind of design and appeals as iPods’. This convergence of medical and mass consumer electronics is creating many challenges for medical device manufacturers. These challenges include widely divergent product life cycles, varying scenarios of use and safety, and efficacy concerns. The typical life cycle of a consumer device is likely to be measured more in months than years. Compare this to the long approval cycles of drug and medical device regulatory authorities – which, according to the article, can be anything from 27 to 36 months in the USA depending on the type of medical device. During this timeframe, an iPod/iPad has probably gone through at least two generations, and smart devices are now the norm. It may be that medical

devices will never get as savvy as a consumer iPad due to regulatory concerns and device efficacy. However, increasing consumer-driven requirements are likely to shorten the product life cycle over coming years as devices move further towards personal smart devices. As of April 2016, for example, a *Financial Times* article notes there are more than 165 000 health and fitness apps available at the Apple App Store. While Apple’s devices are not medical devices they do pose a competitive threat.

Questions

- 1 Do you think the costs of the electronic components in a smart device such as an iPod/iPad are more or less than those in a medical device like a blood pressure monitor?
- 2 Would decreasing the product life cycle of medical devices, or medical devices being more like consumer electronics, pose any risks for manufacturers?

References

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- Financial Times* (2016) Healthcare apps battle to be taken seriously. Available at www.ft.com/content/ed3268f2-e620-11e5-a09b-1f8b0d268c39

important in many organizations. There are several reasons for this. First, environmental costs can be large for some industrial sectors. Second, regulatory requirements involving huge fines for non-compliance have increased significantly over the past decade. Therefore, selecting the least costly method of compliance has become a major objective. Third, society is demanding that companies focus on being more environmentally friendly. Companies are finding that becoming a good social citizen and being environmentally responsible improves their image and enhances their ability to sell their products and services.

These developments have created the need for companies to develop systems of measuring and reporting environmental costs, the consumption of scarce environmental resources and details of hazardous materials used or pollutants emitted to the environment. Knowledge of environmental costs and their causes provides the information that managers need to redesign processes to minimize the usage of scarce environmental resources and the emission pollutants and to also make more sensitive environmental decisions.

Pressures to adopt higher standards of ethical behaviour

Earlier in this chapter it was suggested that management accounting practices were developed to provide information that assist managers to maximize future profits. It was, however, pointed out that it

is too simplistic to assume that the only objective of a business firm is to maximize profits. The profit maximization objective should be constrained by the need for firms to also give high priority to their social responsibilities and ensure that their employees adopt high standards of **ethical behaviour**. A code of ethics has now become an essential part of corporate culture.

Identification of what is acceptable ethical behaviour has attracted much attention in recent years with numerous examples of companies attracting negative coverage for ethical failings and their impact on reported profits. For example, Volkswagen (VW), Europe's biggest car maker has suffered a dramatic decline in its reputation after the revelation that it fitted software designed to cheat emission tests to 11 million cars worldwide. Volkswagen has set aside €18.4 billion to cover the costs of legal action, compensation and refits. Public distrust and protests against corporate misdemeanours have resulted in calls for increased regulation and the need to focus on improving ethical behaviour.

Management accountants have a critical part to play in the management of ethical performance and an obligation to uphold ethical standards. Professional accounting organizations play an important role in promoting a high standard of ethical behaviour by their members. Both of the professional bodies representing management accountants, in the UK (Chartered Institute of Management Accountants), and in the USA (The American Institute of Certified Public Accountants), have issued codes of ethical guidelines for their members and established mechanisms for monitoring and enforcing professional ethics. You can view each organization's ethical standards at www.cimaglobal.com/ethics and www.aicpa.org/research/standards/codesofconduct/pages/default.aspx

Deregulation and privatization

Before the 1990s many organizations, such as those operating in the airline, utility and financial service industries, were either government-owned monopolies or operated in a highly regulated, protected and non-competitive environment. These organizations were not subject to any great pressure to improve the quality and efficiency of their operations or to improve profitability by eliminating services or products that were making losses. Prices were set to cover operating costs and provide a predetermined return on capital. Hence, cost increases could often be absorbed by increasing the prices of the products or services. Little attention was therefore given to developing management accounting systems that accurately measured the costs and profitability of individual products or services.

Privatization of government-controlled companies and deregulation has resulted in the elimination of pricing and competitive restrictions. Deregulation, intensive competition and an expanding product range create the need for these organizations to focus on cost management and develop management accounting information systems that enable them to understand their cost base and determine the sources of profitability for their products, customers and markets.

Focus on value creation

There is now an increasing recognition that management accounting needs to place greater emphasis on creating value rather than an overemphasis on managing and recording costs. Reducing cost is still important because it enables a company to remain competitive by reducing or maintaining selling prices and thus increasing customer value. You will see in Chapter 22 that recent developments have resulted in management accounting distinguishing between value-added and non-value-added activities with the former representing those activities that the customers perceive as adding value to the product or service and the latter adding costs but no value. Cost management seeks to eliminate or reduce non-value-added activities and to identify ways of performing the value-added activities in such a way that they enhance the value to the product or service.

Recently, increasing attention has been given to the importance of **intellectual capital** (also known as intangible assets) arising from the observed dramatic differences between the book and market values

of many companies, particularly the dotcom companies in the late 1990s. Examples of items that represent intellectual capital include resources such as the organization's reputation, the morale of its staff, customer satisfaction, knowledge and skills of employees, established relationships with suppliers, etc. It is important that intangible assets are taken into account in order to assess the value of future business opportunities. This presents a challenge to management accountants as to how to identify, measure and report on the value of intellectual capital.

Customer orientation

In order to survive in today's competitive environment companies have had to become more customer driven and to recognize that customers are crucial to their future success. This has resulted in companies making customer satisfaction an overriding priority and to focus on identifying and achieving the key success factors that are necessary to be successful in today's competitive environment. These key success factors are discussed in the next section.

FOCUS ON CUSTOMER SATISFACTION AND NEW MANAGEMENT APPROACHES

The key success factors that organizations must concentrate on to provide customer satisfaction are cost, quality, reliability, delivery and the choice of innovative new products. In addition, firms are attempting to increase customer satisfaction by adopting a philosophy of continuous improvement to reduce costs and improve quality, reliability and delivery.

Cost efficiency

Keeping costs low and being cost efficient provides an organization with a strong competitive advantage. Increased competition has also made decision errors, due to poor cost information, more potentially hazardous to an organization. Many companies have become aware of the need to improve their cost systems so that they can produce more accurate cost information to determine the cost of their products and services, monitor trends in costs over time, pinpoint loss-making activities and analyse profits by products, sales outlets, customers and markets.

Quality

In addition to demanding low costs, customers are demanding high-quality products and services. Most companies are responding to this by focusing on **total quality management (TQM)**. TQM is a term used to describe a situation in which *all* business functions are involved in a process of continuous quality improvement that focuses on delivering products or services of consistently high quality in a timely fashion. The emphasis on TQM has created fresh demands on the management accounting function to measure and evaluate the quality of products and services and the activities that produce them.

Time as a competitive weapon

Organizations are also seeking to increase customer satisfaction by providing a speedier response to customer requests, ensuring 100 per cent on-time delivery and reducing the time taken to develop and bring new products to market. For these reasons management accounting systems now place more emphasis on time-based measures, such as **cycle time**. This is the length of time from start to

completion of a product or service. It consists of the sum of processing time, move time, wait time and inspection time. Only processing time adds value to the product, and the remaining activities are **non-value-added activities** in the sense that they can be reduced or eliminated without altering the product's service potential to the customer. Organizations are therefore focusing on minimizing cycle time by reducing the time spent on such activities. The management accounting system has an important role to play in this process by identifying and reporting on the time devoted to value-added and non-value-added activities. Cycle time measures have also become important for service organizations. For example, the time taken to process mortgage loan applications by financial organizations can be considerable, involving substantial non-value-added waiting time. Reducing the time to process applications enhances customer satisfaction and creates the potential for increasing sales revenue.

Innovation and continuous improvement

To be successful, companies must develop a steady stream of innovative new products and services and have the capability to adapt to changing customer requirements. Management accounting information systems have begun to report performance measures relating to innovation. Examples include:

- the total launch time for new products/services;
- an assessment of the key characteristics of new products relative to those of competitors;
- feedback on customer satisfaction with the new features and characteristics of newly introduced products and the number of new products launched.

Organizations are also attempting to enhance customer satisfaction by adopting a philosophy of **continuous improvement**. Traditionally, organizations have sought to study activities and establish standard operating procedures. Management accountants developed systems and measurements that compared actual results with predetermined standards. This process created a climate in which the predetermined standards represented a target to be achieved and maintained. In today's competitive environment, companies must adopt a philosophy of continuous improvement, an ongoing process that involves a continuous search to reduce costs, eliminate waste and improve the quality and performance of activities that increase customer value or satisfaction. Management accounting supports continuous improvement by identifying opportunities for change and then reporting on the progress of the methods that have been implemented.

Benchmarking is a technique that is increasingly being adopted as a mechanism for achieving continuous improvement. It is a continuous process of measuring a firm's products, services or activities against the other best performing organizations, either internal or external, to the firm. The objective is to ascertain how the processes and activities can be improved. Ideally, benchmarking should involve an external focus on the latest developments, best practice and model examples that can be incorporated within various operations of business organizations. It therefore represents the ideal way of moving forward and achieving high competitive standards.

In their quest for the continuous improvement of organizational activities, managers have found that they need to rely more on the people closest to the operating processes and customers, to develop new approaches to performing activities. This has led to employees being provided with relevant information to enable them to make continuous improvements to the output of processes. Allowing employees to take such actions without the authorization by superiors has come to be known as **employee empowerment**. It is argued that by empowering employees and giving them relevant information they will be able to respond faster to customers, increase process flexibility, reduce cycle time and improve morale. Management accounting is therefore moving from its traditional emphasis on providing information to managers to monitor the activities of employees, to providing information to employees to empower them to focus on the continuous improvement of activities.

FUNCTIONS OF MANAGEMENT ACCOUNTING

A cost and management accounting system should generate information to meet the following requirements. It should:

- 1 allocate costs between cost of goods sold and inventories for internal and external profit reporting;
- 2 provide relevant information to help managers make better decisions;
- 3 provide information for planning, control, performance measurement and continuous improvement.

Financial accounting rules require that we match costs with revenues to calculate profit. Consequently, any unsold finished goods inventories (or partly completed work in progress) will *not* be included in the cost of goods sold, which is matched against sales revenue during a given period. In an organization that produces a wide range of different products it will be necessary, for inventory valuation purposes, to trace the costs to each individual product. The total value of the inventories of completed products and work in progress, plus any unused raw materials, forms the basis for determining the inventory valuation to be deducted from the current period's costs when calculating profit. This total is also the basis for determining the inventory valuation for inclusion in the balance sheet. Costs are therefore traced to each individual job or product for financial accounting requirements, in order to allocate the costs incurred during a period between cost of goods sold and inventories. (Note that the terms 'stocks' and 'inventories' are used synonymously throughout this book.) This information is required for meeting *external* financial accounting requirements, but most organizations also produce *internal* profit reports at monthly intervals. Thus, product costs are also required for periodic internal profit reporting. Many service organizations, however, do not carry any inventories and product costs are therefore not required by these organizations for valuing inventories.

The second requirement of a cost and management accounting system is to provide relevant financial information to managers to help them make better decisions. Information is required relating to the profitability of various segments of the business such as products, services, customers and distribution channels, in order to ensure that only profitable activities are undertaken. Information is also required for making resource allocation and product/service mix and discontinuation decisions.

REAL WORLD VIEWS 1.4

A look at a key feature of easyJet's business

As one of the pioneers in the low cost airline market, easyJet's business model includes some core values:

- Safety – Our number one value, sitting at the core of everything we do.
- Pioneering – We challenge to find new ways to make travel easy and affordable.
- One team – Together we'll always find a way.
- Passion – We have genuine passion for our customers, our people and the work we do.

- Integrity – We stand by our word and do what we say.
- Simplicity – We cut out the things that don't matter to keep us lean and make it easy.

Question

- 1 How can the management accounting function provide information to support a low cost strategy?



Reference

easyJet 'Our Culture, Vision & Values' available at careers.easyjet.com/why-easyjet/culture-vision-and-value

In some situations, information extracted from the costing system also plays a crucial role in determining selling prices, particularly in markets in which customized products and services that do not have readily available market prices are provided.

Management accounting systems should also provide information for planning, control, performance measurement and continuous improvement. Planning involves translating goals and objectives into the specific activities and resources that are required to achieve them. Companies develop both long-term and short-term plans and the management accounting function plays a critical role in this process. Short-term plans, in the form of the budgeting process, are prepared in more detail than the longer term plans and are one of the mechanisms used by managers as a basis for control and performance evaluation. The control process involves the setting of targets or standards (often derived from the budgeting process) against which actual results are measured. The management accountant's role is to provide managers with feedback information in the form of periodic reports, suitably analysed, to enable them to determine if operations for which they are responsible are proceeding according to plan, and to identify those activities where corrective action is necessary. In particular, the management accounting function should provide economic feedback to managers to assist them in controlling costs and improving the efficiency and effectiveness of operations.

It is appropriate at this point to distinguish between cost accounting and management accounting. **Cost accounting** is concerned with cost accumulation for inventory valuation to meet the requirements of external reporting and internal profit measurement, whereas **management accounting** relates to the provision of appropriate information for decision-making, planning, control and performance evaluation. However, a study of the literature reveals that the distinction between cost accounting and management accounting is not clear cut and the two terms are often used synonymously. In this book, no further attempt will be made to distinguish between them.

You should now be aware that a management accounting system serves multiple purposes. The emphasis throughout this book is that costs must be assembled in different ways for different purposes. Most organizations record cost information in a single database, with costs appropriately coded and classified, so that relevant information can be extracted to meet the requirements of different users. We shall examine this topic in the next chapter.

SUMMARY OF THE CONTENTS OF THIS BOOK

This book is divided into six parts. Part One contains two chapters and provides an introduction to management and cost accounting and a framework for studying the remaining chapters. Part Two consists of five chapters and is entitled 'Cost Accumulation for Inventory Valuation and Profit Measurement'. This section focuses mainly on cost accounting. It is concerned with assigning costs to products to separate costs incurred during a period between costs of goods sold and the closing inventory valuation. The extent to which product costs accumulated for inventory valuation and profit measurement should be adjusted for meeting decision-making, cost control and performance measurement requirements, is also briefly considered. Part Three is made up of seven chapters and is entitled 'Information for Decision-making'. Here the focus is on measuring and identifying those costs that are relevant for different types of decision.

The title of Part Four is 'Information for Planning, Control and Performance Measurement'. It consists of six chapters and concentrates on the process of translating goals and objectives into specific activities and the resources that are required, via the short-term (budgeting) and long-term planning processes, to achieve the goals and objectives. In addition, the management control systems that organizations use are described and the role that management accounting control systems play within the overall control process is examined. The emphasis here is on the accounting process as a means of providing information to help managers control the activities for which they are responsible. Performance measurement and evaluation within different segments of the organization is also examined.

Part Five contains three chapters and is entitled 'Strategic Performance and Cost Management and Challenges for the Future'. The first chapter focuses on strategic performance management, the second

on strategic cost management and the third chapter discusses the challenges for the future facing management accounting. Part Six consists of three chapters and is entitled ‘The Application of Quantitative Methods to Management Accounting’.

GUIDELINES FOR USING THIS BOOK

If you are pursuing a course of management accounting, without cost accumulation for inventory valuation and profit measurement, Chapters 4 to 7 in Part Two can be omitted, since the rest of this book does not rely heavily on these chapters. Alternatively, you could delay your reading of Chapters 4 to 7 in Part Two until you have studied Parts Three and Four. If you wish to gain an insight into cost accumulation for inventory valuation and profit measurement but do not wish to study it in depth, you may prefer to read only Chapters 3 and 7 of Part Two. It is important that you read Chapter 3, which focuses on traditional methods of tracing overheads to cost objects, prior to reading Chapter 11 on activity-based costing.

The chapters on the application of quantitative techniques to management accounting have been delayed until Part Six. An alternative approach would be to read Chapter 24 immediately after reading Chapter 8 on cost–volume–profit analysis. Chapter 25 is self-contained and may be assigned to follow any of the chapters in Part Four. Chapter 26 should be read only after you have studied Chapter 9.

A comprehensive treatment of all of the topics that are contained in this book will not be essential for all readers. To meet different requirements, the more advanced material that is not essential for those readers not requiring an in-depth knowledge of a particular topic has been highlighted. The start of each advanced reading section has a clearly identifiable heading and a vertical green line is used to highlight the full section. The advanced reading sections are more appropriate for an advanced course and may normally be omitted if you are pursuing an introductory course.

SUMMARY

The following items relate to the learning objectives listed at the beginning of the chapter.

- **Distinguish between management accounting and financial accounting.**

Management accounting differs from financial accounting in several ways. Management accounting is concerned with the provision of information to internal users to help them make better decisions and improve the efficiency and effectiveness of operations. Financial accounting is concerned with the provision of information to external parties outside the organization. Unlike financial accounting there is no statutory requirement for management accounting to produce financial statements or to follow externally imposed rules. Furthermore, management accounting provides information relating to different parts of the business whereas financial accounting reports focus on the whole business. Management accounting also tends to be more future oriented and reports are often published on a daily basis whereas financial accounting reports are published semi-annually.

- **Identify and describe the elements involved in the decision-making, planning and control process.**

The following elements are involved in the decision-making, planning and control process: (a) identify the objectives that will guide the business; (b) search for a range of possible courses of action that might enable the objectives to be achieved; (c) select appropriate alternative courses of action that will enable the objectives to be achieved; (d) implement the decisions as

part of the planning and budgeting process; (e) compare actual and planned outcomes; and (f) respond to divergencies from plan by taking corrective action so that actual outcomes conform to planned outcomes, or modify the plans if the comparisons indicate that the plans are no longer attainable.

- **Justify the view that a major objective of commercial organizations is to broadly seek to maximize future profits.**

The reasons for identifying maximizing future profits as a major objective are: (a) it is unlikely that any other objective is as widely applicable in measuring the ability of the organization to survive in the future; (b) although it is unlikely that maximizing future profits can be realized in practice, it is still important to establish the principles necessary to achieve this objective; and (c) it enables shareholders as a group in the bargaining coalition to know how much the pursuit of other goals is costing them by indicating the amount of cash distributed among the members of the coalition.

- **Explain the important changes that have taken place in the business environment that have influenced management accounting practice.**

The important changes are: (a) globalization of world trade; (b) deregulation in various industries; (c) changing product life cycles; (d) advances in manufacturing and information technologies; (e) focus on environmental and ethical issues; (f) a greater emphasis on value creation; (g) the need to become more customer driven.

- **Outline and describe the key success factors that directly affect customer satisfaction.**

The key success factors are: cost efficiency, quality, time, and innovation and continuous improvement. Keeping costs low and being cost efficient provides an organization with a strong competitive advantage. Customers also demand high-quality products and services and this has resulted in companies making quality a key competitive variable. Organizations are also seeking to increase customer satisfaction by providing a speedier response to customer requests, ensuring 100 per cent on-time delivery and reducing the time taken to bring new products to the market. To be successful, companies must be innovative and develop a steady stream of new products and services and have the capability to rapidly adapt to changing customer requirements.

- **Identify and describe the functions of a cost and management accounting system.**

A cost and management accounting system should generate information to meet the following requirements: (a) allocate costs between cost of goods sold and inventories for internal and external profit reporting and inventory valuation; (b) provide relevant information to help managers make better decisions; and (c) provide information for planning, control and performance measurement.

KEY TERMS AND CONCEPTS

Each chapter includes a section like this. You should make sure that you understand each of the terms listed below before you proceed to the next chapter.

Benchmarking A mechanism for achieving continuous improvement by measuring products, services or activities against those of other best performing organizations.

Budget A financial plan for implementing management decisions.

Continuous improvement An ongoing search to reduce costs, eliminate waste and improve the

quality and performance of activities that increase customer value or satisfaction.

Control A managerial function that consists of the measurement, reporting and subsequent correction of performance in order to achieve the organization's objectives.

Control process The process of setting targets or standards against which actual results are measured.

Cost accounting Accounting concerned with cost accumulation for inventory valuation to meet the

requirements of external reporting and internal profit measurement.

Cycle time The length of time from start to completion of a product or service and is the sum of processing time, move time, wait time and inspection time.

E-business The use of information and communication technologies to support any business activities, including buying and selling.

E-commerce The use of information and communication technologies to support the purchase, sale and exchange of goods.

Employee empowerment Providing employees with relevant information to allow them to make continuous improvements to the output of processes without the authorization of superiors.

Ethical behaviour Behaviour that is consistent with the standards of honesty, fairness and social responsibility that have been adopted by the organization.

Financial accounting Accounting concerned with the provision of information to parties that are external to the organization.

Intellectual capital The intangible benefits accessible by a firm from its workforce, and more broadly, from its established relationships with groups such as customers, suppliers and competitors. It is often used interchangeably with other terms such as 'knowledge capital', 'knowledge economy' and 'intangible assets'.

Internet commerce The buying and selling of goods and services over the internet.

Lean manufacturing systems Systems that seek to reduce waste in manufacturing by implementing

just-in-time production systems, focusing on quality, simplifying processes and investing in advanced technologies.

Management accounting Accounting concerned with the provision of information to people within the organization to aid decision-making and improve the efficiency and effectiveness of existing operations.

Management by exception A situation in which management attention is focused on areas where outcomes do not meet targets.

Master budget A single unifying statement of an organization's expectations for future periods comprising budgeted profit and cash flow statements.

Non-value-added activities Activities that can be reduced or eliminated without altering the product's service potential to the customer.

Performance reports Regular reports to management that compare actual outcomes with planned outcomes.

Product's life cycle The period of time from initial expenditure on research and development to the withdrawal of support to customers.

Stakeholders Various parties that have an interest in an organization. Examples include managers, shareholders and potential investors, employees, creditors and the government.

Strategies Courses of action designed to ensure that objectives are achieved.

Total quality management (TQM) A customer-oriented process of continuous improvement that focuses on delivering products or services of consistent high quality in a timely fashion.

KEY EXAMINATION POINTS

Chapter 1 has provided an introduction to the scope of management accounting. It is unlikely that examination questions will be set that refer to the content of an introductory chapter. However, questions are sometimes set requiring you to outline how a costing system can assist the management of an organization. Note that the examiner may not distinguish between cost accounting and management

accounting. Cost accounting is often used to also embrace management accounting. Your discussion of a cost accounting system should therefore include a description (with illustrations) of how the system provides information for decision-making, planning and control. Make sure that you draw off your experience from the whole of a first-year course and not just this introductory chapter.

ASSESSMENT MATERIAL

The review questions are short questions that enable you to assess your understanding of the main topics included in the chapter. The numbers in parentheses provide you with the page numbers to refer to if you cannot answer a specific question.

The remaining chapters also contain review problems. These are more complex and require you to relate and apply the chapter content to various business problems. Fully worked solutions to the review problems are provided in a separate section at the end of the book.

REVIEW QUESTIONS

- 1.1** Identify and describe the different users of accounting information. (pp. 5–6)
- 1.2** Describe the differences between management accounting and financial accounting. (p. 6)
- 1.3** Explain each of the elements of the decision-making, planning and control process. (pp. 7–9)
- 1.4** Describe what is meant by management by exception. (p. 9)
- 1.5** Explain how the business environment that businesses face has changed over the past decades and discuss how this has had an impact on management accounting. (pp. 10–14)
- 1.6** Describe each of the key success factors that companies should concentrate on to achieve customer satisfaction. (pp. 14–15)
- 1.7** Explain why firms are beginning to concentrate on social responsibility and corporate ethics. (pp. 12–13)
- 1.8** Describe the different functions of management accounting. (pp. 16–17)

2

AN INTRODUCTION TO COST TERMS AND CONCEPTS

LEARNING OBJECTIVES After studying this chapter, you should be able to:

- explain why it is necessary to understand the meaning of different cost terms;
- define and illustrate a cost object;
- explain the meaning of each of the key terms or concepts highlighted in bold text in this chapter;
- explain why in the short term some costs and revenues are not relevant for decision-making;
- describe the three purposes for which cost information is required.

In Chapter 1 it was pointed out that accounting systems measure costs which are used for profit measurement and inventory (i.e. stock) valuation, decision-making, performance measurement and control. The term cost is a frequently used word that reflects a monetary measure of the resources sacrificed or forgone to achieve a specific objective, such as acquiring a good or service. However, the term must be defined more precisely before the 'cost' can be determined. You will find that the word *cost* is rarely used without a preceding adjective to specify the type of cost being considered.

To understand how accounting systems calculate costs and to communicate accounting information effectively to others requires a thorough understanding of what the term cost means. Unfortunately, the term has multiple meanings and different types of cost are used in different situations. Therefore, a preceding term must be added to clarify the assumptions that underlie a cost measurement. A large terminology has emerged to indicate more clearly which cost meaning is being conveyed. Examples include variable cost, fixed cost, opportunity cost and sunk cost. The aim of this chapter is to provide you with an understanding of the basic cost terms and concepts that are used in the management accounting literature.

COST OBJECTS

A **cost object** is any activity for which a separate measurement of costs is desired. In other words, if the users of accounting information want to know the cost of something, this something is called a cost object. Examples of cost objects include the cost of a product, the cost of rendering a service to a bank customer or hospital patient, the cost of operating a particular department or sales territory, or indeed anything for which one wants to measure the cost of resources used.

We shall see that the cost collection system typically accounts for costs in two broad stages:

- 1 It accumulates costs by classifying them into certain categories such as by type of expense (e.g. direct labour, direct materials and indirect costs) or by cost behaviour (such as fixed and variable costs).
- 2 It then assigns these costs to cost objects.

In this chapter, we shall focus on the following cost terms and concepts:

- direct and indirect costs;
- period and product costs;
- cost behaviour in relation to volume of activity;
- relevant and irrelevant costs;
- avoidable and unavoidable costs;
- sunk costs;
- opportunity costs;
- incremental and marginal costs.

MANUFACTURING, MERCHANDISING AND SERVICE ORGANIZATIONS

To provide a better understanding of how different cost terms are used in organizations, it is appropriate to describe the major features of activities undertaken in the manufacturing, merchandising and service organizations. Manufacturing organizations purchase raw materials from suppliers and convert these materials into tangible products through the use of labour and capital inputs (e.g. plant and machinery). This process results in manufacturing organizations having the following types of inventory:

- Raw material inventories consisting of purchased raw materials in stock awaiting use in the manufacturing process.
- Work in progress inventory (also called work in process) consisting of partially complete products awaiting completion.
- Finished goods inventory consisting of fully completed products that have not yet been sold.

Merchandising companies such as supermarkets, retail departmental stores and wholesalers sell tangible products that they have previously purchased in the same basic form from suppliers. Therefore they have only finished goods inventories. Service organizations such as accounting firms, insurance companies, advertising agencies and hospitals provide tasks or activities for customers. A major feature of service organizations is that they provide perishable services that cannot be stored for future use. Therefore service organizations do not have finished goods inventory but some service organizations do have work in process. For example, a firm of lawyers may have clients whose work is partially complete at the end of the accounting period.

DIRECT AND INDIRECT COSTS

Costs that are assigned to cost objects can be divided into two broad categories – direct and indirect costs. Both categories can be further divided into direct and indirect materials and direct and indirect labour costs.

Direct materials

Direct material costs represent those material costs that can be specifically and exclusively identified with a particular cost object. In manufacturing organizations where the cost object is a product, physical observation can be used to measure the quantity consumed by each individual product and the cost of direct materials can be directly charged to them. In other words, direct materials become part of a physical product. For example, wood used in the manufacture of different types of furniture can be directly identified with each specific type of furniture such as chairs, tables and bookcases.

The term direct materials is normally not applicable to merchandising and service organizations. The equivalent term in a merchandising organization is the purchase cost of the items that are for resale. For example, with a departmental store where the cost object is a department (e.g. televisions and DVD players, computers, clothing and furniture departments) the purchase cost of the goods from the suppliers will be directly charged to the appropriate department that resells the goods. Some service organizations do purchase materials or parts to provide a service. For example, a garage may purchase parts for vehicle repairs. These parts can be identified with the repair of each customer's vehicle (i.e. the cost object) and thus are equivalent to direct materials.

Direct labour

Direct labour costs are those labour costs that can be specifically and exclusively identified with a particular cost object. Physical observation can be used to measure the quantity of labour used to produce a specific product or provide a service. The direct labour cost in producing a product includes the cost of converting the raw materials into a product, such as the costs of the machine operatives engaged in the production process in the manufacture of televisions. The direct labour cost used to provide a service includes the labour costs in providing a service that can be specifically identified with an individual client or with a specific instance of service. The direct labour costs for a departmental store are the labour costs of the staff that can be attributed specifically to a department.

Indirect costs

Indirect costs cannot be identified specifically and exclusively with a given cost object. They consist of indirect labour, materials and expenses. In a manufacturing organization where products are the cost object, the wages of all employees whose time cannot be identified with a specific product, represent indirect labour costs. Examples include the labour cost of staff employed in the maintenance and repair of production equipment and staff employed in the stores department. The cost of materials used to repair machinery cannot be identified with a specific product and can therefore be classified as indirect material costs. Examples of indirect expenses in manufacturing, service or a departmental store where products, the provision of a service or departments are the cost objectives, include lighting and heating expenses and property taxes. These costs cannot be specifically identified with a particular product, service or department.

The term **overheads** is widely used instead of indirect costs. In a manufacturing organization, overhead costs are categorized as manufacturing, administration or marketing (or selling) overheads. Manufacturing overheads include all the costs of manufacturing apart from direct labour and material costs. Administrative overheads consist of all costs associated with the general administration of the organization that cannot be assigned to manufacturing, marketing and distribution overheads. Examples of administrative overheads include top executive salaries, general accounting, secretarial, and research and development costs. Those costs that are necessary to market and distribute a product or service are categorized as marketing (selling) costs, also known as order-getting and order-filling costs. Examples of marketing costs include advertising, sales personnel salaries/commissions, warehousing and delivery transportation costs.

FIGURE 2.1

Manufacturing and non-manufacturing costs

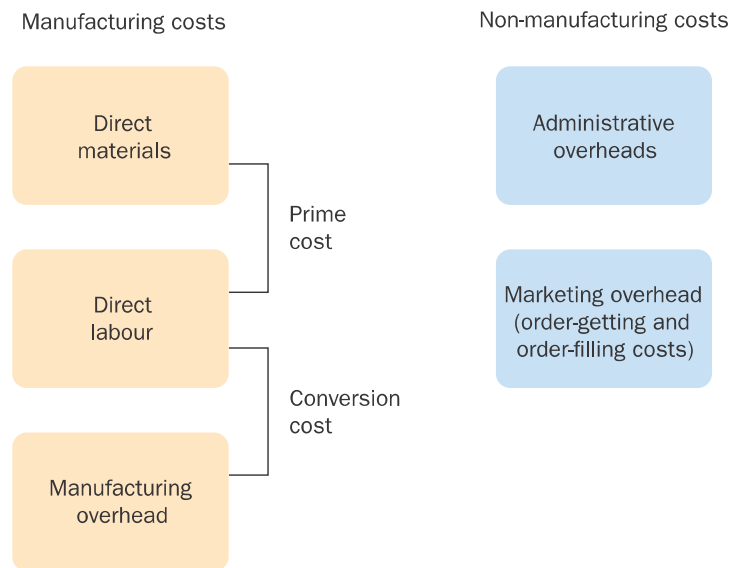


Figure 2.1 illustrates the various classifications of manufacturing and non-manufacturing costs. You will see from this figure that two further classifications of manufacturing costs are sometimes used. **Prime cost** consists of all direct manufacturing costs (i.e. it is the sum of direct material and direct labour costs). **Conversion cost** is the sum of direct labour and manufacturing overhead costs. It represents the cost of converting raw materials into finished products.

Distinguishing between direct and indirect costs

Sometimes, direct costs are treated as indirect because it is not cost effective to trace costs directly to the cost object. For example, the nails used to manufacture a particular desk can be identified specifically with the desk, but, because the cost is likely to be insignificant, the expense of tracing such items does not justify the possible benefits from calculating more accurate product costs.

The distinction between direct and indirect costs also depends on the cost object. A cost can be treated as direct for one cost object but indirect in respect of another. For example, if the cost object is the cost of using different distribution channels, then the rental of warehouses and the salaries of storekeepers will be regarded as direct for each distribution channel. If, by the same token, the cost object is the product, both the warehouse rental and the salaries of the storekeepers will be an indirect cost because these costs cannot be specifically identified with the product.

Assigning direct and indirect costs to cost objects

Direct costs can be traced easily and accurately to a cost object. For example, where products are the cost object, direct materials and labour used can be physically identified with the different products that an organization produces. It is a relatively simple process to establish an information technology system that records the quantity and cost of direct labour and material resources used to produce specific products.

In contrast, indirect costs cannot be traced to cost objects. Instead, an estimate must be made of the resources consumed by cost objects using **cost allocations**. A cost allocation is the process of assigning costs when a direct measure does not exist for the quantity of resources consumed by a particular cost object. Cost allocations involve the use of surrogate rather than direct measures. For example, consider an activity such as receiving incoming materials. Assuming that the cost of receiving materials is strongly influenced by the number of receipts, then costs can be allocated to products (i.e. the cost object) based on the number of material receipts each product requires. If 20 per cent of the total number of receipts for a period were required for a particular product then 20 per cent of the total costs of

REAL WORLD VIEWS 2.1

Industry cost structures

Allan Stratton is a cost management consultant with over 35 years of experience, who shares the benefit of his experience providing tools and resources via the internet. In one of his articles he describes how cost structures vary for different industries and that therefore performance management and measurement should differ and should reflect the cost structures being used.

For example, the semiconductor industry is capital intensive and half the cost structure is depreciation of the capital investment, a cost which is then fixed for the foreseeable future once the investment has been made.

The main expenditures in the oil and gas industry are likely to be incurred by drilling exploratory wells looking for new reserves of oil and natural gas, many of which will turn out to be dry or not commercially viable, or investing in activities related to collecting seismic data and evaluating underground formations.

In a manufacturing organization around half of the costs might be incurred by purchasing component parts or raw materials from suppliers.

Regardless of the industry, in distribution most of the costs will be incurred when purchasing products from manufacturers.

Likewise for retail operations, 70 per cent or more of the costs are likely to be on food displayed in a supermarket or clothes in a clothing shop.

In a service organization such as a software development firm, however, up to 70 per cent of the costs can be people and people-related (offices, computers, etc.).

For a company like Nike, with a hugely valuable brand name, the largest expenditures are likely to be marketing, advertising and promotion.

Questions

- 1 How might performance measurement and management vary between different industries?
- 2 Provide examples of direct labour, direct materials and indirect costs for the different industries mentioned above.



Reference

Stratton, A. (2012) Industry Cost Structures. Available at www.costmatters.com/180-perspective/industry-cost-structures (accessed 30 March, 2017).

receiving incoming materials would be allocated to that product. If that product were discontinued, and not replaced, we would expect action to be taken to reduce the resources required for receiving materials by 20 per cent.

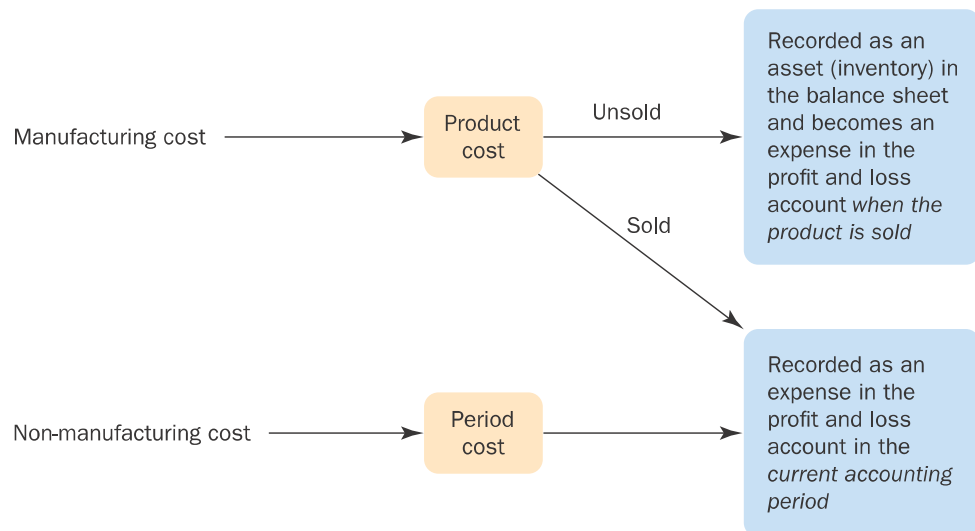
In this example, the surrogate allocation measure is assumed to be a significant determinant of the cost of receiving incoming materials. The process of assigning indirect costs (overheads) and the accuracy of such assignments will be discussed in Chapter 3, but, at this stage, you should note that only direct costs can be accurately assigned to cost objects. Therefore, the more direct costs that can be traced to a cost object, the more accurate is the cost assignment.

PERIOD AND PRODUCT COSTS

For profit measurement and inventory/stock valuation (i.e. the valuation of completed unsold products and partly completed products or services) purposes it is necessary to classify costs as either product costs or period costs. **Product costs** are those costs that are identified with goods purchased or produced for resale. In a manufacturing organization, they are costs that are attached to the product and that are included in the inventory valuation for finished goods or for partly completed goods (work in progress), until they are sold; they are then recorded as expenses and matched against sales for calculating profit. **Period costs** are those costs that are not specifically related to manufacturing or purchasing a product

FIGURE 2.2

Treatment of period and product costs



or providing a service that generates revenues. Therefore they are not included in the inventory valuation and as a result are treated as expenses in the period in which they are incurred. *Hence no attempt is made to attach period costs to products for inventory valuation purposes.*

In a manufacturing organization, all manufacturing costs are regarded as product costs and non-manufacturing costs are regarded as period costs. The treatment of period and product costs for a manufacturing organization is illustrated in Figure 2.2. You will see that both product and period costs are eventually classified as expenses. The major difference is the point in time at which they are so classified.

There are two reasons why non-manufacturing costs are treated as period costs and not included in the inventory valuation. First, inventories are assets (unsold production) and assets represent resources that have been acquired and that are expected to contribute to future revenue. Manufacturing costs incurred in making a product can be expected to generate future revenues to cover the cost of production. There is no guarantee, however, that non-manufacturing costs will generate future revenue, because they do not represent value added to any specific product. Therefore, they are not included in the inventory valuation. Second, many non-manufacturing costs (e.g. distribution costs) are not incurred when the product is being stored. Hence it is inappropriate to include such costs within the inventory valuation.

You should now refer to Example 2.1, which provides an illustration of the accounting treatment of period and product costs for income (profit) measurement purposes for a manufacturing organization. Do merchandising and service organizations need to distinguish between product and period costs? The answer is yes. Companies operating in the merchandising sector purchase goods for resale without changing their basic form. The cost of the goods purchased is regarded as a product cost and all other costs, such as administration and selling and distribution expenses, are considered to be period costs. Therefore, the cost of goods sold for a merchandising company would consist of the beginning merchandise inventory, plus the purchase of merchandise during the period, less the closing merchandise inventory. Note that the opening and closing inventories would be valued at the purchase cost of acquiring the inventories. Service organizations do not have beginning and closing finished goods inventories since it is not possible to store services but they may have work in progress (WIP). The cost of direct materials (if applicable) plus direct labour and overheads that are assigned to cost objects (typically clients/customers) represent the product costs. All other costs represent the period costs. The beginning WIP, plus the cost assigned to the clients during the period, less the closing WIP represents the cost of the services sold for the period. This is equivalent to the cost of goods sold in a manufacturing organization.

EXAMPLE 2.1

The costs for Lee Manufacturing Company for period 1 are as follows:

| | (£) | (£) |
|-------------------------|----------------|---------|
| Manufacturing costs: | | |
| Direct labour | 400 000 | |
| Direct materials | 200 000 | |
| Manufacturing overheads | <u>200 000</u> | 800 000 |
| Non-manufacturing costs | | 300 000 |

The accounting records indicate that 70 per cent of the above costs were assigned to the cost of the goods that were sold during the period, 10 per cent to work in progress and 20 per cent to finished goods inventory. Sales were £910 000 for the period. The opening and closing inventory of raw materials were identical and there were no opening WIP and finished goods inventories at the start of the period. The profit statement for period 1 will be as follows:

| | (£) | (£) |
|--|----------------|----------------|
| Sales (50 000) | | 910 000 |
| Manufacturing costs (<i>product costs</i>): | | |
| Direct labour | 400 000 | |
| Direct materials | 200 000 | |
| Manufacturing overheads | <u>200 000</u> | |
| | 800 000 | |
| Less closing inventory: WIP (10%) | 80 000 | |
| Finished good inventory (20%) | <u>160 000</u> | <u>240 000</u> |
| Cost of goods sold (70%) | | <u>560 000</u> |
| Gross profit | | 350 000 |
| Less non-manufacturing costs (<i>period costs</i>) | | <u>300 000</u> |
| Net profit | | 50 000 |

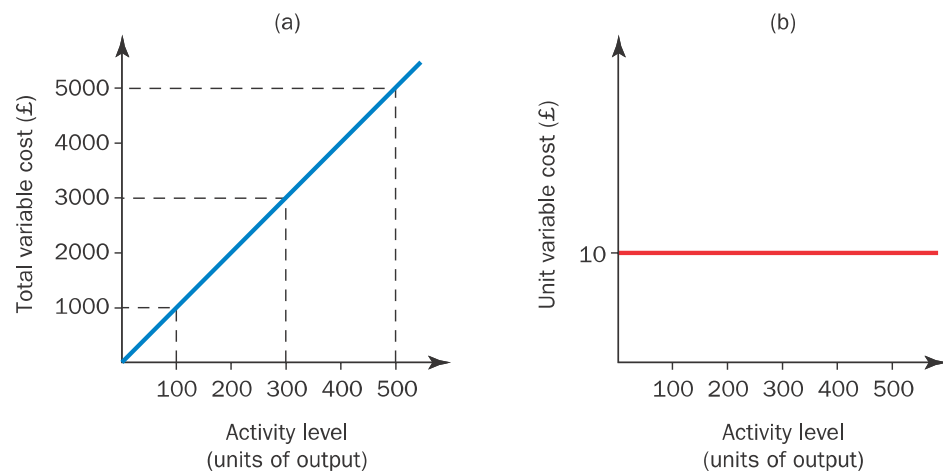
During the period 70 per cent of the production was sold and the remaining 30 per cent was produced for WIP and finished goods inventories. Seventy per cent of the product costs are therefore identified as an expense for the period and the remainder are included in the closing inventory valuations. If we assume that the closing inventory is sold in the next accounting period, the remaining 30 per cent of the product costs will become expenses in the next accounting period. However, all the period costs became an expense in this accounting period, because this is the period to which they relate. Note that only product costs form the basis for the calculation of cost of goods sold and that period costs do not form part of this calculation.

COST BEHAVIOUR

A knowledge of how costs and revenues will vary with different levels of activity (or volume) is essential for decision-making. Managers might require information in order to answer questions such as these:

- 1 How will costs and revenues change if activity is increased (or decreased) by 15 per cent?
- 2 What will be the impact on profits if we reduce selling price by 10 per cent based on the estimate that this will increase sales volume by 15 per cent?
- 3 How do the cost and revenues change for a university if the number of students is increased by 5 per cent?

FIGURE 2.3
Variable costs:
(a) total; (b) unit



- 4 How do costs and revenues of a hotel change if a room and meals are provided for two guests for a three-day stay?
- 5 How many tickets must be sold for a concert in order to break even?

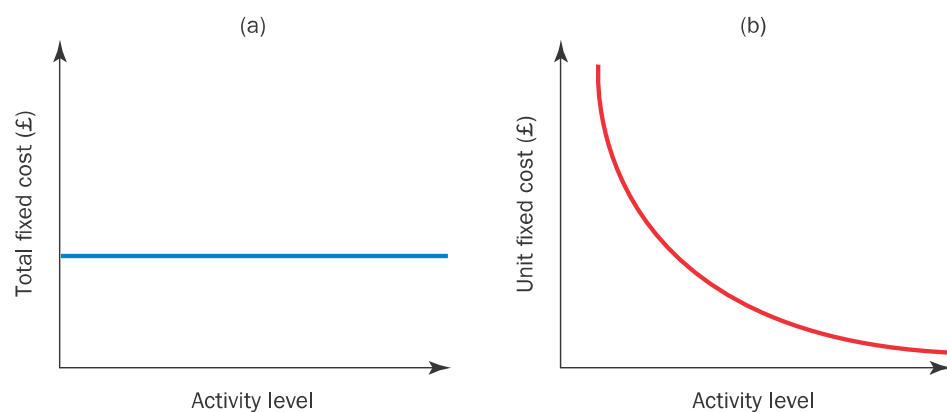
Activity or volume may be measured in terms of units of production or sales, hours worked, miles travelled, patients seen, students enrolled or any other appropriate measure of the activity of an organization.

The terms 'variable', 'fixed', 'semi-variable' and 'semi-fixed' have been traditionally used in the management accounting literature to describe how a cost reacts to changes in activity. **Variable costs** vary in direct proportion to the volume of activity; that is, doubling the level of activity will double the *total* variable cost. Consequently, *total* variable costs are linear and *unit* variable cost is constant. Examples of variable costs in a manufacturing organization include direct materials, energy to operate the machines and sales commissions. Examples of variable costs in a merchandising company, such as a supermarket, include the purchase costs of all items that are sold. In a hospital, variable costs include the cost of drugs and meals which may be assumed to fluctuate with the number of patient days.

Consider the example of a bicycle manufacturer who purchases component parts. Assume that the cost of purchasing two wheels for a particular bicycle is £10 per bicycle. Figure 2.3(a) illustrates the concept of variable costs in graphic form. You can see that as the number of units of output of bicycles increases or decreases, the *total* variable cost of wheels increases and decreases proportionately. Look at Figure 2.3(b). This diagram shows that variable cost per *unit* of output is constant even though total variable cost increases/decreases proportionately with changes in activity.

Fixed costs remain constant over wide ranges of activity for a specified time period. They are not affected by changes in activity. Examples of fixed costs include depreciation of equipment, property taxes, insurance costs, supervisory salaries and leasing charges for cars used by the sales force. Figure 2.4 illustrates how *total* fixed costs and fixed cost per unit of activity react with changes in the level of activity.

FIGURE 2.4
Fixed costs:
(a) total; (b) unit



You will see from this diagram that *total* fixed costs are constant for all units of activity whereas *unit* fixed costs decrease proportionally with the level of activity. For example, if the total of the fixed costs is £50 000 for a month the fixed costs per *unit* of activity will be as follows:

| <i>Units produced</i> | <i>Fixed cost per unit</i> (£) |
|-----------------------|-----------------------------------|
| 1 | 50 000 |
| 10 | 5 000 |
| 100 | 500 |
| 1 000 | 50 |

Because unit fixed costs are not constant per unit they must be interpreted with caution. For decision-making, it is better to work with total fixed costs rather than unit costs.

The distinction between fixed and variable costs must be made relative to the time period under consideration. Over a period of several years, virtually all costs are variable. During such a long period of time, contraction in demand will be accompanied by reductions in virtually all categories of cost. For example, senior managers can be released, machinery need not be replaced and even buildings and land can be sold. Similarly, large expansions in activity will eventually cause all categories of cost to increase. Within shorter time periods, costs will be fixed or variable in relation to changes in activity.

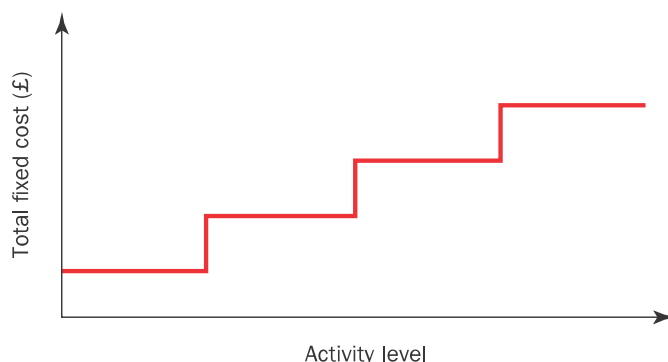
Spending on some fixed costs, such as direct labour and supervisory salaries, can be adjusted in the short term to reflect changes in activity. For example, if production activity declines significantly, then direct workers and supervisors might continue to be employed in the hope that the decline in demand will be temporary; but if there is no upsurge in demand then staff might eventually be made redundant. If, by way of contrast, production capacity expands to some critical level, additional workers might be employed, but the process of recruiting such workers may take several months. Thus, within a short-term period, such as one year, labour costs can change in response to changes in demand in a manner similar to that depicted in Figure 2.5. Costs that behave in this manner are described as **semi-fixed** or **step-fixed costs**. The distinguishing feature of step-fixed costs is that within a given time period they are fixed within specified activity levels, but they are eventually subject to step increases or decreases by a constant amount at various critical activity levels.

Our discussion so far has assumed a one-year time period. If we consider a shorter time period, such as one month, the step-fixed costs described in the previous paragraph will not occur, because it takes several months to respond to changes in activity and alter spending levels. Over very short-term periods such as one month, spending on direct labour and supervisory salaries will be fixed in relation to changes in activity.

Even though fixed costs are normally assumed to remain unchanged in response to changes in the level of activity in the short term, they may change in response to other factors. For example, if price levels increase then some fixed costs such as management salaries will increase.

Before concluding our discussion of cost behaviour in relation to volume of activity, we must consider **semi-variable costs** (also known as **mixed costs**). These include both a fixed and a variable component.

FIGURE 2.5
Step-fixed costs



REAL WORLD VIEWS 2.2

Cost structures in the airline sector

Many low-cost carriers such as easyJet and Ryanair regularly offer flights to customers at low prices. They continue to do this even during depressed economic times. Both continued to make good profits in 2015 with easyJet posting pre-tax profits of £686m and Ryanair €867m. More traditional carriers like Air France-KLM and British Airways reported actual and forecasted profits of €118m and £601m respectively. Why do low-cost carriers continue to do well even though they offer much lower fares? One reason is their cost structures.

You might be thinking, surely there is a cost of providing a seat to a passenger, so how can low-cost carriers sell some so cheaply? To answer this, we need to consider the nature of costs at low-cost carriers. Most costs are fixed in nature. First, the aircraft cost (of about US\$75m–\$90m for a Boeing 737) is fixed. Second, the salaries of the pilot, first officer and cabin crew are also fixed. Third, maintenance costs would also be considered as a fixed cost. And what about the fuel cost? This is also treated as a fixed cost, since it is incurred once the aircraft flies. Thus, if one additional passenger flies with a low-cost carrier, the variable cost associated with this passenger is zero and hence tickets can be sold cheaply.

Traditional carriers like Air France-KLM and British Airways have similar costs to the low-cost carriers – fuel, fleet purchase, maintenance and salaries, etc. These costs too are likely to be fixed.

The difference is that these costs are probably at a higher level than low cost carriers. For example, low cost carriers typically use one model of aircraft which reduces maintenance costs and adds buying leverage. Salaries are also likely to be higher. Traditional airlines may have some variable costs, e.g. passenger meals. Thus, with overall higher costs, it is more difficult to reduce ticket prices. Low-cost carriers do, however, have sophisticated yield management systems to maximize the revenues from flights. This might mean that some customers pay a high price while others travel free. Overall, they try to ensure all fixed costs are covered on every flight.

Questions

- 1 Do you agree that the variable cost associated with a passenger can be zero? Can this be said for both low-cost and traditional carriers?
- 2 What options do more traditional carriers have to improve their fixed cost base?

References

- Air France-KLM 2015 Annual Report, available at: http://www.airfranceklm.com/sites/default/files/publications/annual_report_2015-en.pdf
- EasyJet 2015 Annual Report, available at: www.corporate.easyjet.com/~/_/media/Files/E/Easyjet-Plc-V2/pdf/investors/result-center-investor/annual-report-2015.pdf
- Ryanair 2015 Annual Report, available at: www.investor.ryanair.com/wp-content/uploads/2015/07/Annual-Report-2015.pdf
- 2014 737 Range price list, available at www.boeing.com/boeing/commercial/prices/

If you refer to your telephone account for your land line you will probably find that it consists of a fixed component (the line rental) plus a variable component (the number of telephone calls made multiplied by the cost per call). Similarly, the office photocopying costs may consist of a fixed rental charge for the photocopiers plus a variable cost (the cost of the paper multiplied by the number of photocopies). The approaches that are used to separate semi-variable costs into their fixed and variable elements are explained in Chapter 24.

RELEVANT AND IRRELEVANT COSTS AND REVENUES

For decision-making, costs and revenues can be classified according to whether they are relevant to a particular decision. **Relevant costs and revenues** are those *future* costs and revenues that will be changed by a decision, whereas **irrelevant costs and revenues** are those that will not be affected by the decision. For example, if you are faced with a choice of making a journey using your own car or by public transport, the car tax and insurance costs are irrelevant, since they will remain the same whether

or not you use your car for this journey. However, fuel costs for the car will differ depending on which alternative is chosen and this cost will be relevant for decision-making.

Let us now consider a further illustration of the classification of relevant and irrelevant costs. A company purchased raw materials for £1000 per unit and then found that it was impossible to use them in future production or to sell them in their current state. A former customer is prepared to purchase a product that will require the use of all these materials, but is not prepared to pay more than £2500 for this product. The additional costs of converting these materials into the required product are £2000. Should the company accept the order for £2500? It might appear that the cost of the order is £3000, consisting of £1000 material cost and £2000 conversion cost, but this is incorrect because the £1000 material cost will remain the same whether the order is accepted or rejected. The material cost is therefore irrelevant for the decision. If the order is accepted the conversion costs will change by £2000, and this conversion cost is a relevant cost. If we compare the revenue of £2500 with the relevant cost for the order of £2000, it means that the order should be accepted, assuming of course that no higher priced orders can be obtained elsewhere. The following calculation shows that this is the correct decision:

| | <i>Do not accept order</i> (£) | <i>Accept order</i> (£) |
|------------------|-----------------------------------|----------------------------|
| Materials | 1 000 | 1 000 |
| Conversion costs | — | 2 000 |
| Revenue | — | (2 500) |
| Net costs | <u>1 000</u> | <u>500</u> |

The net costs of the company are £500 less; in other words, the company is £500 better off as a result of accepting the order. This agrees with the £500 advantage which was suggested by the relevant cost method.

In this illustration, the sales revenue was relevant to the decision because future revenue changed depending on which alternative was selected. However, in some circumstances, sales revenue may also be irrelevant for decision-making. Consider a situation where a company can meet its sales demand by purchasing either machine A or machine B. The output of both machines is identical, but the operating costs and purchase costs of the machines are different. In this situation, the sales revenue will remain unchanged irrespective of which machine is purchased (assuming, of course, that the quality of output is identical for both machines). Consequently, sales revenue is irrelevant for this decision; the relevant items are the operating costs and the cost of the machines. We have now established an important principle regarding the classification of cost and revenues for decision-making; namely, that in the short term not all costs and revenues are relevant for decision-making.

AVOIDABLE AND UNAVOIDABLE COSTS

Sometimes the terms avoidable and unavoidable costs are used instead of relevant and irrelevant cost. **Avoidable costs** are those costs that may be saved by not adopting a given alternative, whereas **unavoidable costs** cannot be saved. Only avoidable costs are relevant for decision-making purposes. In the example that we used to illustrate relevant and irrelevant costs, the material costs of £1000 are unavoidable and irrelevant, but the conversion costs of £2000 are avoidable and hence relevant. The decision rule is to accept those alternatives that generate revenues in excess of the avoidable costs.

SUNK COSTS

These costs are the cost of resources already acquired where the total will be unaffected by the choice between various alternatives. They are costs that have been created by a decision made in the past and that cannot be changed by any decision that will be made now or in the future.

The expenditure of £1000 on materials that were no longer required, referred to in the preceding section, is an example of a **sunk cost**. Similarly, the written down values of assets previously purchased are sunk costs. For example, if equipment was purchased four years ago for £100 000 with an expected life of five years and nil scrap value, then the written down value will be £20 000 if straight line depreciation is used. This written down value will have to be written off, no matter what possible alternative future action might be chosen. If the equipment was scrapped, the £20 000 would be written off; if the equipment was used for productive purposes, the £20 000 would still have to be written off. This cost cannot be changed by any future decision and is therefore classified as a sunk cost.

Sunk costs are irrelevant for decision-making, but not all irrelevant costs are sunk costs. For example, two alternative production methods may involve identical direct material expenditure. The direct material cost is irrelevant because it will remain the same whichever alternative is chosen, but the material cost is not a sunk cost since it will be incurred in the future.

OPPORTUNITY COSTS

An **opportunity cost** is a cost that measures the opportunity that is lost or sacrificed when the choice of one course of action requires that an alternative course of action is given up. Consider the situation where a student is contemplating taking a gap year overseas after completing his or her studies. Assume

REAL WORLD VIEWS 2.3

We must stop falling into the 'sunk costs' fallacy

An article written by Ben Chu published in *The Independent* newspaper in 2016 demonstrated why the classical economic view of humans as rational decision-makers is often very wide of the mark. When individuals evaluate a financial decision, when a business leader decides whether or not to continue with an investment project, when a politician decides on a policy, they are all supposed to weigh up the costs and benefits dispassionately. And those decisions are supposed to be made on the basis of future potential costs and benefits, not costs from the past. Anything spent to get to that point of decision should be irrelevant. They are sunk costs which cannot make a project a better or worse proposition.

Nevertheless, we find it very hard to avoid looking back. Business leaders will often plough on with dubious investments because they are so emotionally invested in the project. Fund managers have a tendency to hold on to bad company investments that they spent a great deal of time and effort researching. Football managers will play the

hugely expensive striker they bought, even when the player is obviously misfiring.

Managers are often unable to make the decisions to scrap projects that are already up and running in order to cut their losses. For example, the sunk costs fallacy draws attention to how Sadiq Khan, the Mayor of London, originally opposed the construction of a new £1.75m Garden Bridge across the Thames but later changed his mind because the money [spent on the design] is spent. Cancelling would mean we lose that money and have nothing.

This kind of behaviour is hard-wired into our psyches but nevertheless we should recognize when the sunk costs fallacy is leading us seriously astray.

Questions

- 1 What are the relevant costs and benefits relating to the Garden Bridge?
- 2 Why might managers be reluctant to abandon loss-making projects?

Reference

Chu, B. (2016) *We must stop falling into the 'sunk costs' fallacy*, Independent Print Ltd, London (UK). www.search.proquest.com/docview/1781458259?accountid=11526

EXAMPLE 2.2

A company has an opportunity to obtain a contract for the production of a special component. This component will require 100 hours of processing on machine X. Machine X is working at full capacity on the production of product A, and the only way in which the contract can be fulfilled is by reducing the output of product A. This will result in a lost profit contribution of £200. The

contract will also result in *additional* variable costs of £1000.

If the company takes on the contract, it will sacrifice a profit contribution of £200 from the lost output of product A. This represents an opportunity cost, and should be included as part of the cost when negotiating for the contract. The contract price should at least cover the additional costs of £1000 plus the £200 opportunity cost to ensure that the company will be better off in the short term by accepting the contract.

that the student has an offer of a job on completion of his/her studies. The lost salary is an opportunity cost of choosing the gap year that must be taken into account when considering the financial implications of the decision. For a further illustration of an opportunity cost you should now look at Example 2.2.

Opportunity costs cannot normally be recorded in the accounting system since they do not involve cash outlays. They also only apply to the use of scarce resources. Where resources are not scarce, no sacrifice exists from using these resources. In Example 2.2, if machine X were operating at 80 per cent of its potential capacity and the decision to accept the contract would not have resulted in reduced production of product A, there would have been no loss of revenue, and the opportunity cost would be zero.

Opportunity costs are of vital importance for decision-making. If no alternative use of resources exists then the opportunity cost is zero, but if resources have an alternative use, and are scarce, then an opportunity cost does exist.

INCREMENTAL AND MARGINAL COSTS

Incremental costs, which are also called **differential costs**, are the difference between the costs of each alternative action that is being considered. For example, a university is evaluating the financial implications of increasing student numbers by 20 per cent. The two alternatives are:

- 1 No increase in the number of students.
- 2 A 20 per cent increase in the number of students.

If alternative 2 is chosen, the university will have to increase its budget for full-time lecturers on permanent contracts by £150 000 per annum. It will also need to employ additional part-time lecturers at a cost of £15 000 (300 hours at £50 per hour) per annum. The incremental/differential cost between the two alternatives is £165 000.

Incremental costs can include both fixed and variable costs. In the example above, the full-time staff represent a fixed cost and the part-time staff represent a variable cost. You will also meet the concept of incremental, or differential, revenues. These are the difference in revenues resulting from each alternative.

If you have studied economics, you may have noticed that incremental costs and revenues are similar in principle to the concept of **marginal cost** and **marginal revenue**. The main difference is that marginal cost/revenue represents the additional cost/revenue of one extra unit of output, whereas

REAL WORLD VIEWS 2.4

Opportunity costs and auto bail-outs

According to Andrew Coyne, the author of an article published in the *National Post* (Canada), the \$14 billion in public funds handed out to General Motors and Chrysler by the governments of Canada and Ontario was one of the largest corporate bail-outs in the history of the country. The author claims that the question of opportunity costs (what else might have been done with the same money, what other investments might have been made or jobs created with the \$14 billion governments taken out of the capital markets to lend to GM and Chrysler) never came up and that it never does. Instead, the focus tends to be only on the benefits, and that opportunity costs are neither counted nor understood.

Questions

- 1 Why might opportunity costs not be considered when making decisions?
- 2 Provide examples of opportunity costs that you might incur.

References

- Wired (2011) Homeland Security Junks billion dollar 'virtual fence'. Available at www.wired.com/danger-room/2011/01/homeland-security-junks-its-sensorladen-border-fence/
- RTÉ News (2009) Electronic voting system to be scrapped, 23 April. Available at www.rte.ie/news/2009/0423/evoting.html



incremental cost/revenue represents the additional cost/revenue resulting from a group of additional units of output. Business decisions normally entail identifying the change in costs and revenues arising from comparing two alternative courses of action and where this involves a change in activity, it is likely that this will involve multiple, rather than single, units of activity.

REAL WORLD VIEWS 2.5

Marginal costs of downloadable products

A distinguishing feature of today's digital technology is that it is characterized by zero (or near-zero) marginal costs. Once you've made the investment needed to create a digital good, it costs next to nothing to roll out and distribute millions of copies. Software, e-books and music are increasingly available as downloadable products. Each software, book or music download has no marginal cost. As download purchases are typically fully automated, there are no labour costs. Also, as the software development, publishing or music production costs are all in the past (i.e. sunk costs), there are no material or component type costs. There are, of course, fixed costs incurred with running servers and other components of the technology behind downloadable software and other media. Compare this with a purchase of an item of clothing from a leading high street retail outlet such as Zara. The purchase in this case is processed by a member

of staff at the store. Going back along the supply chain, there may be logistical or delivery costs and, of course, the labour and material cost of the item of clothing itself.

Questions

- 1 Do you agree the marginal cost of downloaded software or music is nil?
- 2 What marginal costs, if any, might be incurred by the provider of the servers where software/music is downloaded from?



References

- Prodhon, B. 'The marginal cost of software', *Enterprise Irregulars Blog*, available at www.enterpriseirregulars.com/31274/the-marginal-cost-of-software
- Naughton, J. (2015), 'How Amazon took control of the cloud', *The Observer*, 4 November 2015 Guardian News & Media Limited, London (UK). search.proquest.com/docview/1729584646?accountid=11526

THE COST AND MANAGEMENT ACCOUNTING INFORMATION SYSTEM

In the previous chapter, we noted that a cost and management accounting information system should generate information to meet the following requirements:

- 1 to allocate costs between cost of goods sold and inventories for internal and external profit measurement and inventory valuation;
- 2 to provide relevant information to help managers make better decisions;
- 3 to provide information for planning, control and performance measurement.

Modern information technology uses bar coding to gather cost information at source that is appropriately coded and classified to establish a database that enables data to be stored in a coherent way. Database software is now available from companies such as Oracle, Microsoft and IBM that enables relevant cost information to be extracted in different ways to meet each of the above requirements according to the specific needs of the different users of cost information. A suitable coding system enables costs to be accumulated by the required *cost objects* (such as products or services, departments, responsibility centres, distribution channels, etc.) and also to be classified by appropriate *categories of expense* (e.g. direct materials, direct labour and overheads) and also by *cost behaviour* (i.e. fixed and variable costs). In practice, direct material costs will be accumulated by each individual type of material, direct labour costs by different grades of labour and overhead costs by different categories of indirect expenses (e.g. rent, depreciation, supervision, etc.).

For *inventory valuation* in a manufacturing organization, the costs of all partly completed products (i.e. work in progress) and unsold finished products can be extracted from the database to ascertain the total cost assigned to inventories. The cost of goods sold that is deducted from sales revenues to compute the profit for the period can also be extracted by summing the manufacturing costs of all those products that have been sold during the period. We shall consider this process in more detail in Chapters 3 and 4.

Future costs, rather than past costs, are required for *decision-making*. Therefore, costs extracted from the database should be adjusted for anticipated price changes. Where a company sells many products or services their profitability should be monitored at regular intervals so that potentially unprofitable products can be highlighted for a more detailed study of their future viability. This information is extracted from the database with costs reported by categories of expenses and divided into their fixed and variable elements. In Chapter 10, we shall focus in more detail on product/segmented profitability analysis.

For *cost control and performance measurement*, costs and revenues must be traced to the individuals who are responsible for incurring them. This system is known as **responsibility accounting**. Responsibility accounting involves the creation of responsibility centres. A **responsibility centre** is an organization unit or part of a business for whose performance a manager is held accountable. At this stage, it may be easier for you to consider responsibility centres as being equivalent to separate departments within an organization. Responsibility accounting enables accountability for financial results and outcomes to be allocated to individuals (typically, heads of departments) throughout the organization. Performance reports are produced at regular intervals for each responsibility centre. The reports are generated by extracting costs from the database analysed by responsibility centres and cost category divided into controllable costs that can be influenced by the manager of the responsibility centre and those uncontrollable costs that cannot be influenced by the manager. Actual costs for each cost item listed on the performance report should be compared with budgeted costs so that those costs that do not conform to plan can be pinpointed and investigated. We examine responsibility accounting in more detail in Chapter 16.

SUMMARY

The following items relate to the learning objectives listed at the beginning of the chapter.

- **Explain why it is necessary to understand the meaning of different cost terms.**

The term 'cost' has multiple meanings and different types of cost are used in different situations. Therefore, a preceding term must be added to clarify the assumptions that underlie the measurement. A knowledge of cost and management accounting depends on a clear understanding of the terminology it uses.

- **Define and illustrate a cost object.**

A cost object is any activity for which a separate measurement of cost is required. In other words, managers often want to know the cost of something and the 'thing' that they want to know the cost of is a cost object. Examples of cost objects include the cost of a new product, the cost of operating a sales outlet, the cost of operating a specific machine and the cost of providing a service for a client.

- **Explain the meaning of each of the key terms highlighted in bold type in this chapter.**

You should check your understanding of each of the terms or concepts highlighted in bold by referring to the Key terms and concepts section.

- **Explain why in the short term some costs and revenues are not relevant for decision-making.**

In the short term, some costs and revenues may remain unchanged for all alternatives under consideration. For example, if you wish to determine the costs of driving to work in your own car or using public transport, the cost of the road fund taxation licence and insurance will remain the same for both alternatives, assuming that you intend to keep your car for leisure purposes. Therefore, the costs of these items are not relevant for assisting you in your decision to travel to work by public transport or in your own car. Costs that remain unchanged for all alternatives under consideration are not relevant for decision-making.

- **Describe the three purposes for which cost information is required.**

A cost and management accounting system should generate information to meet the following requirements:

- (a) to allocate costs between cost of goods sold and inventories for internal and external profit reporting and inventory valuation;
- (b) to provide relevant information to help managers make better decisions;
- (c) to provide information for planning, control and performance measurement.

A database should be maintained with costs appropriately coded or classified, so that relevant information can be extracted for meeting each of the above requirements.

KEY TERMS AND CONCEPTS

Avoidable costs Costs that may be saved by not adopting a given alternative.

Conversion cost The sum of direct labour and manufacturing overhead costs; it is the cost of converting raw materials into finished products.

Cost allocation The process of assigning costs to cost objects where a direct measure of the

resources consumed by these cost objects does not exist.

Cost object Any activity for which a separate measurement of costs is desired.

Differential costs The difference between the costs of each alternative action under consideration, also known as incremental costs.

- Direct labour costs** Labour costs that can be specifically and exclusively identified with a particular cost object.
- Direct material costs** Material costs that can be specifically and exclusively identified with a particular cost object.
- Fixed costs** Costs that remain constant for a specified time period and which are not affected by the volume of activity.
- Incremental costs** The difference between the costs of each alternative action under consideration, also known as differential costs.
- Indirect costs** Costs that cannot be identified specifically and exclusively with a given cost object, also known as overheads.
- Irrelevant costs and revenues** Future costs and revenues that will not be affected by a decision.
- Marginal cost** The additional cost of one extra unit of output.
- Marginal revenue** The additional revenue from one extra unit of output.
- Mixed costs** Costs that contain both a fixed and a variable component, also known as semi-variable costs.
- Opportunity costs** Costs that measure the opportunity that is sacrificed when the choice of one course of action requires that an alternative is given up.
- Overheads** Costs that cannot be identified specifically and exclusively with a given cost object, also known as indirect costs.
- Period costs** Costs that are not included in the inventory valuation of goods and which are treated as expenses for the period in which they are incurred.

- Prime cost** The sum of all direct manufacturing costs.
- Product costs** Costs that are identified with goods purchased or produced for resale and which are attached to products and included in the inventory valuation of goods.
- Relevant costs and revenues** Future costs and revenues that will be changed by a decision.
- Responsibility accounting** Accounting that involves tracing costs and revenues to responsibility centres.
- Responsibility centre** A unit or department within an organization for whose performance a manager is held responsible.
- Semi-fixed costs** Costs that remain fixed within specified activity levels for a given amount of time but which eventually increase or decrease by a constant amount at critical activity levels; also known as step-fixed costs.
- Semi-variable costs** Costs that contain both a fixed and a variable component, also known as mixed costs.
- Step-fixed costs** Costs that remain fixed within specified activity levels for a given amount of time but which eventually increase or decrease by a constant amount at critical activity levels; also known as semi-fixed costs.
- Sunk costs** Costs that have been incurred by a decision made in the past and that cannot be changed by any decision that will be made in the future.
- Unavoidable costs** Costs that cannot be saved, whether or not an alternative is adopted.
- Variable costs** Costs that vary in direct proportion to the volume of activity.

RECOMMENDED READING

This chapter has explained the meaning of important terms that you will encounter when reading this book. For a more comprehensive description and detailed

explanation of various cost terms, you should refer to the Chartered Institute of Management Accountants' Official Terminology (2005).

KEY EXAMINATION POINTS

First year management accounting course examinations frequently involve short essay questions requiring you to describe various cost terms or to discuss the concept that different costs are required for different purposes (see Review problems 2.20–2.26 for examples). It is therefore important that you understand all of the cost terms that have been described in this chapter. In particular, you should be able to explain the context within which a cost term is normally used. For example, a cost such as wages paid to casual labourers will be classified as indirect for inventory valuation

purposes, but as a direct charge to a responsibility centre or department for cost control purposes. A common error is for students to produce a very short answer, but you must be prepared to expand your answer and to include various situations within which the use of a cost term is appropriate. Always make sure your answer includes illustrations of cost terms. Multiple choice questions are also often set on topics included in this chapter. Review problems 2.15–2.19 are typical examples of such questions. You should now attempt these and compare your answers with the solutions.

ASSESSMENT MATERIAL

The review questions are short questions that enable you to assess your understanding of the main topics included in the chapter. The numbers in parentheses provide you with the page numbers to refer to if you cannot answer a specific question.

The review problems are more complex and require you to relate and apply the content to various business problems. The problems are graded by their level of difficulty. Solutions to review problems that are not preceded by the term 'IM' are provided in a separate section at the end of the book. Solutions to problems preceded by the term 'IM' are provided in the Instructor's Manual accompanying this book that can be downloaded from the lecturer's digital support resources. Additional review problems with fully worked solutions are provided in the *Student Manual* that accompanies this book.

REVIEW QUESTIONS

- 2.1** Define the meaning of the term 'cost object' and provide three examples of cost objects. (pp. 22–23)
- 2.2** Distinguish between a direct and indirect cost. (pp. 23–24)
- 2.3** Describe how a given direct cost item can be both a direct and indirect cost. (p. 25)
- 2.4** Provide examples of each of the following: (a) direct labour, (b) indirect labour, (c) direct materials, (d) indirect materials and (e) indirect expenses. (p. 24)
- 2.5** Explain the meaning of the terms: (a) prime cost, (b) overheads and (c) cost allocations. (pp. 25–26)
- 2.6** Distinguish between product costs and period costs. (pp. 26–28)
- 2.7** Provide examples of decisions that require knowledge of how costs and revenues vary with different levels of activity. (pp. 28–29)
- 2.8** Explain the meaning of each of the following terms: (a) variable costs, (b) fixed costs, (c) semi-fixed costs and (d) semi-variable costs. Provide examples of costs for each of the four categories. (pp. 29–31)
- 2.9** Distinguish between relevant (avoidable) and irrelevant (unavoidable) costs and provide examples of each type of cost. (pp. 31–32)
- 2.10** Explain the meaning of the term 'sunk cost'. (p. 33)
- 2.11** Distinguish between incremental and marginal costs. (pp. 34–35)
- 2.12** What is an opportunity cost? Give some examples. (pp. 33–34)
- 2.13** Explain responsibility accounting. (p. 36)

REVIEW PROBLEMS

2.14 Basic. Classify each of the following as being usually fixed (F), variable (V), semi-fixed (SF) or semi-variable (SV):

- (i) direct labour;
- (ii) depreciation of machinery;
- (iii) factory rental;
- (iv) supplies and other indirect materials;
- (v) advertising;
- (vi) maintenance of machinery;
- (vii) factory manager's salary;
- (viii) supervisory personnel;
- (ix) royalty payments.

2.15 Basic. The audit fee paid by a manufacturing company would be classified by that company as:

- (a) A production overhead cost;
- (b) A selling and distribution cost;
- (c) A research and development cost;
- (d) An administration cost.

CIMA Fundamentals of Management Accounting

2.16 Basic. Which ONE of the following costs would NOT be classified as a production overhead cost in a food processing company?

- (a) The cost of renting the factory building;
- (b) The salary of the factory manager;
- (c) The depreciation of equipment located in the materials store;
- (d) The cost of ingredients.

CIMA Fundamentals of Management Accounting

2.17 Basic. Which one of the following would be classified as indirect labour?

- (a) assembly workers on a car production line;
- (b) bricklayers in a house building company;

- (c) machinists in a factory producing clothes;
- (d) forklift truck drivers in the stores of an engineering company.

ACCA 1.2: Financial Information for Management

2.18 Basic. Fixed costs are conventionally deemed to be:

- (a) constant per unit of output;
- (b) constant in total when production volume changes;
- (c) outside the control of management;
- (d) those unaffected by inflation.

CIMA Stage 1 Cost Accounting

2.19 Intermediate. A manufacturing company has four types of cost (identified as T1, T2, T3 and T4). The total cost for each type at two different production levels is:

| Cost type | Total cost for 125 units (£) | Total cost for 180 units (£) |
|-----------|------------------------------------|------------------------------------|
| T1 | 1 000 | 1 440 |
| T2 | 1 750 | 2 520 |
| T3 | 2 475 | 2 826 |
| T4 | 3 225 | 4 644 |

Which cost types would be classified as being semi-variable?

- (a) T1
- (b) T2
- (c) T3
- (d) T4

ACCA Financial Information for Management

2.20 Intermediate. Prepare a report for the managing director of your company explaining how costs may be classified by their behaviour, with particular reference to the effects both on total and on unit costs. Your report should:

- (i) say why it is necessary to classify costs by their behaviour; and
- (ii) be illustrated by sketch graphs within the body of the report. (15 marks)

CIMA Stage 1 Accounting

2.21 Intermediate. Cost classifications used in costing include:

- (i) period costs;
- (ii) product costs;
- (iii) variable costs;
- (iv) opportunity costs.

Required:

Explain each of these classifications, with examples of the types of cost that may be included. (17 marks)

ACCA Level 1 Costing

2.22 Intermediate.

- (a) Describe the role of the cost accountant in a manufacturing organization. (8 marks)
- (b) Explain whether you agree with each of the following statements:
 - (i) 'All direct costs are variable.'
 - (ii) 'Variable costs are controllable and fixed costs are not.'
 - (iii) 'Sunk costs are irrelevant when providing decision making information.' (9 marks)

ACCA Level 1 Costing

2.23 Intermediate. 'Costs may be classified in a variety of ways according to their nature and the information needs of management.' Explain and discuss this statement, illustrating with examples of the classifications required for different purposes. (22 marks)

ICSA Management Accounting

2.24 Intermediate. It is commonly suggested that a management accounting system should be capable of supplying different measures of cost for different purposes. You are required to set out the main types of purpose for which cost information may be required in a business organization and to discuss the alternative measures of cost that might be appropriate for each purpose.

ICAEW Management Accounting

2.25 Intermediate. Opportunity cost and sunk cost are among the concepts of cost commonly discussed. You are required:

- (i) to define these terms precisely; (4 marks)
- (ii) to suggest for each of them situations in which the concept might be applied; (4 marks)
- (iii) to assess briefly the significance of each of the concepts. (4 marks)

ICAEW P2 Management Accounting

2.26 Intermediate. Distinguish between, and provide an illustration of:

- (i) 'avoidable' and 'unavoidable' costs;
- (ii) 'cost centres' and 'cost units'. (8 marks)

ACCA Foundation Paper 3

2.27 Intermediate: Cost behaviour.

| Data | (£) |
|---|------|
| Cost of motor car | 5500 |
| Trade-in price after two years or 60000 miles is expected to be | 1500 |
| Maintenance – six-monthly service costing | 60 |

| Data | (£) |
|--|------|
| Spares/replacement parts, per 1000 miles | 20 |
| Vehicle licence, per annum | 80 |
| Insurance, per annum | 150 |
| Tyre replacements after 25000 miles, four at £37.50 each | |
| Petrol, per gallon | 1.90 |
| Average mileage from one gallon is 25 miles. | |

(a) From the above data, you are required:

- (i) To prepare a schedule to be presented to management showing for the mileages of 5000, 10000, 15000 and 30000 miles per annum:
 - 1 total variable cost;
 - 2 total fixed cost;
 - 3 total cost;
 - 4 variable cost per mile (in pence to nearest penny);
 - 5 fixed cost per mile (in pence to nearest penny);
 - 6 total cost per mile (in pence to nearest penny).

If, in classifying the costs, you consider that some can be treated as either variable or fixed, state the assumption(s) on which your answer is based together with brief supporting reason(s).

- (ii) On graph paper, plot the information given in your answer to (i) above for the costs listed against (1), (2), (3) and (6).
- (iii) To read off from your graph(s) in (ii) and state the approximate total costs applicable to 18000 miles and 25000 miles and the total cost per mile at these two mileages.

(b) 'The more miles you travel, the cheaper it becomes.' Comment briefly on this statement. (25 marks)

CIMA Cost Accounting 1

2.28 Intermediate: Sunk and opportunity costs for decision-making. Mrs Johnston has taken out a lease on a shop for a down payment of £5000. Additionally, the rent under the lease amounts to £5000 per annum. If the lease is cancelled, the initial payment of £5000 is forfeit. Mrs Johnston plans to use the shop for the sale of clothing, and has estimated operations for the next 12 months as follows:

| | (£) | (£) |
|--|---------------|---------------|
| Sales | 115 000 | |
| Less Value-added tax (VAT) | <u>15 000</u> | |
| Sales less VAT | | 100 000 |
| Cost of goods sold | 50 000 | |
| Wages and wage related costs | 12 000 | |
| Rent including down payment | 10 000 | |
| Rates, heating, lighting and insurance | 13 000 | |
| Audit, legal and general expenses | <u>2 000</u> | |
| | | <u>87 000</u> |
| Net profit before tax | | <u>13 000</u> |

In the figures, no provision has been made for the cost of Mrs Johnston but it is estimated that one half of her time will be devoted to the business. She is undecided whether to continue with her plans, because she knows that she can sublet the shop to a friend for a monthly rent of £550 if she does not use the shop herself.

You are required to:

- (a) (i) explain and identify the 'sunk' and 'opportunity' costs in the situation depicted above;
- (ii) state what decision Mrs Johnston should make according to the information given, supporting your conclusion with a financial statement; (11 marks)

- (b) explain the meaning and use of 'notional' (or 'imputed') costs and quote two supporting examples. (4 marks)

CIMA Foundation Cost Accounting 1

IM2.1 Basic: Cost classification. For the relevant cost data in items (1)–(7), indicate which of the following is the best classification.

- (a) sunk cost;
- (b) incremental cost;
- (c) variable cost;
- (d) fixed cost;
- (e) semi-variable cost;
- (f) semi-fixed cost;
- (g) controllable cost;
- (h) non-controllable cost;
- (i) opportunity cost.

- 1 A company is considering selling an old machine. The machine has a book value of £20 000. In evaluating the decision to sell the machine, the £20 000 is a _____.
- 2 As an alternative to the old machine, the company can rent a new one. It will cost £3000 a year. In analysing the cost-volume behaviour the rental is a _____.
- 3 To run the firm's machines, there are two alternative courses of action. One is to pay the operators a base salary plus a small amount per unit produced. This makes the total cost of the operators a _____.
- 4 As an alternative, the firm can pay the operators a flat salary. It would then use one machine when volume is low, two when it expands, and three during peak periods. This means that the total operator cost would now be a _____.
- 5 The machine mentioned in (1) could be sold for £8000. If the firm considers retaining and using it, the £8000 is a _____.
- 6 If the firm wishes to use the machine any longer, it must be repaired. For the decision to retain the machine, the repair cost is a _____.
- 7 The machine is charged to the foreman of each department at a rate of £3000 a year. In evaluating the foreman, the charge is a _____.

IM2.2 Basic: Cost classification. A company manufactures and retails clothing. You are required to group the costs that are listed below and numbered (1)–(20) into the following classifications (each cost is intended to belong to only one classification):

- (i) direct materials;
 - (ii) direct labour;
 - (iii) direct expenses;
 - (iv) indirect production overhead;
 - (v) research and development costs;
 - (vi) selling and distribution costs;
 - (vii) administration costs;
 - (viii) finance costs.
- 1 lubricant for sewing machines;
 - 2 floppy disks for general office computer;
 - 3 maintenance contract for general office photocopying machine;
 - 4 telephone rental plus metered calls;
 - 5 interest on bank overdraft;
 - 6 Performing Rights Society charge for music broadcast throughout the factory;
 - 7 market research undertaken prior to a new product launch;
 - 8 wages of security guards for factory;
 - 9 carriage on purchase of basic raw material;
 - 10 royalty payable on number of units of product XY produced;
 - 11 road fund licences for delivery vehicles;
 - 12 parcels sent to customers;
 - 13 cost of advertising products on television;
 - 14 audit fees;
 - 15 chief accountant's salary;

- 16 wages of operatives in the cutting department;
- 17 cost of painting advertising slogans on delivery vans;
- 18 wages of storekeepers in materials store;
- 19 wages of forklift truck drivers who handle raw materials;
- 20 developing a new product in the laboratory. (10 marks)

CIMA Cost Accounting 1

IM2.3 Intermediate: Analysis of costs by behaviour for decision-making. The Northshire Hospital Trust operates two types of specialist X-ray scanning machine, XR1 and XR50. Details for the next period are estimated as follows:

| Machine | XR1 | XR50 |
|--|--------|--------|
| Running hours | 1 100 | 2 000 |
| | (£) | (£) |
| Variable running costs (excluding plates) | 27 500 | 64 000 |
| Fixed costs | 20 000 | 97 500 |

A brain scan is normally carried out on machine type XR1: this task uses special X-ray plates costing £40 each and takes four hours of machine time. Because of the nature of the process, around 10 per cent of the scans produce blurred and therefore useless results.

Required:

- (a) Calculate the cost of a satisfactory brain scan on machine type XR1. (7 marks)
- (b) Brain scans can also be done on machine type XR50 and would take only 1.8 hours per scan with a reduced reject rate of 6 per cent. However, the cost of the X-ray plates would be £55 per scan.

Required:

Advise which type should be used, assuming sufficient capacity is available on both types of machine. (8 marks)

CIMA Stage 1 Cost Accounting

IM2.4 Intermediate: Product cost calculation. From the information given below you are required to:

- (a) Prepare a standard cost sheet for one unit and enter on the standard cost sheet the costs to show sub-totals for:
 - (i) prime cost;
 - (ii) variable production cost;
 - (iii) total production cost;
 - (iv) total cost.

- (b) Calculate the selling price per unit allowing for a profit of 15 per cent of the selling price.

The following data are given:

Budgeted output for the year 9800 units

Standard details for one unit:

Direct materials 40 square metres at £5.30 per square metre

Direct wages:

Bonding department 48 hours at £12.50 per hour

Finishing department 30 hours at £7.60 per hour

Budgeted costs and hours per annum:

Variable overhead:

| | (£) | (hours) |
|--------------------------|---------|---------|
| Bonding department | 375 000 | 500 000 |
| Finishing department | 150 000 | 300 000 |
| Fixed overhead: | | |
| | (£) | (hours) |
| Production | 392 000 | |
| Selling and distribution | 196 000 | |
| Administration | 98 000 | |

(15 marks)

CIMA Cost Accounting 1

PART TWO

COST ACCUMULATION FOR INVENTORY VALUATION AND PROFIT MEASUREMENT

- 3 Cost assignment
- 4 Accounting entries for a job costing system
- 5 Process costing
- 6 Joint and by-product costing
- 7 Income effects of alternative cost accumulation systems

This section focuses mainly on assigning costs to products to divide costs incurred during a period between costs of goods sold and the closing inventory valuation. The extent to which product costs accumulated for inventory valuation and profit measurement should be adjusted for meeting decision-making, cost control and performance measurement requirements is also briefly considered. Inventory valuation is a topic that is mainly applicable to manufacturing organizations but some service organizations do have work in progress inventories. Because inventory valuation is a major issue in manufacturing organizations, most of the content in this section is related to the manufacturing environment.

Chapter 3 aims to provide you with an understanding of how costs are assigned to cost objects. In particular, the chapter focuses on the assignment of indirect costs using traditional and activity-based systems. In Chapter 4, the emphasis is on the accounting entries necessary to record transactions within a job-order costing system. The issues relating to a cost accumulation procedure for a process costing system are described in Chapter 5. This is a system that is applicable to industries that produce many units of the same product during a particular period. In Chapter 6, the problems associated with calculating product costs in those industries that produce joint and by-products are discussed. Chapter 7 is concerned with the alternative accounting methods of assigning fixed manufacturing overheads to products and their implications for profit measurement and inventory valuation.

The topics covered in the chapters in Section 2 focus mainly on technical aspects relating to how costs are accumulated for inventory valuation and profit measurement. Apart from Chapter 3 the content relates mainly to readers who are pursuing specialist accounting courses. If you are not pursuing a specialist accounting course, your syllabus is unlikely to require an understanding of the content covered in Chapters 4–7 and it is likely that only Chapter 3 will be relevant to you. It is therefore important that you check your course syllabus prior to determining which chapters within this section are relevant to you.

3

COST ASSIGNMENT

LEARNING OBJECTIVES After studying this chapter, you should be able to:

- distinguish between cause-and-effect and arbitrary cost allocations;
- explain why different cost information is required for different purposes;
- describe how cost systems differ in terms of their level of sophistication;
- understand the factors influencing the choice of an optimal cost system;
- explain why departmental overhead rates should be used in preference to a single blanket overhead rate;
- construct an overhead analysis sheet and calculate cost centre allocation rates;
- distinguish between traditional and activity-based costing (ABC) systems and calculate product costs derived from an ABC system;
- justify why budgeted overhead rates should be used in preference to actual overhead rates;
- calculate and explain the accounting treatment of the under-/over-recovery of overheads;
- explain how the cost assignment approach described for manufacturing organizations can be extended to non-manufacturing organizations.

In the previous chapter, it was pointed out that companies need cost and management accounting systems to perform a number of different functions. In this chapter, we are going to concentrate on two of these functions – they are (i) allocating costs between cost of goods sold and inventories for internal and external profit reporting and (ii) providing relevant decision-making information for distinguishing between profitable and unprofitable activities.

In order to perform the above functions, a cost accumulation system is required that assigns costs to cost objects. The aim of this chapter is to provide you with an understanding of how costs are accumulated and assigned to cost objects. You should have remembered from the previous chapter that a cost object is anything for which a separate measurement of cost is desired. Typical cost objects include products, services, customers and locations. In this chapter, we shall initially assume that products are the cost object. In particular, we shall concentrate on how costs are assigned to products in manufacturing firms that produce unique individual products or unique batches of products and where the

products or batches of products incur different costs resulting in the need to keep track of the cost of each product or batch. This cost assignment system is referred to as a **job-order costing system**. Our initial focus is also cost assignment for allocating costs between cost of goods sold and inventories for profit reporting. Later in the chapter we shall look at how the approaches that have been described for inventory (stock) valuations in manufacturing organizations can be applied to non-manufacturing organizations. We shall also consider how they can be adapted to providing decision-making information for distinguishing between profitable and unprofitable activities.

We begin by explaining how the cost assignment process differs for direct and indirect costs.

ASSIGNMENT OF DIRECT AND INDIRECT COSTS

Costs that are assigned to cost objects can be divided into two categories – direct costs and indirect costs. Sometimes the term **overheads** is used instead of indirect costs. Direct costs can be accurately traced to cost objects because they can be specifically and exclusively traced to a particular cost object whereas indirect costs cannot. Where a cost can be directly assigned to a cost object the term **direct cost tracing** is used. In contrast, direct cost tracing cannot be applied to indirect costs because they are usually common to several cost objects. Indirect costs are therefore assigned to cost objects using cost allocations.

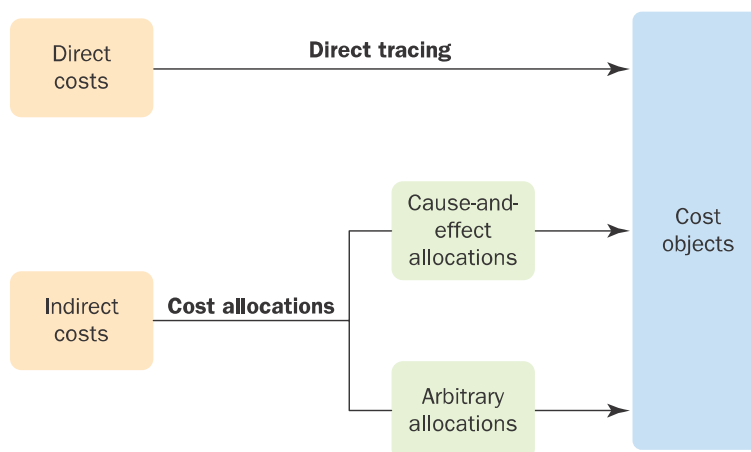
A **cost allocation** is the process of assigning costs when the quantity of resources consumed by a particular cost object cannot be directly measured. Cost allocations involve the use of surrogate rather than direct measures. For example, consider an activity such as receiving incoming materials. Assuming that the cost of receiving materials is strongly influenced by the number of receipts, then costs can be allocated to products (i.e. the cost object) based on the number of material receipts each product requires. The basis that is used to allocate costs to cost objects (i.e. the number of material receipts in our example) is called an **allocation base** or **cost driver**. If 20 per cent of the total number of receipts for a period were required for a particular product then 20 per cent of the total costs of receiving incoming materials would be allocated to that product. Assuming that the product were discontinued, and not replaced, we would expect action to be taken to reduce the resources required for receiving materials by 20 per cent.

In the above illustration, the allocation base is assumed to be a significant determinant of the cost of receiving incoming materials. Where allocation bases are significant determinants of costs the terms **cause-and-effect allocations** or **driver tracing** are used. Where a cost allocation base is used that is not a significant determinant of its cost, the term **arbitrary allocation** is used. An example of an arbitrary allocation would be if direct labour hours were used as the allocation base to allocate the costs of materials receiving. If a labour intensive product required a large proportion of direct labour hours (say 30 per cent) but few material receipts, it would be allocated with a large proportion of the costs of material receiving. The allocation would be an inaccurate assignment of the resources consumed by the product. Furthermore, if the product were discontinued, and not replaced, the cost of the material receiving activity would not decline by 30 per cent because the allocation base is not a significant determinant of the costs of the materials receiving activity. Arbitrary allocations are therefore likely to result in inaccurate allocations of indirect costs to cost objects.

Figure 3.1 provides a summary of the three methods of assigning costs to cost objects. You can see that direct costs are assigned to cost objects using direct cost tracing whereas indirect costs are assigned using either cause-and-effect or arbitrary cost allocations. For accurate assignment of indirect costs to cost objects, cause-and-effect allocations should be used. Two types of system can be used to assign costs to cost objects. They are direct and absorption costing systems. A **direct costing system** (also known as a marginal or variable costing system) assigns only direct costs to cost objects whereas an **absorption costing system** assigns both direct and indirect costs to cost objectives. Absorption costing systems can be sub-divided into **traditional costing systems** and **activity-based costing (ABC)** systems. Traditional costing systems were developed in the early 1900s and are still widely used today. They tend to use arbitrary cost allocations. ABC systems began to be implemented only in the 1990s.

FIGURE 3.1

Cost assignment methods



REAL WORLD VIEWS 3.1

Absorption costing used in practice

A questionnaire survey based on the responses of 272 practising UK management accountants who were members of the Chartered Institute of Management Accountants (CIMA) revealed that approximately 81 per cent of the respondent firms used absorption costing techniques to allocate overheads to products. The survey also revealed that absorption costing was used to a greater degree in larger companies. Only 58 per cent of the smaller companies (defined as having less than 50 employees) used absorption costing

with the remaining 42 per cent using direct/variable costing.

Questions

- 1 Why do you think absorption costing is more likely to be used by larger business?
- 2 What difficulties might be faced by smaller firms who may want to utilize absorption costing?

Reference

Brierley, J.A. (2011) 'A comparison of the product costing practices of large and small-to medium-sized enterprises: A survey of British manufacturing firms', *International Journal of Management* 28(4): 184–195.

One of the major aims of ABC systems is to use mainly cause-and-effect cost allocations and avoid arbitrary allocations. Both cost systems adopt identical approaches to assigning direct costs to cost objects. We shall look at traditional and ABC systems in more detail later in the chapter.

DIFFERENT COSTS FOR DIFFERENT PURPOSES

Manufacturing organizations assign costs to products for two purposes: first, for internal profit measurement and external financial accounting requirements in order to allocate the manufacturing costs incurred during a period between cost of goods sold and inventories; second, to provide useful information for managerial decision-making requirements. In order to meet financial accounting requirements, it may not be necessary to accurately trace costs to *individual* products. Consider a situation where a firm produces 1000 different products and the costs incurred during a period are £10 million. A well-designed product costing system should accurately analyse the £10 million costs incurred between cost of sales and inventories. Let us assume the true figures are £7 million and £3 million. Approximate but inaccurate *individual* product costs may provide a reasonable approximation of how much of the £10 million should be attributed to cost of sales and inventories. Some product costs may be overstated

and others may be understated, but this would not matter for financial accounting purposes as long as the *total* of the individual product costs assigned to cost of sales and inventories was approximately £7 million and £3 million.

For decision-making purposes, however, more accurate *individual* product costs are required so that we can distinguish between profitable and unprofitable products. By more accurately measuring the resources consumed by products, or other cost objects, a firm can identify its sources of profits and losses. If the cost system does not capture sufficiently accurately the consumption of resources by products, the reported product costs will be distorted, and there is a danger that managers may drop profitable products or continue production of unprofitable products.

Besides different levels of accuracy, different cost information is required for different purposes. For meeting external financial accounting requirements, financial accounting regulations and legal requirements in most countries require that inventories should be valued at manufacturing cost. Therefore, only manufacturing costs are assigned to products for meeting external financial accounting requirements. For decision-making, non-manufacturing costs must be taken into account and assigned to products. Not all costs, however, may be relevant for decision-making. For example, depreciation of plant and machinery will not be affected by a decision to discontinue a product. Such costs were described in the previous chapter as irrelevant and sunk for decision-making. Thus, depreciation of plant must be assigned to products for inventory valuation but it should not be assigned for discontinuation decisions.

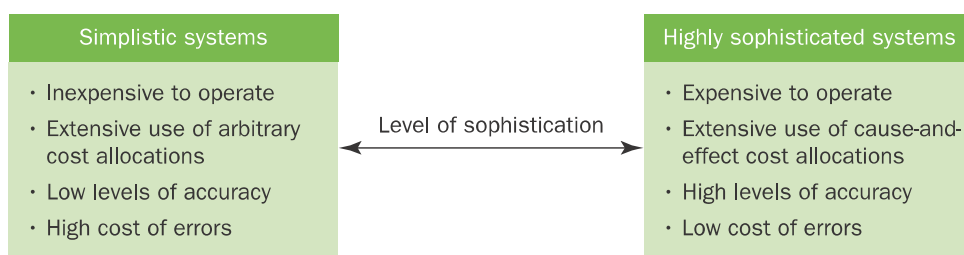
COST-BENEFIT ISSUES AND COST SYSTEMS DESIGN

Until the 1990s most organizations relied on traditional costing systems that had been designed primarily for meeting external financial accounting requirements. These systems were designed decades ago when information processing costs were high and precluded the use of more sophisticated methods of assigning indirect costs to products. Such systems are still widely used today. They rely extensively on arbitrary cost allocations which may not be sufficiently accurate for meeting decision-making requirements.

In the 1990s ABC systems were promoted as a mechanism for more accurately assigning indirect costs to cost objects. Surveys in many countries suggest that between 20 and 30 per cent of the surveyed organizations currently use ABC systems. The majority of organizations, therefore, continue to operate traditional systems. Both traditional and ABC systems vary in their level of sophistication but, as a general rule, traditional systems tend to be simplistic whereas ABC systems tend to be more sophisticated. What determines the chosen level of sophistication of a costing system? The answer is that the choice should be made on costs versus benefits criteria. Simplistic systems are inexpensive to operate, but they are likely to result in inaccurate cost assignments and the reporting of inaccurate costs, which can cause managers to make dangerous mistakes. The end result may be a high cost of errors. Conversely, sophisticated systems are more expensive to operate but they minimize the cost of errors.

Figure 3.2 illustrates the above points with costing systems ranging from simplistic to sophisticated. In practice, cost systems in most organizations are not located at either of these extreme points but are positioned somewhere within the range shown in Figure 3.2. The aim should not be to have the most accurate cost system. Improvements should be made in the level of sophistication of the costing system

FIGURE 3.2
Cost systems –
varying levels
of sophistica-
tion for cost
assignment



up to the point where the marginal/incremental cost of improvement equals the marginal/incremental benefit from the improvement.

The optimal cost system for an organization can be influenced by several factors. For example, the optimal costing system will be located towards the extreme left for an organization whose indirect costs are a low percentage of total costs and which also has a fairly standardized product range, all consuming organizational resources in similar proportions. In these circumstances, simplistic systems may not result in the reporting of inaccurate costs. In contrast, the optimal costing system for organizations with a high proportion of indirect costs, whose products consume organizational resources in different proportions, will be located towards the extreme right. More sophisticated costing systems are required to capture the diversity of consumption of organizational resources and accurately assign the high level of indirect costs to different cost objects.

ASSIGNING DIRECT COSTS TO COST OBJECTS

Both simplistic and sophisticated systems accurately assign direct costs to cost objects. Cost assignment merely involves the implementation of suitable data processing procedures to identify and record the resources consumed by cost objects. Consider direct labour. The time spent on providing a service to a specific customer, or manufacturing a specific product, is recorded on source documents, such as **time sheets** or **job cards**. Details of the customer's account number, job number or the product's code are also entered on these documents. The employee's hourly rate of pay is then entered so that the direct labour cost for the employee can be assigned to the appropriate cost object.

For direct materials, the source document is a **materials requisition**. Details of the materials issued for manufacturing a product, or providing a specific service, are recorded on the materials requisition. The customer's account number, job number or product code is also entered and the items listed on the requisition are priced at their cost of acquisition. The details on the material requisition thus represent the source information for assigning the cost of the materials to the appropriate cost object. A more detailed explanation of this procedure is provided in the next chapter.

In many organizations, the recording procedure for direct costs is computerized using bar coding and other forms of online information recording. The source documents exist only in the form of computer records. Because the assignment of direct costs to cost objects is a straightforward process, whereas the assignment of indirect costs is a more complex process, the remainder of this chapter will focus on indirect cost assignment.

PLANT-WIDE (BLANKET) OVERHEAD RATES

The most simplistic traditional costing system assigns indirect costs (overheads) to cost objects using a single overhead rate for the organization as a whole, known as **blanket overhead rate** or **plant-wide rate**. Such a costing system would be located at the extreme left of the level of sophistication shown in Figure 3.2. Let us assume that the total manufacturing overheads for the manufacturing plant of Arcadia are £9 million and that the company has selected direct labour hours as the allocation base for assigning overheads to products. Assuming that the total number of direct labour hours are 600 000 for the period, the plant-wide overhead rate for Arcadia is £15 per direct labour hour (£9 million/600 000 direct labour hours). This calculation consists of two stages. First, overheads are accumulated in one single plant-wide pool for a period. Second, a plant-wide rate is computed by dividing the total amount of overheads accumulated (£9 million) by the selected allocation base (600 000 direct labour hours). The overhead costs are assigned to products by multiplying the plant-wide rate by the units of the selected allocation base (direct labour hours) used by each product.

Assume now that Arcadia is considering establishing separate overheads for each of its three production departments. Further investigations reveal that the products made by the company require different operations and some products do not pass through all three departments. These investigations

also indicate that the £9 million total manufacturing overheads and 600 000 direct labour hours can be analysed as follows:

| | <i>Department A</i> | <i>Department B</i> | <i>Department C</i> | <i>Total</i> |
|---|---------------------|---------------------|---------------------|--------------|
| Overheads | £2 000 000 | £6 000 000 | £1 000 000 | £9 000 000 |
| Direct labour hours | 200 000 | 200 000 | 200 000 | 600 000 |
| Overhead rate per direct labour hour | £10 | £30 | £5 | £15 |

Now consider a situation where product Z requires 20 direct labour hours in department C but does not pass through departments A and B. If a plant-wide overhead rate is used then overheads of £300 (20 hours at £15 per hour) will be allocated to product Z. Contrariwise, if a departmental overhead rate is used, only £100 (20 hours at £5 per hour) would be allocated to product Z. Which method should be used? The logical answer must be to establish separate departmental overhead rates, since product Z only consumes overheads in department C. If the plant-wide overhead rate were applied, all the factory overhead rates would be averaged out and product Z would be indirectly allocated with some of the overheads of department B. This would not be satisfactory, since product Z does not consume any of the resources and this department incurs a large amount of the overhead expenditure.

Where some departments are more 'overhead intensive' than others, products spending more time in these departments should be assigned more overhead costs than those spending less time. Departmental rates capture these possible effects but plant-wide rates do not, because of the averaging process. We can conclude that a plant-wide rate will generally result in the reporting of inaccurate product costs and can only be justified when all products consume departmental overheads in approximately the same proportions (i.e. low product diversity applies). In the above illustration, each department accounts for one-third of the total direct labour hours. If all products spend approximately one-third of their time in each department, a plant-wide overhead rate can safely be used. Consider a situation in which product X spends one hour in each department and product Y spends five hours in each department. Overheads of £45 and £225 respectively would be allocated to products X and Y using either a plant-wide rate (three hours at £15 and 15 hours at £15) or separate departmental overhead rates. However, if a diverse product range is produced with products spending different proportions of time in each department, separate departmental overhead rates should be established.

Surveys indicate that less than 5 per cent of the surveyed organizations use a single plant-wide overhead rate. In Scandinavia, only 5 per cent of the Finnish companies (Lukka and Granlund, 1996), one Norwegian company (Bjornenak, 1997b) and none of the Swedish companies sampled (Ask, Ax and Jonsson, 1996) used a single plant-wide rate. Zero usage of plant-wide rates was also reported from a survey of Greek companies (Ballas and Venieris, 1996). In a more recent study of UK organizations, Al-Omiri and Drury (2007) reported that a plant-wide rate was used by 4 per cent of the surveyed organizations.

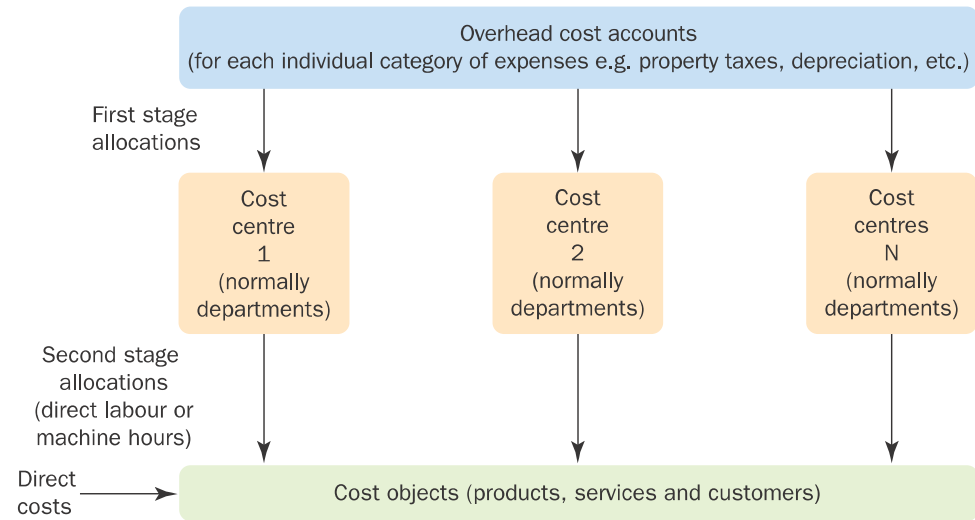
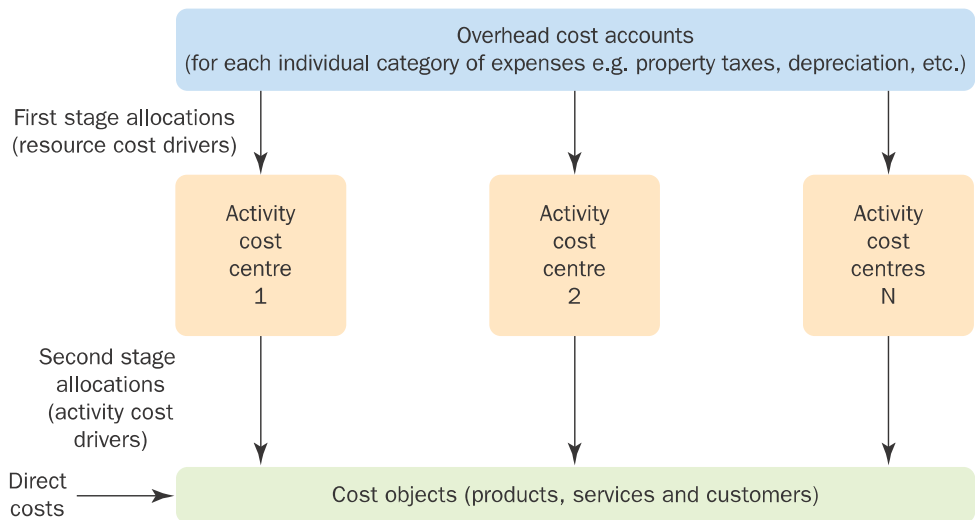
THE TWO-STAGE ALLOCATION PROCESS

It is apparent from the previous section that separate departmental overhead rates should normally be established. To establish departmental overhead rates, an approach known as the two-stage allocation process is used. This process applies to assigning costs to other cost objects, besides products, and is applicable to all organizations that assign indirect costs to cost objects. The approach applies to both traditional and ABC systems.

The two-stage allocation process for traditional and ABC systems is illustrated in Figure 3.3. You can see in the upper section for a traditional costing system that in the *first stage*, overheads are assigned to cost centres (also called cost pools). The terms **cost centres** or **cost pools** are used to describe a location to which overhead costs are initially assigned. Normally cost centres consist of departments, but in some cases they consist of smaller segments such as separate work centres within a department.

FIGURE 3.3

An illustration of the two-stage allocation process for traditional and activity-based costing systems

(a) Traditional costing systems**(b) Activity-based costing systems**

In the *second stage*, the costs accumulated in the cost centres are allocated to cost objects using selected allocation bases (you should remember from our discussion earlier that allocation bases are also called cost drivers). Traditional costing systems tend to use a small number of second stage allocation bases, typically direct labour hours or machine hours. In other words, traditional systems assume that direct labour or machine hours have a significant influence in the long term on the level of overhead expenditure. Other allocation bases used to a lesser extent by traditional systems are direct labour cost, direct materials cost and units of output. These methods are described and illustrated in Learning Note 3.1 on the dedicated digital support resources (see Preface for details).

Within the two-stage allocation process, ABC systems (see the lower section of Figure 3.3) differ from traditional systems by having a greater number of cost centres in the first stage and a greater number, and variety, of cost drivers or allocation bases in the second stage. Both systems will be described in more detail later in the chapter.

How many cost centres should a firm establish? If only a small number of cost centres are established it is likely that activities within a cost centre will not be homogeneous and, if the consumption of the activities by products/services within the cost centres varies, activity resource consumption

will not be accurately measured. Therefore, in most situations, increasing the number of cost centres increases the accuracy of measuring the indirect costs consumed by cost objects. The choice of the number of cost centres should be based on cost–benefit criteria using the principles described on pages 47–48. A survey by Drury and Tayles (2007) of 170 UK organizations reported that 35 per cent of the organizations used fewer than 11 cost centres whereas 36 per cent used more than 20 cost centres. In terms of the number of different types of second stage cost drivers/allocation bases, 59 per cent of the responding organizations used fewer than three.

AN ILLUSTRATION OF THE TWO-STAGE PROCESS FOR A TRADITIONAL COSTING SYSTEM

We shall now use Example 3.1 to provide a more detailed illustration of the two-stage allocation process for a traditional costing system. Note that a manufacturing company is used to illustrate the process. We shall also assume that the aim is to calculate product costs that are required for inventory valuation and profit measurement purposes. To keep the illustration manageable it is assumed that the company has only five cost centres – machine departments X and Y, an assembly department and materials handling and general factory support cost centres. The illustration focuses on manufacturing costs but we shall look at non-manufacturing costs later in the chapter. Applying the two-stage allocation process requires the following four steps:

- 1 assigning all manufacturing overheads to production and service cost centres;
- 2 reallocating the costs assigned to service cost centres to production cost centres;
- 3 computing separate overhead rates for each production cost centre;
- 4 assigning cost centre overheads to products or other chosen cost objects.

Steps 1 and 2 comprise stage one and steps 3 and 4 relate to the second stage of the two-stage allocation process. Let us now consider each of these steps in detail.

Step 1 – Assigning all manufacturing overheads to production and service cost centres

Using the information given in Example 3.1, our initial objective is to assign all manufacturing overheads to production and service cost centres. To do this requires the preparation of an **overhead analysis sheet**, which is shown in Exhibit 3.1. In most organizations, it will consist only in computer form.

If you look at Example 3.1, you will see that the indirect labour and indirect material costs have been directly traced to cost centres. Although these items cannot be directly assigned to products they can be directly assigned to the cost centres. In other words, they are indirect costs when products are the cost objects, and direct costs when cost centres are the cost object. Therefore they are traced directly to the cost centres shown in the overhead analysis sheet in Exhibit 3.1. The remaining costs shown in Example 3.1 cannot be traced directly to the cost centres and must be allocated to the cost centre using appropriate allocation bases.

The term **first-stage allocation bases** is used to describe allocations at this point. The following list summarizes commonly used first-stage allocation bases:

| <i>Cost</i> | <i>Basis of allocation</i> |
|--|---------------------------------------|
| Property taxes, lighting and heating | Area |
| Employee-related expenditure: works management, works canteen, payroll office | Number of employees |
| Depreciation and insurance of plant and machinery | Value of items of plant and machinery |

EXAMPLE 3.1

The annual overhead costs for the Enterprise Company which has three production centres (two machine centres and one assembly centre) and two service centres (materials procurement and general factory support) are as follows:

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

The following information is also available:

| | <i>Book value of Machinery (£)</i> | <i>Area occupied (sq. metres)</i> | <i>Number of employees</i> | <i>Direct labour hours</i> | <i>Machine hours</i> |
|-----------------|--|---------------------------------------|--------------------------------|--------------------------------|--------------------------|
| Machine shop: X | 8 000 000 | 10 000 | 300 | 1 000 000 | 2 000 000 |
| Y | 5 000 000 | 5 000 | 200 | 1 000 000 | 1 000 000 |
| Assembly | 1 000 000 | 15 000 | 300 | 2 000 000 | |
| Stores | 500 000 | 15 000 | 100 | | |
| Maintenance | <u>500 000</u> | <u>5 000</u> | <u>100</u> | | |
| | <u>15 000 000</u> | <u>50 000</u> | <u>1 000</u> | | |

Details of total materials issues (i.e. direct and indirect materials) to the production centres are as follows:

| | £ |
|----------------|------------------|
| Machine shop X | 4 000 000 |
| Machine shop Y | 3 000 000 |
| Assembly | <u>1 000 000</u> |
| | <u>8 000 000</u> |

To allocate the overheads listed above to the production and service centres, we must prepare an overhead analysis sheet, as shown in Exhibit 3.1.

EXHIBIT 3.1 Overhead analysis sheet

| Item of expenditure | Basis of allocation | Production centres | | | | Service centres | |
|---------------------------------------|---------------------------|--------------------|----------------------|----------------------|----------------|---------------------------|-----------------------------|
| | | Total (£) | Machine centre X (£) | Machine centre Y (£) | Assembly (£) | Materials procurement (£) | General factory support (£) |
| Indirect wage and supervision | Direct | 6 080 000 | 1 000 000 | 1 000 000 | 1 500 000 | 1 100 000 | 1 480 000 |
| Indirect materials | Direct | 1 420 000 | 500 000 | 805 000 | 105 000 | | 10 000 |
| Lighting and heating | Area | 500 000 | 100 000 | 50 000 | 150 000 | 150 000 | 50 000 |
| Property taxes | Area | 1 000 000 | 200 000 | 100 000 | 300 000 | 300 000 | 100 000 |
| Insurance of machinery | Book value of machinery | 150 000 | 80 000 | 50 000 | 10 000 | 5 000 | 5 000 |
| Depreciation of machinery | Book value of machinery | 1 500 000 | 800 000 | 500 000 | 100 000 | 50 000 | 50 000 |
| Insurance of buildings | Area | 250 000 | 50 000 | 25 000 | 75 000 | 75 000 | 25 000 |
| Salaries of works management | Number of employees | <u>800 000</u> | <u>240 000</u> | <u>160 000</u> | <u>240 000</u> | <u>80 000</u> | <u>80 000</u> |
| | Step 1 of stage 1 | 11 700 000 | 2 970 000 | 2 690 000 | 2 480 000 | 1 760 000 | 1 800 000 |
| Reallocation of service centre costs | | | | | | | |
| Materials procurement | Value of materials issued | — | 880 000 | 660 000 | 220 000 | (1 760 000) | |
| General factory support | Direct labour hours | — | <u>450 000</u> | <u>450 000</u> | <u>900 000</u> | | (1 800 000) |
| | Step 2 of stage 1 | 11 700 000 | 4 300 000 | 3 800 000 | 3 600 000 | — | — |
| Machine hours and direct labour hours | | | 2 000 000 | 1 000 000 | 2 000 000 | | |
| Machine hour overhead rate | Step 3 | | £2.15 | £3.80 | | | |
| Direct labour hour overhead rate | Step 3 | | | | £1.80 | | |

Where utility consumption, such as lighting and heating, can be measured by separate meters located in each department, departmental consumption can be measured and the costs directly traced to the user departments.

Applying the allocation bases to the data given in respect of the Enterprise Company in Example 3.1, it is assumed that property taxes, lighting and heating, and insurance of buildings are related to the total floor area of the buildings, and the benefit obtained by each cost centre can therefore be ascertained according to the proportion of floor area which it occupies. The total floor area of the factory shown in Example 3.1 is 50 000 square metres; machine centre X occupies 20 per cent of this and machine centre Y a further 10 per cent. Therefore, if you refer to the overhead analysis sheet in

Exhibit 3.1, you will see that 20 per cent of property taxes, lighting and heating and insurance of buildings are allocated to machine centre X, and 10 per cent are allocated to machine centre Y.

The insurance premium paid and depreciation of machinery are generally regarded as being related to the book value of the machinery. Because the book value of machinery for machine centre X is 8/15 of the total book value, and machine centre Y is 5/15 of the total book value, then 8/15 and 5/15 of the insurance and depreciation of machinery is allocated to machine centres X and Y.

It is assumed that the amount of time that works management devotes to each cost centre is related to the number of employees in each centre; since 30 per cent of the total employees are employed in machine centre X, 30 per cent of the salaries of works management will be allocated to this centre.

If you now look at the overhead analysis sheet shown in Exhibit 3.1, you will see in the row labelled 'step 1 of stage 1' that all manufacturing overheads for the Enterprise Company have been assigned to the three production and two service cost centres.

Step 2 – Reallocating the costs assigned to service cost centres to production cost centres

The next step is to reallocate the costs that have been assigned to service cost centres to production cost centres. **Service departments** (i.e. service cost centres) are those departments that exist to provide services of various kinds to other units within the organization. They are sometimes called **support departments**. The Enterprise Company has two service centres. They are materials procurement and general factory support which includes activities such as production scheduling and machine maintenance. These service centres render essential services that support the production process, but they do not deal directly with the products. Therefore service centre costs are not allocated to products because products do not pass through these centres. Nevertheless, the costs of providing support services are part of the total product costs and therefore should be assigned to products. To assign costs to products traditional costing systems reallocate service centre costs to production centres that actually work on the product. The method that is chosen to allocate service centre costs to production centre should be related to the benefits that the production centres derive from the service rendered.

We shall assume that the value of materials issued (shown in Example 3.1) provides a suitable approximation of the benefit that each of the production centres receives from materials procurement. Therefore 50 per cent of the value of materials is issued to machine centre X, resulting in 50 per cent of the total costs of materials procurement being allocated to this centre. If you refer to Exhibit 3.1, you will see that £880 000 (50 per cent of material procurement costs of £1 760 000) has been reallocated to machine centre X. It is also assumed that direct labour hours provides an approximation of the benefits received by the production centres from general factory support resulting in the total costs for this centre being reallocated to the production centres proportionate to direct labour hours. Therefore, since machine centre X consumes 25 per cent of the direct labour hours, £450 000 (25 per cent of the total costs of £1 800 000 assigned to general factory support) has been reallocated to machine centre X. You will see in the row labelled 'step 2 of stage 1' in Exhibit 3.1 that all manufacturing costs have now been assigned to the three production centres. This completes the first stage of the two-stage allocation process.

Step 3 – Computing separate overhead rates for each production cost centre

The second stage of the two-stage process is to allocate overheads of each production centre to products passing through that centre by establishing departmental overhead rates. It is necessary to establish departmental overhead rates because multiple products are worked on by each producing department.

If each department worked only on one product all of the costs allocated to that department would be assigned to the product and step 3 would not be required. The allocation bases most frequently used by traditional costing systems for computing production cost centre rates, are based on the amount of time products spend in each production centre – for example direct labour hours, machine hours and direct wages. In respect of non-machine centres, direct labour hours is the most frequently used allocation base. This implies that the overheads incurred by a production centre are closely related to direct labour hours worked. In the case of machine centres, a machine hour overhead rate is preferable since most of the overheads (e.g. depreciation) are likely to be more closely related to machine hours. We shall assume that the Enterprise Company uses a **machine hour rate** for the machine production centres and a **direct labour hour rate** for the assembly centre. The overhead rates are calculated by applying the following formula:

$$\frac{\text{cost centre overheads}}{\text{cost centre direct labour hours or machine hours}}$$

The calculations (i.e. step 3 of the four steps of the two-stage allocation process) using the information given in Exhibit 3.1 are as follows:

$$\text{Machine centre X} = \frac{£4\,300\,000}{2\,000\,000 \text{ machine hours}} = £2.15 \text{ per machine hour}$$

$$\text{Machine centre Y} = \frac{£3\,800\,000}{1\,000\,000 \text{ machine hours}} = £3.80 \text{ per machine hour}$$

$$\text{Assembly department} = \frac{£3\,600\,000}{2\,000\,000 \text{ direct labour hours}} = £1.80 \text{ per direct labour hour}$$

Step 4 – Assigning cost centre overheads to products or other chosen cost objects

The final step is to allocate the overheads to products passing through the production centres. Therefore, if a product spends ten hours in machine cost centre A, overheads of £21.50 (10 × £2.15) will be allocated to the product. We shall compute the manufacturing costs of two products. Product A is a low sales volume product with direct costs of £100. It is manufactured in batches of 100 units and each unit requires five hours in machine centre A, ten hours in machine centre B and ten hours in the assembly centre. Product B is a high sales volume product thus enabling it to be manufactured in larger batches. It is manufactured in batches of 200 units and each unit requires ten hours in machine centre A, 20 hours in machine centre B and 20 hours in the assembly centre. Direct costs of £200 have been assigned to product B. The calculations of the manufacturing costs assigned to the products are as follows:

| <i>Product A</i> | £ |
|---|---------------|
| Direct costs (100 units × £100) | 10 000 |
| Overhead allocations | |
| Machine centre A (100 units × 5 machine hours × £2.15) | 1 075 |
| Machine centre B (100 units × 10 machine hours × £3.80) | 3 800 |
| Assembly (100 units × 10 direct labour hours × £1.80) | <u>1 800</u> |
| Total cost | <u>16 675</u> |
| Cost per unit (£16 675/100 units) = | £166.75 |

| <i>Product B</i> | £ |
|---|---------------|
| Direct costs (200 units × £200) | 40 000 |
| Overhead allocations | |
| Machine centre A (200 units × 10 machine hours × £2.15) | 4 300 |
| Machine centre B (200 units × 20 machine hours × £3.80) | 15 200 |
| Assembly (200 units × 20 direct labour hours × £1.80) | <u>7 200</u> |
| Total cost | <u>66 700</u> |
| Cost per unit (£66 700/200 units) = £333.50 | |

The overhead allocation procedure is more complicated where service cost centres serve each other. In Example 3.1, it was assumed that materials procurement does not provide any services for general factory support and that general factory support does not provide any services for materials procurement. An understanding of situations where service cost centres do serve each other is not, however, necessary for a general understanding of the overhead procedure, and the problem of service centre reciprocal cost allocations is therefore dealt with in Appendix 3.1.

AN ILLUSTRATION OF THE TWO-STAGE PROCESS FOR AN ABC SYSTEM

Earlier in this chapter, Figure 3.3 was used to contrast the general features of ABC systems with traditional costing systems. It was pointed out that ABC systems differ from traditional systems by having a greater number of cost centres in the first stage, and a greater number, and variety, of cost drivers/allocation bases in the second stage of the two-stage allocation process. We shall now look at ABC systems in more detail.

You will see from Figure 3.3 that another major distinguishing feature of ABC is that overheads are assigned to each major activity, rather than departments, which normally represent cost centres with traditional systems. **Activities** consist of the aggregation of many different tasks, events or units of work that cause the consumption of resources. They tend to consist of verbs associated with objects. Typical production support activities include schedule production, set-up machines, move materials, purchase materials, inspect items and process supplier records. When costs are accumulated by activities they are known as **activity cost centres**. Production process activities include machine products and assemble products. Thus, within the production process, activity cost centres are sometimes identical to the cost centres used by traditional cost systems. Generally with ABC systems cost centres are often decomposed into many different activity centres.

We shall now use Example 3.1 for the Enterprise Company to compute the product costs for an ABC system. The computations are shown in Exhibit 3.2. ABC systems normally decompose production cost centres into many different activity centres but to keep things simple we shall assume that the three production centres (i.e. the two machine centres and the assembly centre) established for the traditional costing system have also been identified as activity centres with the ABC system. Therefore, the production activity cost centres shown in Exhibit 3.2 are identical to the cost centres used by the traditional cost system shown in Exhibit 3.1. However, we shall assume that three activity centres have been established for each of the two support functions. For materials procurement the following activity centres have been established:

| <i>Activity</i> | £ | <i>Activity cost driver</i> |
|----------------------|------------------|-----------------------------|
| Purchasing materials | 960 000 | Number of purchase orders |
| Receiving materials | 600 000 | Number of material receipts |
| Disburse materials | <u>200 000</u> | Number of production runs |
| | <u>1 760 000</u> | |

EXHIBIT 3.2 Overheads assigned to the production of 1000 units of products A and B (ABC system)

| | Machine centre X | Machine centre Y | Assembly | Purchasing components | Receiving components | Disburse materials | Production scheduling | Set-up machines | Quality inspection |
|---|---------------------------|------------------|---------------------|---------------------------|-----------------------------|---------------------------|---------------------------|------------------------|----------------------------------|
| 1 Stage 1 assignment (£) | 2 970 000 | 2 690 000 | 2 480 000 | 960 000 | 600 000 | 200 000 | 1 000 000 | 600 000 | 200 000 |
| 2 Activity cost driver | Machine hours | Machine hours | Direct labour hours | Number of purchase orders | Number of material receipts | Number of production runs | Number of production runs | Number of set-up hours | Number of first item inspections |
| 3 Quantity of activity cost driver | 2 000 000 | 1 000 000 | 2 000 000 | 10 000 | 5 000 | 2 000 | 2 000 | 12 000 | 1 000 |
| 4 Activity cost driver rate (£) | £1.485 | £2.69 | £1.24 | £96 | £120 | £100 | £500 | £50 | £200 |
| 5 Quantity of activity cost driver for 100 units of product A | 500 hours | 1 000 hours | 1 000 hours | 1 purchased component | 1 component received | 5 production runs | 5 production runs | 50 set-up hours | 1 inspection |
| 6 Quantity of activity cost driver for 200 units of product B | 2 000 hours | 4 000 hours | 4 000 hours | 1 purchased component | 1 purchased component | 1 production run | 1 production run | 10 set-up hours | 1 inspection |
| 7 Overheads assigned to Product A (£) | 742.50 | 2 690.00 | 1 240.00 | 96.00 | 120.00 | 500.00 | 2 500.00 | 2 500.00 | 200.00 |
| 8 Overheads assigned to Product B (£) | 2 970.00 | 10 760.00 | 4 960.00 | 96.00 | 120.00 | 100.00 | 500.00 | 500.00 | 200.00 |
| 9 Product A total overhead cost = | £10 588.50 (sum of row 7) | | | | | | | | |
| 10 Product B total overhead cost = | £20 206.00 (sum of row 8) | | | | | | | | |

Therefore the assignment of £1 760 000 to the materials procurement department in Exhibit 3.1 is replaced by the assignments to the above three activities totalling £1 760 000 that are shown in row 1 of Exhibit 3.2. For the second support department (i.e. general factory support) used as a cost centre with the traditional costing system we shall assume that the following three activity cost centres have been identified:

| <i>Activity</i> | £ | <i>Activity cost driver</i> |
|-----------------------|------------------|---------------------------------|
| Production scheduling | 1 000 000 | Number of production runs |
| Set-up machines | 600 000 | Number of set-up hours |
| Quality inspection | 200 000 | Number of first item inspection |
| | <u>1 800 000</u> | |

You can see that the total costs assigned to the production scheduling, machines set up and quality inspection activities shown in row 1 in Exhibit 3.2 total £1 800 000, the same as the total allocated to the general factory support cost centre with the traditional costing system in the row labelled 'step 1 of stage 1' in Exhibit 3.1. The process of allocating the costs of £1 760 000 to the activity cost centres is the same as that used to allocate these costs with the traditional costing system. To simplify the presentation in Exhibit 3.2 the stage 1 cost assignments for the ABC system are not shown. Row 1 of Exhibit 3.2 therefore shows the completion of the first stage of the two-stage allocation process for both the traditional and ABC systems. The row labelled 'step 2 of stage 1' in Exhibit 3.1 indicates that overhead costs are assigned to *three* cost centres with the traditional system whereas row 1 of Exhibit 3.2 indicates that overheads are assigned to *nine* activity cost centres. Thus a major distinguishing feature between the two exhibits is that the ABC system uses a greater number of cost centres than traditional systems in the first stage of the two-stage allocation process.

We shall now compare the second stage of the two-stage allocation process for the traditional and ABC systems. You will see by referring back to Exhibit 3.1 that in the two final rows labelled 'step 3', separate machine hour overhead rates have been established for the two machine production centres and a direct labour hour rate has been established for the assembly department. Overheads are assigned to products A and B by multiplying the overhead rates by the quantity of the selected allocation base used by each product (see 'step 4' shown on page 55).

The same approach is used in Exhibit 3.2 with the ABC system. You will see from row 2 that seven different types of second stage cost drivers have been established for the ABC system. Cost driver rates are computed in row 4 by dividing the costs assigned to the activity cost centres in row 1 by the estimated quantity of the cost drivers for the period shown in row 3. Activity centre costs are assigned to products by multiplying the cost driver rate by the quantity of the cost driver used by products. These calculations are shown in rows 5–8 of Exhibit 3.2. For example, £960 000 has been assigned to the purchasing activity for processing 10 000 purchasing orders resulting in a cost driver rate of £96 per purchasing order. Rows 5 and 6 indicate that a batch of 100 units of product A, and 200 units of product B, each require one purchased component and thus one purchase order. Therefore purchase order costs of £96 are allocated to each batch in rows 7 and 8. Now look at the production scheduling column in Exhibit 3.2. You will see that £1m has been assigned to this activity for 2000 production runs resulting in a cost driver rate of £500 per production run. Rows 5 and 6 show that a batch of 100 units of product A requires five production runs whereas a batch of 200 units of product B requires one production run. Therefore production scheduling activity costs of £2500 ($5 \times £500$) are allocated to a batch of product A and £500 to a batch of product B in rows 7 and 8. The same approach is used to allocate the costs of the remaining activities shown in Exhibit 3.2. You should now work through Exhibit 3.2 and study the product cost calculations.

By comparing Exhibits 3.1 and 3.2 the major differences between traditional and ABC systems can be identified. They are:

- 1 ABC systems have a greater number of cost centres than traditional costing systems. Exhibit 3.1 indicates that three cost centres are used with the traditional costing system to determine cost

centre overhead rates whereas Exhibit 3.2 indicates that nine cost centres are used with the ABC system.

- 2 ABC systems use a greater number and variety of second stage cost drivers (Exhibit 3.2 shows that nine cost drivers consisting of seven different types are used with the ABC system whereas three cost drivers consisting of two different types are used by the traditional system shown in Exhibit 3.1).
- 3 The traditional costing system reallocates service/support department costs to production cost centres and allocates these costs within the production cost centre overhead rates (see 'Reallocation of service department costs' in Exhibit 3.1) whereas the ABC system does not reallocate these costs. Instead, the ABC system establishes separate cost driver rates for the support activities (see row 4 relating to the final six columns in Exhibit 3.2).

Step 4 of the traditional system (see page 55) and rows 9 and 10 of Exhibit 3.2 indicate that the overhead costs assigned to products A and B are as follows:

| | <i>Traditional costing system</i> | <i>ABC system</i> |
|---------------------------------|-----------------------------------|-------------------------------|
| | £ | £ |
| Batch of 100 units of product A | 6 675 | 10 588.50 |
| Batch of 200 units of product B | 26 700 | 20 206.00 |
| Product A cost per unit | 66.75 (£6 675/100 units) | 105.88 (£10 588.50/100 units) |
| Product B cost per unit | 133.50 (£26 700/200 units) | 101.03 (£20 206/200 units) |

Compared with the ABC system the traditional system under-costs product A and over-costs product B. By reallocating the service centre costs to the production centres, and allocating the costs to products on the basis of either machine hours or direct labour hours, the traditional system incorrectly assumes that these allocation bases are the cause of the costs of the support activities. Compared with product A, product B consumes twice as many machine and direct labour hours per unit of output. Therefore, relative to product A, the traditional costing system allocates twice the amount of support costs to product B.

In contrast, ABC systems create separate cost centres for each major support activity and allocate costs to products using cost drivers that are the significant determinants of the cost of the activities. The ABC system recognizes that a batch of both products consume the same quantity of purchasing, receiving and inspection activities and, for these activities, allocates the same costs to both products. Because product B is manufactured in batches of 200 units, and product A in batches of 100 units, the cost per unit of output for product B is half the amount of product A for these activities. Product A also has five unique machined components, whereas product B has only one, resulting in a batch of product A requiring five production runs whereas a batch of product B only requires one. Therefore, relative to product B, the ABC system assigns five times more costs to product A for the production scheduling and disbursement of materials activities (see rows 5–8 for these activities in Exhibit 3.2). Because product A is a more complex product it requires relatively more support activity resources and the cost of this complexity is captured by the ABC system.

It should be apparent from the computation of the product costs that traditional and ABC systems use the same basic approach. It is unfortunate that the terms traditional and ABC systems have emerged. They have now become the conventional terms used in the literature but using these terms gives the impression that they are two very different type of cost systems, when in reality they represent the same type of cost assignment system. If you re-examine the workings it will become apparent that one approach (ABC systems) merely uses more cost centres and different types of cost drivers. Rather than viewing the approaches as two separate systems it is preferable to view ABC systems as sophisticated or complex cost assignment systems and traditional systems as simple or unsophisticated cost assignment systems.

EXTRACTING RELEVANT COSTS FOR DECISION-MAKING

The cost computations relating to the Enterprise Company for products A and B represent the costs that should be generated for meeting inventory valuation and profit measurement requirements. For decision-making, non-manufacturing costs should also be taken into account. In addition, some of the costs that have been assigned to the products may not be relevant for certain decisions. For example, if you look at the overhead analysis sheet in Exhibit 3.1, you will see that property taxes, depreciation of machinery and insurance of buildings and machinery have been assigned to cost centres, and thus included in the costs assigned to products for both traditional and ABC systems. If these costs are unaffected by a decision to discontinue a product they should not be assigned to products when undertaking product discontinuation reviews. However, if cost information is used to determine selling prices, such costs may need to be assigned to products to ensure that the selling price of a customer's order covers a fair share of all organizational costs. It is therefore necessary to ensure that the costs incorporated in the overhead analysis are suitably coded so that different overhead rates can be extracted for different combinations of cost. This will enable relevant cost information to be extracted from the database for meeting different requirements. For an illustration of this approach you should refer to the answer to Review problem 3.23.

Our objective in this chapter has not been to focus on the cost information that should be extracted from the costing system for meeting decision-making requirements. Instead, it is to provide you with an understanding of how cost systems assign costs to cost objects. In Chapter 9, we shall concentrate on the cost information that should be extracted for decision-making. Also, only the basic principles of ABC have been introduced. A more theoretical approach to ABC will be presented in Chapter 10 with an emphasis being given to how cost information generated from an ABC system can be used for decision-making.

REAL WORLD VIEWS 3.2

Three cost allocation myths

Allan Stratton is a cost management consultant with over 35 years of experience who shares the benefit of his experience providing tools and resources via the internet. In one of his articles he debunks three myths on cost allocation.

All sorts of businesses and government organizations use cost allocation. It is a way of dividing and assigning the money that an entity spends. Sometimes this means spreading costs incurred by one department amongst others who also benefitted from the expense, sometimes it means distributing a cost across all products. Over time, several dangerous myths about cost allocation have developed.

First, that allocating costs improves decision-making; this is the intent but the outcome depends on the way it is done. Attention must be paid to cause and effect and/or the actual operating relationships, otherwise those using the data to make decisions may be misled.

Second, that all costs must be allocated. There is no reason to allocate a cost that will not influence a decision.

Third, that idle capacity cost must be allocated to actual products and services. A dangerous downward spiral could be started if idle capacity cost is allocated to products because this would result in higher product costs. If higher product costs are reported then the company may raise their prices in order to continue making the same profit margin.

Questions

- 1 Explain how applying each of the above three myths can lead to bad decisions.
- 2 What changes should be made to cost allocations to avoid the bad decisions?

Reference

Stratton, A. (2012) *Three Cost Allocation Myths*. Available at www.costmatters.com/2012/06/three-cost-allocation-myths/#more-415 (accessed 30 March, 2017).

BUDGETED OVERHEAD RATES

Our discussion in this chapter has assumed that the *actual* overheads for an accounting period have been allocated to the products. However, the use of actual figures can be problematic. This is because the product cost calculations have to be delayed until the end of the accounting period, since the overhead rate calculations cannot be obtained before this date. However, information on product costs is required more quickly if it is to be used for monthly profit calculations and inventory valuations or as a basis for setting selling prices. One may argue that the timing problem can be resolved by calculating actual overhead rates at more frequent intervals, say on a monthly basis, but the difficulty here is that a large amount of overhead expenditure is fixed in the short term whereas activity will vary from month to month, giving large fluctuations in the overhead rates.

REAL WORLD VIEWS 3.3

Product diversity and costing system design choice

Two Australian firms, one with three divisions (HC1, HC2 and HC3), and the second with two divisions (FT1 and FT2) were studied. HC1 and FT1 had the simplest costing systems with all of the overheads accumulated into a single cost pool. In other words, a plant-wide overhead rate was used. HC2 and HC3 established separate 'work centre cost pools' that reflect manufacturing processes (e.g. HC2 had three cost pools and HC3 two cost pools). Overheads such as power were directly traced to the work centres. The remaining overheads were allocated to the work centres based on their levels of direct labour hours (DLHs) usage. The work centre overhead was then determined by dividing the work centre cost pool by the number of DLHs and allocating the costs to the product according to the consumption of DLHs in each of the work centres.

FT2 was the only research site that had a highly sophisticated costing system consisting of many different cost pools. The overheads for each cost pool were allocated to products on the basis of two cost drivers, namely direct labour hours and machine hours. The overheads allocated based on DLHs included indirect labour associated with materials handling, packers and factory foremen. Overheads allocated on the basis of machine hours include costs that vary with machine hours (e.g. power and electricity) as well as fixed costs such as factory management and depreciation.

HC1, HC2 and FT1 all had low product diversity (i.e. products consumed organizational resources

in similar proportions) and users were satisfied with the information provided by the costing system. Both HC3 and FT2 had high levels of product diversity. FT2 had a relatively sophisticated costing system while HC3 maintained a simplistic system. The users of the costing system at FT2 were very satisfied with the system whereas there was much dissatisfaction with HC3's system. Costing information at HC3 was particularly important for determining product costs. However, management believed that the costs were highly inaccurate and were inadequate for setting prices. Overheads were large and product diversity was high, creating the need for a relatively sophisticated costing system. However, a simplistic costing system was implemented. This absence of 'fit' was a major dissatisfaction with the existing costing system. In contrast, there was a 'fit' between the costing systems and the level of product diversity in the four other business units and a general satisfaction with the costing systems.

Questions

- 1 Why might increasing the number of cost centres (pools) result in the reporting of more accurate product costs?
- 2 What other factors, besides product diversity, might enable a simplistic product costing system to report reasonably accurate product costs?

Reference

Adapted from Abernethy, M.A. et al. (2001), 'Product diversity and costing system design: Field study evidence', *Management Accounting Research* 12(3): 261–280.

EXAMPLE 3.2

The fixed overheads for Euro are £24 million per annum, and monthly production varies from 400 000 to one million hours. The monthly overhead rate for fixed overhead will therefore fluctuate as follows:

| | | |
|-----------------------|---------------|-----------------|
| Monthly overhead | £2 000 000 | £2 000 000 |
| Monthly production | 400 000 hours | 1 000 000 hours |
| Monthly overhead rate | £5 per hour | £2 per hour |

Overhead expenditure that is fixed in the short term remains constant each month, but monthly production fluctuates because of holiday periods and seasonal variations in demand. Consequently, the overhead rate varies from £2 to £5 per hour. It would be unreasonable for a product worked on in one month to be allocated overheads at a rate of £5 per hour and an identical product worked on in another month allocated at a rate of only £2 per hour.

Consider Example 3.2. The monthly overhead rates of £2 and £5 per hour are not representative of typical, normal production conditions. Management has committed itself to a specific level of fixed costs in the light of foreseeable needs for beyond one month. Thus, where production fluctuates, monthly overhead rates may be volatile. Furthermore, some costs such as repairs, maintenance and heating are not incurred evenly throughout the year. Therefore, if monthly overhead rates are used, these costs will not be allocated fairly to units of output. For example, heating costs would be charged only to winter production so that products produced in winter would be more expensive than those produced in summer.

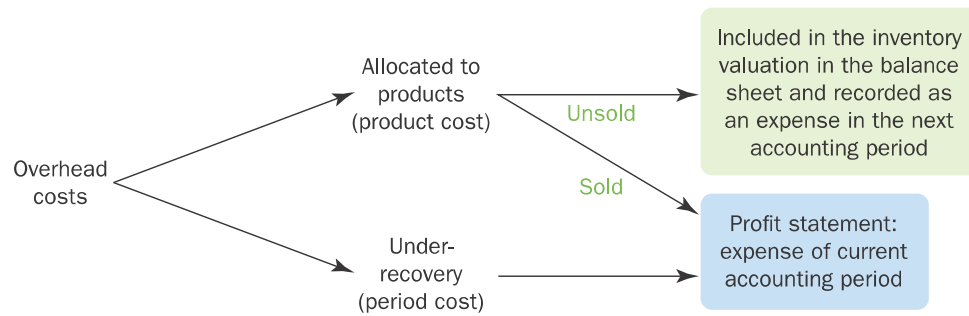
An average, annualized rate based on the relationship of total annual overhead to total annual activity is more representative of typical relationships between total costs and volume than a monthly rate. What is required is a normal product cost, based on average long-term production rather than an actual product cost, which is affected by month-to-month fluctuations in production volume. Taking these factors into consideration, it is preferable to establish a **budgeted overhead rate** based on annual *estimated* overhead expenditure and activity.

Consequently, the procedure outlined in the previous sections for calculating cost centre overhead rates for traditional and ABC systems should be based on *standard (estimated)* activity levels and not *actual* activity levels. We shall consider how we might determine standard activity in Chapter 7. Surveys of product costing practices indicate that most organizations use annual budgeted activity as a measure of standard activity.

UNDER- AND OVER-RECOVERY OF OVERHEADS

The effect of calculating overhead rates based on budgeted annual overhead expenditure and activity is that it will be most unlikely that the overhead allocated to products manufactured during the period will be the same as the actual overhead incurred. Consider a situation where the estimated annual fixed overheads are £2 000 000 and the estimated annual activity is 1 000 000 direct labour hours. The estimated fixed overhead rate will be £2 per hour. Assume that actual overheads are £2 000 000 and are therefore identical with the estimate, but that actual activity is 900 000 direct labour hours instead of the estimated 1 000 000 hours. In this situation, only £1 800 000 will be charged to production. This calculation is based on 900 000 direct labour hours at £2 per hour, giving an under-recovery of overheads of £200 000.

FIGURE 3.4
Illustration of
under-recovery
of factory
overheads



Consider an alternative situation where the actual overheads are £1 950 000 instead of the estimated £2 000 000, and actual activity is 1 000 000 direct labour hours, which is identical to the original estimate. In this situation, 1 000 000 direct labour hours at £2 per hour will be charged to production giving an over-recovery of £50 000. This example illustrates that there will be an **under- or over-recovery of overheads** whenever actual *activity* or overhead *expenditure* is different from the budgeted overheads and activity used to estimate the budgeted overhead rate. This under- or over-recovery of *fixed* overheads arising from actual activity differing from budgeted activity is also called a **volume variance** and any under- or over-recovery arising from actual fixed overhead expenditure differing from budget is also called a **fixed overhead expenditure variance**.

Accounting regulations in most countries recommend that the under- or over-recovery of overheads should be regarded as a period cost adjustment. For example, the UK Financial Reporting Standard 102 (FRS 102) on Stocks and Work in Progress, and the international accounting standard on inventories (IAS2), recommend that the allocation of overheads in the valuation of inventories and work in progress needs to be based on the company's normal level of activity and that any under- or over-recovery should be written off in the current year. This procedure is illustrated in Figure 3.4. Note that any under- or over-recovery of overhead is not allocated to products. Also note that the under-recovery is recorded as an expense in the current accounting period whereas an over-recovery is recorded as a reduction in the expenses for the period. Finally, you should note that our discussion here is concerned with how to treat any under- or over-recovery for the purpose of financial accounting and its impact on inventory valuation and profit measurement.

NON-MANUFACTURING OVERHEADS

For financial accounting purposes, only manufacturing costs are allocated to products. Non-manufacturing overheads are regarded as period costs and are disposed of in exactly the same way as the under- or over-recovery of manufacturing overheads outlined in Figure 3.4. For external reporting, it is therefore unnecessary to allocate non-manufacturing overheads to products. However, for decision-making, it may be necessary to assign non-manufacturing costs to products. For example, in many organizations, it is not uncommon for selling prices to be based on estimates of total cost or even actual cost. Housing contractors and garages often charge for their services by adding a percentage profit margin to actual cost.

Some non-manufacturing costs may be a direct cost of the product. Delivery costs, salesmen's salaries and travelling expenses may be directly identifiable with the product, but it is likely that many non-manufacturing overheads cannot be allocated directly to specific products. On what basis should we allocate non-manufacturing overheads? The answer is that we should select an allocation base/cost driver that corresponds most closely to the causation of non-manufacturing overheads. The problem is that cause-and-effect allocation bases cannot be established for many non-manufacturing overheads. Therefore, an allocation base must be used which, although arbitrary, allocates costs on

REAL WORLD VIEWS 3.4

Overheads in cafés

Bubble tea cafés are becoming increasingly popular across Malaysia and in recent years, many new chains have been formed, opening cafés in mainly urban locations.

Leading bubble tea firms provide some interesting information on the rapid growth of the product in recent years. According to Bryan Loo of Chatime (which is quoted on the Taiwan stock exchange), the rationale for setting up a bubble tea business was that there is a strong demand for tea in Malaysia, but no tea businesses as such – in the coffee business names like Starbucks are already in situ. Bubble tea is also more appealing to health-conscious consumers. Globally, Chatime has more than 800 outlets as of 2016, 116 of which are in Malaysia.

The primary business model for the new cafés is a franchise model. The cost of setting up a café in Malaysia is at least RM200 000 (about £45 000), depending on factors such as location,

size and renovation costs. According to Billy Koh, the franchisor for Gong Cha brand bubble tea, overhead costs of running a café are typically higher in a shopping mall franchise than in a normal high-street type shop. However, the profit margins are reasonable at approximately 30 per cent for a typical franchise operation. The lower margin is attributable to the high materials cost.

Questions

- 1 Can you think of some examples of overhead costs that might be incurred by cafés such as those described above?
- 2 How would these overheads affect profit if sales declined?

References

- Wei-Shen, W. (2012) Bubble tea craze leads to a flurry of stores opening in Klang Valley, *The Star* (Malaysia), 19 March. Available at www.thestar.com.my/news/community/2012/03/19/bubble-tea-craze-leads-to-a-flurry-of-stores-opening-in-klang-valley/
- Chatime (2015) Nothing but bubbling good ... Available at www.chatime.com.my/main/story.php

EXAMPLE 3.3

The estimated non-manufacturing and manufacturing costs of a company for the year ending 31 December are £500 000 and £1 million,

respectively. The non-manufacturing overhead absorption rate is calculated as follows:

$$\frac{\text{estimated non-manufacturing overhead}}{\text{estimated manufacturing cost}}$$

In percentage terms, each product will be allocated with non-manufacturing overheads at a rate of 50 per cent of its total manufacturing cost.

as reasonable a basis as possible. A widely used approach is to allocate non-manufacturing overheads on the ability of the products to bear such costs. This approach can be implemented by allocating non-manufacturing costs to products on the basis of their manufacturing costs. This procedure is illustrated in Example 3.3.

COST ASSIGNMENT IN NON-MANUFACTURING ORGANIZATIONS

So far in this chapter we have concentrated on describing a job-order costing system that is used in manufacturing firms where the products incur different costs resulting in the need to keep track of the cost of each product or batch of products. In particular, we have focused on cost assignment for allocating

costs between cost of goods sold and inventories for profit reporting. Many service organizations also use a job-order costing system. For example, accounting, law, printing, automotive and appliance repair firms provide unique services to customers resulting in the need to track the costs of the services provided to each customer. The costs assigned to each customer are also often used to determine the prices of the services that have been provided. These firms may also have inventories consisting of work partially completed (i.e. WIP) at the end of the accounting period. The same basic concepts and procedures that are used by manufacturing organizations can therefore be applied where the cost of a service provided to customer differs.

Consider a firm of accountants that provide three different types of service – audit, taxation and financial consultancy. These three services can be viewed as being equivalent to production departments in manufacturing organizations. Direct labour costs consist of chargeable hours that can be specifically identified with individual customers. Separate overhead rates can be established for each of the three service departments. Some costs, such as the cost of non-chargeable hours arising for staff development and training and departmental secretarial salaries, can be directly traced to each of the three service departments. The cost of the support departments such as printing and photocopying, data processing and general administration are reallocated to the three service departments (audit, tax and consultancy departments) using appropriate allocation bases. The choice of specific allocation bases should be based on a detailed study of the benefits received by the three service departments from the support departments.

We shall assume that the identified allocation bases are number of pages printed/photocopied for the printing/photocopying department and the number of chargeable hours for the data processing and general administration departments. The total costs assigned to each of the three service departments (audit, taxation and consultancy) after support department reallocation are divided by the number of chargeable (direct) labour hours to establish an overhead rate for each service department (audit, taxation and consultancy). Therefore, the total cost assigned to each customer is the sum of the direct costs plus the chargeable hours in each department multiplied by the appropriate overhead rate. In other words, it is assumed that the overheads incurred by each service department are closely related to chargeable hours.

However, a job-order costing system as described above is inappropriate for many non-manufacturing organizations for the following reasons:

- 1** They do not provide unique services for customers. Instead, they provide similar services for a large number of customers. Consider a bank whose principal activities include mortgage lending, personal lending, variable interest and fixed interest savings accounts, insurance, foreign currency, etc. It is not feasible or useful to track the costs of undertaking these activities to individual customers. Instead, costs are assigned to each activity so that the total costs incurred can be deducted from sales revenue to periodically determine the profits/losses of each activity.
- 2** They do not need to assign costs to individual customers to determine prices of the services provided because prices are determined by market forces rather than cost.
- 3** They do not convert purchased materials into finished products or have work in progress. Therefore, there is no legal requirement to assign indirect costs to cost objects for inventory valuation.

Instead of using job-order costing systems, the above organizations require costing systems that support profitability analysis. They need to undertake periodic profitability analysis that analyses profits by appropriate activities (e.g. products, services, departments, locations, etc.) so that they can distinguish between profitable and unprofitable activities in order to ensure that only profitable activities are undertaken. Consider a merchandising company such as a departmental store that analyses profits by departments (e.g. televisions and DVD players, computers, clothing, and furniture departments). The company does not have to adhere to legal requirements for assigning indirect costs to goods processed for inventory valuation. It may choose not to assign indirect costs

to departments where they are a small proportion of total costs or are common to all departments resulting in arbitrary allocations not having to be relied upon. In other words, only direct costs are assigned to departments so that departmental profits cannot be reported. Instead, departmental profit contributions to indirect costs (i.e. sales revenues less direct costs) are reported. A system that assigns only direct costs to cost objects is called direct costing. This costing system will be examined in detail in Chapter 7.

Alternatively, indirect costs can be assigned to departments using suitable allocation bases. For example, utility and property costs may be allocated based on the floor area occupied by each department. Other indirect costs may initially be assigned to relevant support departments such as payroll, data processing and personnel and then reallocated to the user departments (i.e. television, computing, clothing, etc.) using appropriate allocation bases. This approach enables all costs (direct and indirect) to be assigned to departments so that departmental profits can be reported.

THE INDIRECT COST ASSIGNMENT PROCESS

The following is a summary of the process of assigning indirect costs to cost objects for a job-order traditional costing system:

- 1 identify the production departments (or their equivalent in service organizations) that are responsible for creating the products of services that are sold;
- 2 identify the support departments that provide essential support services for the production departments;
- 3 assign all indirect (overhead) costs in the firm to a producing or support department;
- 4 reallocate the support department costs to the production departments;
- 5 calculate predetermined overhead rates for each producing department;
- 6 allocate the departmental overhead costs to the units of the individual products or services using the predetermined overhead rates.

Where a job-order costing system is not used the process may end at stage 4. For example, in the preceding section, the costs of the merchandising departmental store were assigned to departments and not to the individual products sold within the departments. We also noted that a bank may assign costs to the principal activities that it undertakes for profitability analysis purposes. These activities may be performed by separate departments so that the mortgage lending department is responsible for all mortgage lending activities, the insurance department is responsible for all insurance activities, the foreign currency department is responsible for all foreign currency transactions and so on. Therefore, the costs assigned to the departments are equivalent to the costs of undertaking the activities. Thus for profitability analysis purposes the assignment of costs can end at the fourth stage since the costs assigned to the departments also represents the costs of undertaking the principal activities.

SUMMARY

The following items relate to the learning objectives listed at the beginning of the chapter.

- **Distinguish between cause-and-effect and arbitrary allocations.**

Allocation bases which are significant determinants of costs that are being allocated are described as cause-and-effect allocations whereas arbitrary allocations refer to allocation bases that are

not the significant determinants of the costs. To accurately measure the cost of resources used by cost objects, cause-and-effect allocations should be used.

- **Explain why different cost information is required for different purposes.**

Manufacturing organizations assign costs to products for two purposes: first, for external (financial accounting) profit measurement and inventory valuation purposes in order to allocate manufacturing costs incurred during a period to cost of goods sold and inventories; second, to provide useful information for managerial decision-making requirements. Financial accounting regulations specify that only manufacturing costs should be assigned to products for meeting inventory and profit measurement requirements. Both manufacturing and non-manufacturing costs, however, may be relevant for decision-making. In addition, not all costs that are assigned to products for inventory valuation and profit measurement are relevant for decision-making. For example, costs that will not be affected by a decision (e.g. depreciation) are normally not relevant for product/service discontinuing decisions.

- **Describe how cost systems differ in terms of their level of sophistication.**

Cost systems range from simplistic to sophisticated. Simplistic systems are inexpensive to operate, involve extensive use of arbitrary allocations, have a high likelihood of reporting inaccurate product costs and generally result in a high cost of errors. Sophisticated costing systems are more expensive to operate, rely more extensively on cause-and-effect allocations, generally report more accurate product costs and have a low cost of errors. Further distinguishing features are that simplistic costing systems have a small number of first-stage cost centres/pools and use a single second-stage cost driver. In contrast, sophisticated costing systems use many first-stage cost centres/pools and many different types of second-stage driver.

- **Understand the factors influencing the choice of an optimal costing system.**

The optimal costing system is different for different organizations and should be determined on a costs versus benefits basis. Simplistic costing systems are appropriate in organizations whose indirect costs are a low percentage of total costs and which also have a fairly standardized product range, all consuming organizational resources in similar proportions. Under these circumstances, simplistic costing systems may report costs that are sufficiently accurate for decision-making purposes. Conversely, organizations with a high proportion of indirect costs, whose products consume organizational resources in different proportions, are likely to require sophisticated costing systems. Relying on sophisticated costing systems under these circumstances is likely to result in the additional benefits from reporting more accurate costs exceeding the costs of operating more sophisticated systems.

- **Explain why departmental overhead rates should be used in preference to a single blanket overhead rate.**

A blanket (also known as plant-wide) overhead rate establishes a single overhead rate for the organization as a whole, whereas departmental rates involve indirect costs being accumulated by different departments and a separate overhead rate being established for each department. A blanket overhead rate can only be justified when all products or services consume departmental overheads in approximately the same proportions. Such circumstances are unlikely to be applicable to most organizations, resulting in blanket overheads generally reporting inaccurate product/service costs.

- **Construct an overhead analysis sheet and calculate cost centre allocation rates.**

Cost centre overhead allocation rates are established and assigned to cost objects using the two-stage allocation overhead procedure. In the first stage, an overhead analysis sheet is used to (a) allocate overheads to production and service centres or departments; and (b) to reallocate the total service department overheads to production departments. The second stage involves (a) the calculation of appropriate departmental overhead rates and (b) the allocation of overheads to products passing through each department. These steps were illustrated using data presented in Example 3.1.

- **Distinguish between traditional and activity-based costing systems and calculate product costs derived from an ABC system.**

The major distinguishing features of ABC compared with traditional costing systems are that ABC systems assign costs to activity cost centres rather than departments. ABC systems thus tend to use a greater number of cost centres in the first stage of the allocation process. In the second stage, they also use a greater number, and variety, of second-stage allocation bases that mostly rely on cause-and-effect allocation bases. In contrast, traditional systems use second-stage allocation bases that rely on arbitrary allocations. The assignment of costs to products using an ABC system was illustrated in Exhibit 3.2.

- **Justify why budgeted overhead rates should be used in preference to actual overhead rates.**

Because the uses of actual overhead rates causes a delay in the calculation of product or service costs, and the establishment of monthly rates results in fluctuations in the overhead rates throughout the year, it is recommended that annual budgeted overhead rates should be used.

- **Calculate and explain the treatment of the under-/over-recovery of overheads.**

The use of annual budgeted overhead rates gives an under- or over-recovery of overheads whenever actual overhead expenditure or activity is different from budget. Any under- or over-recovery is generally regarded as a period cost adjustment and written off to the profit and loss statement and thus not allocated to products.

- **Explain how the cost assignment approach described for manufacturing organizations can be extended to non-manufacturing organizations.**

The same basic cost assignment procedures that are used by manufacturing organizations can be applied where there is a need to track the cost of the services provided to each individual customer. Where a job-order costing system is inappropriate, cost information is required for profitability analysis by products, services, departments, etc. Organizations may choose to assign only direct costs to cost objects using a direct costing system. Alternatively, they may also use only the first stage of the two-stage overhead allocation procedure to assign indirect costs to departments that are synonymous with the products/services that are sold by the organization.

- **Additional learning objectives presented in Appendix 3.1.**

The appendix to this chapter includes the following additional learning objective: to be able to reallocate service department costs to production departments when service departments provide services for other service departments as well as production departments. This topic tends to be included in the syllabus requirements of the examinations set by professional accountancy bodies but may not be part of the course curriculum for other courses. You may omit Appendix 3.1 if this topic is not part of your course curriculum.

APPENDIX 3.1: INTER-SERVICE DEPARTMENT REALLOCATIONS

Service departments may provide services for other service departments as well as for production departments. For example, a personnel department provides services for other service departments such as the power generating plant, maintenance department and stores. The power generating department also provides heat and light for other service departments, including the personnel department and so on. When such interactions occur, the allocation process can become complicated. Difficulties arise because each service department begins to accumulate charges from other service departments from which it receives services and these must be reallocated back to the user department. Once it has

EXAMPLE 3A.1

A company has three production departments and two service departments. The overhead analysis sheet provides the following totals of the overheads analysed to production and service departments:

| | | (£) |
|-----------------------|---|---------|
| Production department | X | 48 000 |
| | Y | 42 000 |
| | Z | 30 000 |
| Service department | 1 | 14 040 |
| | 2 | 18 000 |
| | | 152 040 |

The expenses of the service departments are apportioned as follows:

| | <i>Production departments</i> | | | <i>Service departments</i> | |
|----------------------|-------------------------------|-----|-----|----------------------------|-----|
| | X | Y | Z | 1 | 2 |
| Service department 1 | 20% | 40% | 30% | — | 10% |
| Service department 2 | 40% | 20% | 20% | 20% | — |

begun, this allocation and reallocation process can continue for a long time before a solution is found. The problem is illustrated in Example 3A.1. We shall use the example to illustrate four different methods of allocating the service department costs:

- 1** repeated distribution (reciprocal) method;
- 2** simultaneous equation method;
- 3** specified order of closing method;
- 4** direct allocation method.

When determining which of the above methods to use, companies should consider the extent of service department interaction and the cost and benefits associated with each method. You should also note at this point that the emergence of just-in-time production methods involving manufacturing cells (see Chapter 22) and activity-based costing have reduced or eliminated the need for reallocating support department costs. In manufacturing cells, many support activities such as machine maintenance, materials handling and performing set-ups are performed by cell workers so that these costs can be assigned to products processed within each manufacturing cell. You should also remember from our discussion in the main body of this chapter that ABC systems tend to establish separate cost driver rates for support (service) centres and assign the cost of support activities directly to cost objects without any reallocation to production centres.

1. Repeated distribution (reciprocal) method

Where this method is adopted, the service department costs are repeatedly allocated in the specified percentages until the figures become too small to be significant. You can see from line 2 of Exhibit 3A.1 that the overheads of service department 1 are allocated according to the prescribed percentages. As a result, some of the overheads of service department 1 are transferred to service department 2. In line 3, the overheads of service department 2 are allocated, which means that service department 1 receives

EXHIBIT 3A.1 Repeated distribution method

| Line | Production departments | | | Service departments | | | |
|------|-------------------------------------|----------------|----------------|---------------------|----------------|-----------------------|---------------|
| | X | Y | Z | 1 | 2 | Total | |
| 1 | Allocation as per overhead analysis | 48 000 | 42 000 | 30 000 | 14 040 | 18 000 | 152 040 |
| 2 | Allocation of service department 1 | 2 808 (20%) | 5 616 (40%) | 4 212 (30%) | (14 040) | <u>1 404</u> (10%) | <u>19 404</u> |
| 3 | Allocation of service department 2 | 7 762 (40%) | 3 881 (20%) | 3 880 (20%) | 3 881 (20%) | (19 404) | |
| 4 | Allocation of service department 1 | 776 (20%) | 1 552 (40%) | 1 165 (30%) | (3 881) | 388 (10%) | |
| 5 | Allocation of service department 2 | 154 (40%) | 78 (20%) | 78 (20%) | 78 (20%) | (388) | |
| 6 | Allocation of service department 1 | 16 (20%) | 31 (40%) | 23 (30%) | (78) | 8 (10%) | |
| 7 | Allocation of service department 2 | 4 (40%) | 2 (20%) | 2 (20%) | — | (8) | |
| 8 | Total overheads | 59 520 | 53 160 | 39 360 | — | — | 152 040 |

some further costs. The costs of service department 1 are again allocated and service department 2 receives some further costs. This process continues until line 7, by which time the costs have become so small that any further detailed apportionments are unnecessary. As a result, the total overheads in line 8 of £152 040 are allocated to production departments only.

2. Simultaneous equation method

Instead of using the repeated distribution (reciprocal) method the same allocations can be derived using the simultaneous equation method. When this method is used simultaneous equations are initially established as follows: Let

$$\begin{aligned} x &= \text{total overhead of service department 1} \\ y &= \text{total overhead of service department 2} \end{aligned}$$

The total overhead transferred into service departments 1 and 2 can be expressed as

$$\begin{aligned} x &= 14\,040 + 0.2y \\ y &= 18\,000 + 0.1x \end{aligned}$$

Rearranging the above equations:

$$\begin{aligned} x - 0.2y &= 14\,040 & (1) \\ -0.1x + y &= 18\,000 & (2) \end{aligned}$$

We can now multiply equation (1) by 5 and equation (2) by 1, giving

$$\begin{aligned} 5x - y &= 70\,200 \\ -0.1x + y &= 18\,000 \end{aligned}$$

Adding the above equations together we have

$$\begin{aligned} 4.9x &= 88\,200 \\ \text{Therefore } x &= 18\,000 (= 88\,200/4.9) \end{aligned}$$

Substituting this value for x in equation (1), we have

$$\begin{array}{r} 18\,000 - 0.2y = 14\,040 \\ \text{Therefore} \quad - 0.2y = -3\,960 \\ \text{Therefore} \quad y = 19\,800 \end{array}$$

We now apportion the values for x and y to the production departments in the agreed percentages.

| <i>Line</i> | | <i>X</i> | <i>Y</i> | <i>Z</i> | <i>Total</i> |
|-------------|-------------------------------------|---------------|---------------|---------------|----------------|
| 1 | Allocation as per overhead analysis | 48 000 | 42 000 | 30 000 | 120 000 |
| 2 | Allocation of service department | 3 600 (20%) | 7 200 (40%) | 5 400 (30%) | 16 200 |
| 3 | Allocation of service department 2 | 7 920 (40%) | 3 960 (20%) | 3 960 (20%) | 15 840 |
| | | <u>59 520</u> | <u>53 160</u> | <u>39 360</u> | <u>152 040</u> |

You will see from line 2 that the value for X (service department 1) of £18 000 is allocated in the specified percentages. Similarly, in line 3, the value for Y (service department 2) of £19 800 is apportioned in the specified percentages. As a result the totals in line 4 are in agreement with the totals in line 8 of the repeated distribution method (Exhibit 3A.1).

3. Specified order of closing

If this method (also known as the **sequential** or **step allocation method**) is used, the service departments' overheads are allocated to the production departments in a certain order. The service department that does the largest proportion of work for other service departments is closed first; the service department that does the second largest proportion of work for other service departments is closed second; and so on. Return charges are not made to service departments whose costs have previously been allocated. Let us now apply this method to the information contained in Example 3A.1. The results are given in Exhibit 3A.2.

The costs of service department 2 are allocated first (line 2) because 20 per cent of its work is related to service department 1, whereas only 10 per cent of the work of service department 1 is related to service department 2. In line 3, we allocate the costs of service department 1, but the return charges are not made to department 2. This means that the proportions allocated have changed as 10 per cent of the costs of service department 1 have not been allocated to service department 2.

EXHIBIT 3A.2 Specified order of closing method

| <i>Line</i> | <i>Production departments</i> | | | <i>Service departments</i> | | <i>Total</i> | |
|-------------|-------------------------------------|----------------|----------------|----------------------------|----------------|--------------|----------------|
| | <i>X</i> | <i>Y</i> | <i>Z</i> | <i>1</i> | <i>2</i> | | |
| 1 | Allocation as per overhead analysis | 48 000 | 42 000 | 30 000 | 14 040 | 18 000 | 152 040 |
| 2 | Allocate service department 2 | 7 200 (40%) | 3 600 (20%) | 3 600 (20%) | 3 600 (20%) | 18 000 | |
| 3 | Allocate service department 1 | 3 920 (2/9) | 7 840 (4/9) | 5 880 (3/9) | (17 640) | — | |
| 4 | | <u>59 120</u> | <u>53 440</u> | <u>39 480</u> | <u>—</u> | <u>—</u> | <u>152 040</u> |

Therefore 20 per cent out of a 90 per cent total or $2/9$ of the costs of service department 1 are allocated to department X.

You will see that the totals allocated in line 4 do not agree with the totals allocated under the repeated distribution or simultaneous equation methods. This is because the specified order of closing method sacrifices accuracy for clerical convenience. However, if this method provides a close approximation to an alternative accurate calculation then there are strong arguments for its use.

4. Direct allocation method

This method is illustrated in Exhibit 3A.3. It ignores inter-service department service reallocations. Therefore service department costs are reallocated only to production departments. This means that the proportions allocated have changed, as 10 per cent of the costs of service department 1 have not been allocated to service department 2. Therefore, 20 per cent out of a 90 per cent total, or $2/9$ of the costs of service department 1, are allocated to department X, $4/9$ are allocated to department Y and $3/9$ are allocated to department Z. Similarly the proportions allocated for service department 2 have changed with $4/8$ (40 per cent out of 80 per cent) of the costs of service department 2 being allocated to department X, $2/8$ to department Y and $2/8$ to department Z. The only justification for using the direct allocation method is its simplicity. The method is recommended when inter-service reallocations are relatively insignificant.

EXHIBIT 3A.3 Direct allocation method

| Line | Production departments | | | Service departments | | |
|---------------------------------------|------------------------|-----------------|-----------------|---------------------|----------|----------------|
| | X | Y | Z | 1 | 2 | Total |
| 1 Allocation as per overhead analysis | 48 000 | 42 000 | 30 000 | 14 040 | 18 000 | 152 040 |
| 2 Allocate service department 1 | 3 120 ($2/9$) | 6 240 ($4/9$) | 4 680 ($3/9$) | (14 040) | | |
| 3 Allocate service department 2 | 9 000 ($4/8$) | 4 500 ($2/8$) | 4 500 ($2/8$) | — | (18 000) | |
| 4 | <u>60 120</u> | <u>52 740</u> | <u>39 180</u> | <u>—</u> | <u>—</u> | <u>152 040</u> |

KEY TERMS AND CONCEPTS

Absorption costing system A costing system that allocates all manufacturing costs, including fixed manufacturing costs, to products and values unsold stocks at their total cost of manufacture.

Activity The aggregation of different tasks, events or units of work that cause the consumption of resources.

Activity cost centre A cost centre in which costs are accumulated by activities.

Activity-based costing (ABC) A system of cost allocation that aims to use mainly cause-and-effect cost allocations by assigning costs to activities.

Allocation base The basis used to allocate costs to cost objects.

Arbitrary allocation The allocation of costs using a cost base that is not a significant determinant of cost.

Blanket overhead rate An overhead rate that assigns indirect costs to cost objects using a single overhead rate for the whole organization, also known as plant-wide rate.

Budgeted overhead rate An overhead rate based on estimated annual expenditure on overheads and levels of activity.

Cause-and-effect allocation The use of an allocation base that is a significant determinant of cost, also known as driver tracing.

Cost allocation The process of assigning costs to cost objects where a direct measure of the resources consumed by these cost objects does not exist.

Cost centre A location to which costs are assigned, also known as a cost pool.

Cost driver The basis used to allocate costs to cost objects in an ABC system.

Cost pool A location to which overhead costs are assigned, also known as a cost centre.

Direct cost tracing The process of assigning a cost directly to a cost object.

Direct costing system A costing system that assigns only direct manufacturing costs, not fixed manufacturing costs, to products or services. Also known as variable costing system or marginal costing system.

Direct labour hour rate An hourly overhead rate calculated by dividing the cost centre overheads by the number of direct labour hours.

Driver tracing The use of an allocation base that is a significant determinant of cost, also known as cause-and-effect allocation.

First-stage allocation bases The various bases, such as area, book value of machinery and number of employees, used to allocate indirect costs to production and service centres.

Fixed overhead expenditure variance The difference between the budgeted fixed overheads and the actual fixed overhead spending.

Job cards A source document that records the amount of time spent on a particular job, together with the employee's hourly rate, so that direct labour costs can be assigned to the appropriate cost object.

Job-order costing system A system of assigning costs to products or services that is used in situations where many different products or services are produced.

Machine hour rate An hourly overhead rate calculated by dividing the cost centre overheads by the number of machine hours.

Materials requisition A source document that records the cost of acquisition of the materials

issued for manufacturing a product, or providing a specific service, so that the cost of the materials can be assigned to the appropriate cost object.

Overhead analysis sheet A document used to assign manufacturing overheads to production and service cost centres.

Overheads Another term for indirect costs, which are costs that cannot be specifically traced to a particular cost object.

Plant-wide rate An overhead rate that assigns indirect costs to cost objects using a single overhead rate for the whole organization, also known as a blanket overhead rate.

Sequential allocation method A method of allocating service departments' overheads to production departments in a certain order, also known as the step allocation method.

Service departments Departments that exist to provide services to other units within the organization, also known as support departments.

Step allocation method A method of allocating service departments' overheads to production departments in a certain order, also known as the sequential allocation method.

Support departments Departments that exist to provide services to other units within the organization, also known as service departments.

Time sheets Source documents that record the time spent by an employee on particular jobs which can be used to allocate direct labour costs to the appropriate cost object.

Traditional costing systems Widely used costing systems that tend to use arbitrary allocations to assign indirect costs to cost objects.

Under- or over-recovery of overheads The difference between the overheads that are allocated to products or services during a period and the actual overheads that are incurred.

Volume variance The difference between actual activity or overhead expenditure and the budgeted overheads and activity used to estimate the budgeted overhead rate, also known as under- or over-recovery of overheads.

RECOMMENDED READING

If your course requires a detailed understanding of accounting for direct labour and materials you should refer to Learning Note 3.2 on the digital support resources for this book. For an explanation of how you can access the digital support resources you should refer to the Preface. For a more detailed review of cost

allocations for different purposes, see Ahmed and Scapens (2000). You should refer to Brierley, Cowton and Drury (2001) for a review of European product costing practices. See also Drury and Tayles (2005) for a description of overhead absorption procedures in UK organizations.

KEY EXAMINATION POINTS

A typical question (e.g. Review problem 3.22) will require you to analyse overheads by departments and calculate appropriate overhead allocation rates. These questions may require a large number of calculations, and it is possible that you will make calculation errors. Do make sure that your answer is clearly presented, since marks tend to be allocated according to whether you have adopted the correct method. You are recommended to present your answer in a format similar to that in Exhibit 3.1. For a traditional costing system you should normally recommend a direct labour hour rate if a department is non-mechanized and a machine hour rate if machine hours are the dominant activity. You should only recommend

the direct wages percentage method when the rates within a non-mechanized department are uniform.

Where a question requires you to present information for decision-making, do not include apportioned fixed overheads in the calculations. Remember the total manufacturing costs should be calculated for inventory valuation, but incremental costs should be calculated for decision-making purposes (see answer to Review problem 3.23).

Finally, ensure that you can calculate under- or over-recoveries of overheads. To check your understanding of this topic, you should refer to the solution to Review problem 3.16.

ASSESSMENT MATERIAL

The review questions are short questions that enable you to assess your understanding of the main topics included in the chapter. The numbers in parentheses provide you with the page numbers to refer to if you cannot answer a specific question.

The review problems are more complex and require you to relate and apply the content to various business problems. The problems are graded by their level of difficulty. Solutions to review problems that are not preceded by the term 'IM' are provided in a separate section at the end of the book. Solutions to problems preceded by the term 'IM' are provided in the Instructor's Manual that can be downloaded from the lecturer's digital support resources. Additional review problems with fully worked solutions are provided in the *Student Manual* that accompanies this book.

REVIEW QUESTIONS

- | | |
|--|---|
| <p>3.1 Why are indirect costs not directly traced to cost objects in the same way as direct costs? (p. 45)</p> <p>3.2 Define cost tracing, cost allocation, allocation base and cost driver. (p. 45)</p> <p>3.3 Distinguish between arbitrary and cause-and-effect allocations. (p. 45)</p> <p>3.4 Explain how cost information differs for profit measurement/inventory valuation requirements compared with decision-making requirements. (pp. 46–47)</p> <p>3.5 Explain why cost systems should differ in terms of their level of sophistication. (pp. 47–48)</p> <p>3.6 Describe the process of assigning direct labour and direct materials to cost objects. (p. 48)</p> <p>3.7 Why are separate departmental or cost centre overhead rates preferred to a plant-wide (blanket) overhead rate? (pp. 48–49)</p> | <p>3.8 Describe the two-stage overhead allocation procedure. (pp. 49–51)</p> <p>3.9 Define the term 'activities'. (p. 56)</p> <p>3.10 Describe two important features that distinguish activity-based costing from traditional costing systems. (pp. 58–59)</p> <p>3.11 Why are some overhead costs sometimes not relevant for decision-making purposes? (p. 60)</p> <p>3.12 Why are budgeted overhead rates preferred to actual overhead rates? (pp. 61–62)</p> <p>3.13 Give two reasons for the under- or over-recovery of overheads at the end of the accounting period. (pp. 62–63)</p> <p>3.14 Explain how the cost assignment approach described for manufacturing organizations can be extended to non-manufacturing organizations. (pp. 64–66)</p> |
|--|---|

REVIEW PROBLEMS

3.15 Basic. A company uses a predetermined overhead recovery rate based on machine hours. Budgeted factory overhead for a year amounted to £720 000, but actual factory overhead incurred was £738 000. During the year, the company absorbed £714 000 of factory overhead on 119 000 actual machine hours.

What was the company's budgeted level of machine hours for the year?

- (a) 116 098
- (b) 119 000
- (c) 120 000
- (d) 123 000

3.16 Basic. A company uses an overhead absorption rate of \$3.50 per machine hour, based on 32 000 budgeted machine hours for the period. During the same period the actual total overhead expenditure amounted to \$108 875 and 30 000 machine hours were recorded on actual production.

By how much was the total overhead under- or over-absorbed for the period?

- (a) Under-absorbed by \$3875
- (b) Under-absorbed by \$7000
- (c) Over-absorbed by \$3875
- (d) Over-absorbed by \$7000

ACCA F2 Management Accounting

3.17 Basic. A company has over-absorbed fixed production overheads for the period by £6000. The fixed production overhead absorption rate was £8 per unit and is based on the normal level of activity of 5000 units. Actual production was 4500 units.

What was the actual fixed production overheads incurred for the period?

- (a) £30 000
- (b) £36 000
- (c) £40 000
- (d) £42 000

ACCA Paper 1.2 – Financial Information for Management

3.18 Basic. A company absorbs overheads on machine hours. In a period, actual machine hours were 17 285, actual overheads were £496 500 and there was under-absorption of £12 520.

What was the budgeted level of overheads?

- (a) £483 980
- (b) £496 500
- (c) £509 020
- (d) It cannot be calculated from the information provided.

CIMA Stage 1 Cost Accounting

3.19 Basic. Canberra has established the following information regarding fixed overheads for the coming month:

Budgeted information:

| | |
|---------------------|----------|
| Fixed overheads | £180 000 |
| Labour hours | 3000 |
| Machine hours | 10 000 |
| Units of production | 5000 |

Actual fixed costs for the last month were £160 000.

Canberra produces many different products using highly automated manufacturing processes and absorbs overheads on the most appropriate basis.

What will be the predetermined overhead absorption rate?

- (a) £16
- (b) £18
- (c) £36
- (d) £60

ACCA Paper 1.2 – Financial Information for Management

3.20 Basic. An engineering firm operates a job costing system. Production overhead is absorbed at the rate of \$8.50 per machine hour. In order to allow for non-production overhead costs and profit, a mark-up of 60 per cent of prime cost is added to the production cost when preparing price estimates.

The estimated requirements of job number 808 are as follows:

| | |
|------------------|----------|
| Direct materials | \$10 650 |
| Direct labour | \$3 260 |
| Machine hours | 140 |

The estimated price notified to the customer for job number 808 will be:

- (a) \$22 256
- (b) \$22 851

- (c) \$23 446
- (d) \$24 160

CIMA – Management Accounting Fundamentals

3.21 Basic. A factory consists of two production cost centres (P and Q) and two service cost centres (X and Y). The total allocated and apportioned overhead for each is as follows:

| | P | Q | X | Y |
|--|----------|----------|----------|----------|
| | \$95 000 | \$82 000 | \$46 000 | \$30 000 |

It has been estimated that each service cost centre does work for other cost centres in the following proportions:

| | P | Q | X | Y |
|--|----|----|----|---|
| Percentage of service cost centre X to | 50 | 50 | — | — |
| Percentage of service cost centre Y to | 30 | 60 | 10 | — |

The reapportionment of service cost centre costs to other cost centres fully reflects the above proportions.

After the reapportionment of service cost centre costs has been carried out, what is the total overhead for production cost centre P?

- (a) \$124 500
- (b) \$126 100
- (c) \$127 000
- (d) \$128 500

ACCA F2 Management Accounting

3.22 Intermediate: Overhead analysis and calculation of product costs.

A furniture making business manufactures quality furniture to customers' orders. It has three production departments and two service departments. Budgeted overhead costs for the coming year are as follows:

| | Total (£) |
|----------------------------------|---------------|
| Rent and rates | 12 800 |
| Machine insurance | 6 000 |
| Telephone charges | 3 200 |
| Depreciation | 18 000 |
| Production supervisor's salaries | 24 000 |
| Heating and lighting | 6 400 |
| | <u>70 400</u> |

The three production departments – A, B and C, and the two service departments – X and Y, are housed in the new premises, the details of which, together with other statistics and information, are given as follows:

| | Departments | | | | |
|---|-------------|-------|-------|-------|-------|
| | A | B | C | X | Y |
| Floor area occupied (sq. metres) | 3000 | 1800 | 600 | 600 | 400 |
| Machine value (£000) | 24 | 10 | 8 | 4 | 2 |
| Direct labour hrs budgeted | 3200 | 1800 | 1000 | | |
| Labour rates per hour | £3.80 | £3.50 | £3.40 | £3.00 | £3.00 |
| Allocated overheads: Specific to each department (£000) | 2.8 | 1.7 | 1.2 | 0.8 | 0.6 |
| Service department X's costs apportioned | 50% | 25% | 25% | | |
| Service department Y's costs apportioned | 20% | 30% | 50% | | |

Required:

- (a) Prepare a statement showing the overhead cost budgeted for each department, showing the basis of apportionment used. Also calculate suitable overhead absorption rates. (9 marks)
- (b) Two pieces of furniture are to be manufactured for customers. Direct costs are as follows:

| | Job 123 | Job 124 |
|-----------------|---|---|
| Direct material | £154 | £108 |
| Direct labour | 20 hours Dept A 12 hours Dept B 10 hours Dept C | 16 hours Dept A 10 hours Dept B 14 hours Dept C |

Calculate the total costs of each job. (5 marks)

- (c) If the firm quotes prices to customers that reflect a required profit of 25 per cent on selling price, calculate the quoted selling price for each job. (2 marks)
- (d) If material costs are a significant part of total costs in a manufacturing company, describe a system of material control that might be used in order to effectively control costs, paying practical attention to the stock control aspect. (9 marks)

AAT Stage 3 Cost Accounting and Budgeting

3.23 Intermediate: Make or buy decision. Shown below is next year's budget for the forming and finishing departments of Tooton Ltd. The departments manufacture three different types of component, which are incorporated into the output of the firm's finished products.

| | Component | | |
|---------------------------------------|-------------------------------|---------------------------------|-----------|
| | A | B | C |
| Production (units) | 14 000 | 10 000 | 6 000 |
| Prime cost (£ per unit): | | | |
| Direct materials | | | |
| Forming dept | 8 | 7 | 9 |
| Direct labour | | | |
| Forming dept | 6 | 9 | 12 |
| Finishing dept | 10 | 15 | 8 |
| | <u>24</u> | <u>31</u> | <u>29</u> |
| Manufacturing times (hours per unit): | | | |
| Machining | | | |
| Forming dept | 4 | 3 | 2 |
| Direct labour | | | |
| Forming dept | 2 | 3 | 4 |
| Finishing dept | 3 | 10 | 12 |
| | | | |
| | <i>Forming department (£)</i> | <i>Finishing Department (£)</i> | |
| Variable overheads | 200 900 | 115 500 | |
| Fixed overheads | 401 800 | 231 000 | |
| | <u>£602 700</u> | <u>£346 500</u> | |
| Machine time required and available | 98 000 hours | — | |
| Labour hours required and available | 82 000 hours | 154 000 hours | |

The forming department is mechanized and employs only one grade of labour, the finishing department employs several grades of labour with differing hourly rates of pay.

Required:

- (a) Calculate suitable overhead absorption rates for the forming and finishing departments for next year and include a brief explanation for your choice of rates. (6 marks)
- (b) Another firm has offered to supply next year's budgeted quantities of the above components at the following prices:

| | |
|-------------|-----|
| Component A | £30 |
| Component B | £65 |
| Component C | £60 |

Advise management whether it would be more economical to purchase any of the above components from the outside supplier. You must show your workings and, considering cost criteria only, clearly state any assumptions made or any aspects that may require further investigation. (8 marks)

- (c) Critically consider the purpose of calculating production overheads absorption rates. (8 marks)

ACCA Foundation Costing

3.24 Intermediate: Calculation of gross profit using ABC.

MS manufactures three types of skincare product for sale to retailers. MS currently operates a standard absorption costing system. Budgeted information for next year is given below:

| Products | Anti-ageing cream (\$000) | Facial masks (\$000) | Collagen fillers (\$000) | Total (\$000) |
|----------------------------|---------------------------|----------------------|--------------------------|---------------|
| Sales | 60 000 | 38 000 | 22 000 | 120 000 |
| Direct material | 11 800 | 6 200 | 4 000 | 22 000 |
| Direct labour | 3 700 | 2 400 | 1 900 | 8 000 |
| Fixed production overheads | | | | 15 400 |
| Gross profit | | | | <u>74 600</u> |

| | Anti-ageing cream | Facial masks | Collagen fillers |
|------------------------------|-------------------|--------------|------------------|
| Production and sales (units) | 1 000 000 | 1 200 000 | 600 000 |

Fixed production overheads are absorbed using a direct material cost percentage rate.

The management accountant of MS is proposing changing to an activity-based costing system. The main activities and their associated cost drivers and overhead cost have been identified as follows:

| Activity | Cost driver | Production overhead cost (\$000) |
|--------------------|-------------------------------|----------------------------------|
| Machine set up | Number of set ups | 3 600 |
| Quality inspection | Number of quality inspections | 1 200 |
| Processing | Processing time | 6 500 |
| Purchasing | Number of purchase orders | 1 800 |
| Packaging | Number of units of product | 2 300 |
| | | <u>15 400</u> |

Further details have been ascertained as follows:

| | Anti-ageing cream | Facial masks | Collagen fillers |
|------------------------------------|-------------------|--------------|------------------|
| Batch size (units) | 1 000 | 2 000 | 1 500 |
| Machine set-ups per batch | 3 | 3 | 4 |
| Purchase orders per batch | 2 | 2 | 1 |
| Processing time per unit (minutes) | 2 | 3 | 4 |
| Quality inspections per batch | 1 | 1 | 1 |

Required:

Calculate for each product:

- (i) the total fixed production overhead costs using the current absorption costing system; (2 marks)
- (ii) the total gross profit using the proposed activity-based costing system. (13 marks)

CIMA P1 Performance Operations

3.25 Intermediate: Calculation of ABC product cost and discussion as to whether ABC should be implemented.

Beckley Hill (BH) is a private hospital carrying out two types of procedures on patients. Each type of procedure incurs the following direct costs:

| Procedure | A (\$) | B (\$) |
|--------------------------------|-----------|-----------|
| Surgical time and materials | 1200 | 2640 |
| Anaesthesia time and materials | 800 | 1620 |

BH currently calculates the overhead cost per procedure by taking the total overhead cost and simply dividing it by the number of procedures, then rounding the cost to the nearest two decimal places. Using this method, the total cost is \$2475.85 for Procedure A and \$4735.85 for Procedure B.

Recently, another local hospital has implemented activity-based costing (ABC). This has led the finance director at BH to consider whether this alternative costing technique would bring any benefits to BH. He has obtained an analysis of BH's total overheads for the last year and some additional data, all of which is shown below:

| Cost | Cost driver | (\$) |
|------------------------|-----------------------------------|----------|
| Administrative costs | Administrative time per procedure | 1870160 |
| Nursing costs | Length of patient stay | 6215616 |
| Catering costs | Number of meals | 966976 |
| General facility costs | Length of patient stay | 8553600 |
| Total overhead costs | | 17606352 |

| Procedure | A | B |
|--|-------|-------|
| No. of procedures | 14600 | 22400 |
| Administrative time per procedure (hours) | 1 | 1.5 |
| Length of patient stay per procedure (hours) | 24 | 48 |
| Average no. of meals required per patient | 1 | 4 |

Required:

- (a) Calculate the full cost per procedure using activity-based costing. (6 marks)
- (b) Making reference to your findings in part (a), advise the finance director as to whether activity-based costing should be implemented at BH. (4 marks)

ACCA F2 Management Accounting

3.26 Intermediate: Reapportionment of service department costs.

A company reapportions the costs incurred by two service cost centres, materials handling and inspection, to the three production cost centres of machining, finishing and assembly.

The following are the overhead costs which have been allocated and apportioned to the five cost centres:

| | (£000) |
|--------------------|--------|
| Machining | 400 |
| Finishing | 200 |
| Assembly | 100 |
| Materials handling | 100 |
| Inspection | 50 |

Estimates of the benefits received by each cost centre are as follows:

| | Materials | | | | |
|--------------------|----------------|----------------|---------------|---------------|-----------------|
| | Machining % | Finishing % | Assembly % | handling % | Inspection % |
| Materials handling | 30 | 25 | 35 | — | 10 |
| Inspection | 20 | 30 | 45 | 5 | — |

You are required to:

- (a) Calculate the charge for overhead to each of the three production cost centres, including the amounts reapportioned from the two service centres, using:
 - (i) the continuous allotment (or repeated distribution) method
 - (ii) an algebraic method (15 marks)
- (b) Comment on whether reapportioning service cost centre costs is generally worthwhile and suggest an alternative treatment for such costs. (4 marks)
- (c) Discuss the following statement: 'Some writers advocate that an under- or over-absorption of overhead should be apportioned between the cost of goods sold in the period to which it relates and to closing stocks. However, the United Kingdom practice is to treat under- or over-absorption of overhead as a period cost'. (6 marks)

CIMA Stage 2 Cost Accounting 3

IM3.1 Intermediate.

- (a) Explain why predetermined overhead absorption rates are preferred to overhead absorption rates calculated from factual information after the end of a financial period.
- (b) The production overhead absorption rates of factories X and Y are calculated using similar methods. However, the rate used by factory X is lower than that used by factory Y. Both factories produce the same type of product. You are required to discuss whether or not this can be taken to be a sign that factory X is more efficient than factory Y. (20 marks)

CIMA Cost Accounting 1

IM3.2 Intermediate. Critically consider the purpose of calculating production overhead absorption rates.

IM3.3 Intermediate.

- (a) Specify and explain the factors to be considered in determining whether to utilize a single factory-wide recovery rate for all production overheads or a separate rate for each cost centre, production or service department. (12 marks)
- (b) Describe three methods of determining fixed overhead recovery rates and specify the circumstances under which each method is superior to the other methods mentioned. (8 marks)

ACCA P2 Management Accounting

IM3.4 Intermediate: Overhead analysis, calculation of overhead rate and overhead charged to a unit of output.

A company makes a range of products with total budgeted manufacturing overheads of £973560 incurred in three production departments (A, B and C) and one service department.

Department A has ten direct employees, who each work 37 hours per week.

Department B has five machines, each of which is operated for 24 hours per week.

Department C is expected to produce 148000 units of final product in the budget period.

The company will operate for 48 weeks in the budget period.

Budgeted overheads incurred directly by each department are:

| | |
|-------------------------|----------|
| Production department A | £261 745 |
| Production department B | £226 120 |
| Production department C | £93 890 |
| Service department | £53 305 |

The balance of budgeted overheads are apportioned to departments as follows:

| | |
|-------------------------|-----|
| Production department A | 40% |
| Production department B | 35% |
| Production department C | 20% |
| Service department | 5% |

Service department overheads are apportioned equally to each production department. You are required to:

- (a) Calculate an appropriate predetermined overhead absorption rate in each production department. (9 marks)
- (b) Calculate the manufacturing overhead cost per unit of finished product in a batch of 100 units which take nine direct labour hours in department A and three machine hours in department B to produce. (3 marks)

(Total 12 marks)

ACCA Foundation Paper 3

IM3.5 Intermediate: Overhead analysis sheet and calculation of overhead rates. Dunstan Ltd manufactures tents and sleeping bags in three separate production departments. The principal manufacturing processes consist of cutting material in the pattern cutting room and sewing the material in either the tent or the sleeping bag departments. For the year to 31 July cost centre expenses and other relevant information are budgeted as follows:

| | Total (£) | Cutting room (£) | Tents (£) | Sleeping bags (£) | Raw material stores (£) | Canteen (£) | Main-tenance (£) |
|----------------------------------|-----------|------------------|-----------|-------------------|-------------------------|-------------|------------------|
| Indirect wages | 147 200 | 6 400 | 19 500 | 20 100 | 41 200 | 15 000 | 45 000 |
| Consumable materials | 54 600 | 5 300 | 4 100 | 2 300 | — | 18 700 | 24 200 |
| Plant depreciation | 84 200 | 31 200 | 17 500 | 24 600 | 2 500 | 3 400 | 5 000 |
| Power | 31 700 | | | | | | |
| Heat and light | 13 800 | | | | | | |
| Rent and rates | 14 400 | | | | | | |
| Building insurance | 13 500 | | | | | | |
| Floor area (sq. ft) | 30 000 | 8 000 | 10 000 | 7 000 | 1 500 | 2 500 | 1 000 |
| Estimated power usage (%) | 100 | 17 | 38 | 32 | 3 | 8 | 2 |
| Direct labour (hours) | 112 000 | 7 000 | 48 000 | 57 000 | — | — | — |
| Machine usage (hours) | 87 000 | 2 000 | 40 000 | 45 000 | — | — | — |
| Value of raw material issues (%) | 100 | 62.5 | 12.5 | 12.5 | — | — | 12.5 |

Requirements:

- (a) Prepare in columnar form a statement calculating the overhead absorption rates for each machine hour and each direct labour hour for each of the three production units. You should use bases of apportionment and absorption which you consider most appropriate, and the bases used should be clearly indicated in your statement. (16 marks)

- (b) 'The use of predetermined overhead absorption rates based on budgets is preferable to the use of absorption rates calculated from historical data available after the end of a financial period.'

Discuss this statement insofar as it relates to the financial management of a business. (5 marks)

ICAEW PI AC Techniques

IM3.6 Intermediate: Computation of three different overhead absorption rates and a cost-plus selling price. A manufacturing company has prepared the following budgeted information for the forthcoming year:

| | £ |
|-----------------------------------|---------|
| Direct material | 800 000 |
| Direct labour | 200 000 |
| Direct expenses | 40 000 |
| Production overhead | 600 000 |
| Administrative overhead | 328 000 |
| Budgeted activity levels include: | |
| Budgeted production units | 600 000 |
| Machine hours | 50 000 |
| Labour hours | 40 000 |

It has recently spent heavily on advanced technological machinery and reduced its workforce. As a consequence, it is thinking about changing its basis for overhead absorption from a percentage of direct labour cost to either a machine hour or labour hour basis. The administrative overhead is to be absorbed as a percentage of factory cost.

Required:

- (a) Prepare predetermined overhead absorption rates for production overheads based on the three different bases for absorption mentioned above. (6 marks)
- (b) Outline the reasons for calculating a predetermined overhead absorption rate. (2 marks)
- (c) Select the overhead absorption rate that you think the organization should use giving reasons for your decision. (3 marks)
- (d) The company has been asked to price job AX, this job requires the following:

| | |
|-----------------|--------|
| Direct material | £3 788 |
| Direct labour | £1 100 |
| Direct expenses | £422 |
| Machine hours | 120 |
| Labour hours | 220 |

Compute the price for this job using the absorption rate selected in (c) above, given that the company profit margin is equal to 10 per cent of the price. (6 marks)

- (e) The company previously paid its direct labour workers on a time basis but is now contemplating moving over to an incentive scheme.

Required:

Draft a memo to the chief accountant outlining the general characteristics and advantages of employing a successful incentive scheme. (8 marks)

AAT Cost Accounting and Budgeting

IM3.7 Intermediate: Calculation of overhead absorption rates and under-/over-recovery of overheads. BEC Limited operates an absorption costing system. Its budget for the year ended 31 December shows that it expects its production overhead expenditure to be as follows:

| | Fixed £ | Variable £ |
|---------------------------|---------|------------|
| Machining department | 600 000 | 480 000 |
| Hand finishing department | 360 000 | 400 000 |

During the year it expects to make 200 000 units of its product. This is expected to take 80 000 machine hours in the machining department and 120 000 labour hours in the hand finishing department. The costs and activity are expected to arise evenly throughout the year and the budget has been used as the basis of calculating the company's absorption rates.

During March the monthly profit statement reported:

- (i) that the actual hours worked in each department were:
Machining 6000 hours
Hand finishing 9600 hours
- (ii) that the actual overhead costs incurred were:

| | Fixed £ | Variable £ |
|----------------|------------|---------------|
| Machining | 48 500 | 36 000 |
| Hand finishing | 33 600 | 33 500 |

- (iii) that the actual production was 15 000 units.

Required:

- (a) Calculate appropriate pre-determined absorption rates for the year ended 31 December. (4 marks)
- (b) (i) Calculate the under/over-absorption of overhead for each department of the company for March. (4 marks)
(ii) Comment on the problems of using predetermined absorption rates based on the arbitrary apportionment of overhead costs, with regard to comparisons of actual/target performance. (4 marks)
- (c) State the reasons why absorption costing is used by companies. (3 marks)

CIMA Stage 1 Accounting

IM3.8 Intermediate: Calculation of under-/over-recovery of overheads. A company produces several products which pass through the two production departments in its factory. These two departments are concerned with filling and sealing operations. There are two service departments, maintenance and canteen, in the factory.

Predetermined overhead absorption rates, based on direct labour hours, are established for the two production departments. The budgeted expenditure for these departments for the period just ended, including the apportionment of service department overheads, was £110 040 for filling, and £53 300 for sealing. Budgeted direct labour hours were 13 100 for filling and 10 250 for sealing.

Service department overheads are apportioned as follows:

| | | | |
|-------------|---|-------------|-----|
| Maintenance | — | Filling | 70% |
| Maintenance | — | Sealing | 27% |
| Maintenance | — | Canteen | 3% |
| Canteen | — | Filling | 60% |
| | — | Sealing | 32% |
| | — | Maintenance | 8% |

During the period just ended, actual overhead costs and activity were as follows:

| | (£) | Direct labour hours |
|-------------|--------|---------------------|
| Filling | 74 260 | 12 820 |
| Sealing | 38 115 | 10 075 |
| Maintenance | 25 050 | |
| Canteen | 24 375 | |

Required:

- (a) Calculate the overheads absorbed in the period and the extent of the under-/over-absorption in each of the two production departments. (14 marks)

- (b) State, and critically assess, the objectives of overhead apportionment and absorption. (11 marks)

ACCA Level 1 Cost and Management Accounting 1

IM3.9 Intermediate: Under- and over-absorption of overheads and calculation of budgeted expenditure and activity. A large firm of solicitors uses a job costing system to identify costs with individual clients. Hours worked by professional staff are used as the basis for charging overhead costs to client services. A predetermined rate is used, derived from budgets drawn up at the beginning of each year commencing on 1 April.

Actual overheads incurred for the year ending 31 March 2018 were £742 600 and 1360 professional hours over budget were worked. Overheads were absorbed at a rate of £7.50 per hour and were over-absorbed by £4760.

The solicitors' practice has decided to refine its overhead charging system by differentiating between the hours of senior and junior professional staff, respectively. A premium of 40 per cent is to be applied to the hourly overhead rate for senior staff compared with junior staff.

Budgets for the year to 31 March 2019 are as follows:

| | |
|---------------------------------|----------|
| Senior professional staff hours | 21 600 |
| Junior professional staff hours | 79 300 |
| Practice overheads | £784 000 |

Required:

- (a) Using the data for the actual results for year ended 31 March 2018 calculate for year ending 2018:
 - (i) budgeted professional staff hours
 - (ii) budgeted overhead expenditure (5 marks)
- (b) Calculate, for the budgeted year ending 31 March 2019, the overhead absorption rates (to three decimal places of a £) to be applied to:
 - (i) senior professional staff hours
 - (ii) junior professional staff hours (4 marks)
- (c) How is the change in method of charging overheads likely to improve the firm's job costing system? (3 marks)
- (d) Explain briefly why overhead absorbed using predetermined rates may differ from actual overhead incurred for the same period. (2 marks)

ACCA Foundation Paper 3

IM3.10 Intermediate: Reapportionment of service department costs. JR Co. Ltd's budgeted overheads for the forthcoming period applicable to its production departments, are as follows:

| | (£000) |
|---|--------|
| 1 | 870 |
| 2 | 690 |

The budgeted total costs for the forthcoming period for the service departments, are as follows:

| | (£000) |
|---|--------|
| G | 160 |
| H | 82 |

The use made of each of the services has been estimated as follows:

| | Production department | | Service department | |
|-------|-----------------------|----|--------------------|----|
| | 1 | 2 | G | H |
| G (%) | 60 | 30 | — | 10 |
| H (%) | 50 | 30 | 20 | — |

Required:

Apportion the service department costs to production departments:

- (i) using the step-wise (elimination) method, starting with G;

- (ii) using the reciprocal (simultaneous equation) method;
- (iii) commenting briefly on your figures. (8 marks)

ACCA Paper 8 Managerial Finance

IM3.11 Advanced: Reapportionment of service department costs and comments on apportionment and absorption calculation.

The Isis Engineering Company operates a job-order costing system which includes the use of predetermined overhead absorption rates. The company has two service cost centres and two production cost centres. The production cost centre overheads are charged to jobs via direct labour hour rates which are currently £3.10 per hour in production cost centre A and £11.00 per hour in production cost centre B. The calculations involved in determining these rates have excluded any consideration of the services that are provided by each service cost centre to the other.

The bases used to charge general factory overhead and service cost centre expenses to the production cost centres are as follows:

- (i) General factory overhead is apportioned on the basis of the floor area used by each of the production and service cost centres.
- (ii) The expenses of service cost centre 1 are charged out on the basis of the number of personnel in each production cost centre.
- (iii) The expenses of service cost centre 2 are charged out on the basis of the usage of its services by each production cost centre.

The company's overhead absorption rates are revised annually prior to the beginning of each year, using an analysis of the outcome of the current year and the draft plans and forecasts for the forthcoming year. The revised rates for next year are to be based on the following data:

| | General factory overhead | Service cost centres | | Product cost centres | |
|--|--------------------------|----------------------|--------|----------------------|---------|
| | | 1 | 2 | A | B |
| Budgeted overhead for next year (before any reallocation) (£) | 210 000 | 93 800 | 38 600 | 182 800 | 124 800 |
| % of factory floor area | — | 5 | 10 | 15 | 70 |
| % of factory personnel | — | 10 | 18 | 63 | 9 |
| Estimated usage of services of service cost centre 2 in forthcoming year (hours) | — | 1 000 | — | 4 000 | 25 000 |
| Budgeted direct labour hours for next year (to be used to calculate next year's absorption rates) | — | — | — | 120 000 | 20 000 |
| Budgeted direct labour hours for current year (these figures were used in the calculation of this year's absorption rates) | — | — | — | 100 000 | 30 000 |

- (a) Ignoring the question of reciprocal charges between the service cost centres, you are required to calculate the revised overhead absorption rates for the two production cost centres. Use the company's established procedures. (6 marks)
- (b) Comment on the extent of the differences between the current overhead absorption rates and those you have calculated in your answer to (a). Set out the likely reasons for these differences. (4 marks)
- (c) Each service cost centre provides services to the other. Recalculate next year's overhead absorption rates, recognizing the existence of such reciprocal services and assuming that they can be measured on the same bases as those used to allocate costs to the production cost centres. (6 marks)
- (d) Assume that:
 - (i) General factory overhead is a fixed cost.
 - (ii) Service cost centre 1 is concerned with inspection and quality control, with its budgeted expenses (before any reallocations) being 10 per cent fixed and 90 per cent variable.
 - (iii) Service cost centre 2 is the company's plant maintenance section, with its budgeted expenses (before any reallocations) being 90 per cent fixed and 10 per cent variable.
 - (iv) Production cost centre A is labour intensive, with its budgeted overhead (before any reallocation) being 90 per cent fixed and 10 per cent variable.
 - (v) Production cost centre B is highly mechanized, with its budgeted overhead (before any reallocations) being 20 per cent fixed and 80 per cent variable.

In the light of these assumptions, comment on the cost apportionment and absorption calculations made in parts (a) and (c) and suggest any improvements that you would consider appropriate. (6 marks)

ACCA Level 2 Management Accounting

IM3.12 Advanced: Product cost calculation and costs for decision-making.

Kaminsky Ltd manufactures belts and braces. The firm is organized into five departments. These are belt-making, braces-making and three service departments (maintenance, warehousing and administration).

Direct costs are accumulated for each department. Factory-wide indirect costs (which are fixed for all production levels within the present capacity limits) are apportioned to departments on the basis of the percentage of floorspace occupied. Service department costs are apportioned on the basis of estimated usage, measured as the percentage of the labour hours operated in the service department utilized by the user department.

Each service department also services at least one other service department.

| | Belts | Braces | Admini- | Main- | Ware- | Company total |
|--|---------|--------|---------------|--------------|---------|---------------|
| | | | stration dept | tenance dept | housing | |
| (1) Output and sales (units): | | | | | | |
| Output capacity | 150 000 | 60 000 | | | | |
| Output budgeted | 100 000 | 50 000 | | | | |
| Sales budgeted | 100 000 | 50 000 | | | | |
| (2) Direct variable costs (£000) | | | | | | |
| Materials | 120 | 130 | — | 20 | 30 | 300 |
| Labour | 80 | 70 | 50 | 80 | 20 | 300 |
| Total | 200 | 200 | 50 | 100 | 50 | 600 |
| (3) Factory-wide fixed indirect costs (£000) | | | | | | 1 000 |

(Continued)

| | Belts | Braces | Admini- stration dept | Main- tenance dept | Ware- housing | Company total |
|------------------------------------|-------|--------|-----------------------------|--------------------------|------------------|------------------|
| (4) Floorspace (%) | 40 | 40 | 5 | 10 | 5 | 100 |
| (5) Usage of service department | | | | | | |
| Labour hours (%) | | | | | | |
| Administration | 40 | 40 | — | 10 | 10 | 100 |
| Warehousing | 50 | 25 | — | 25 | — | 100 |
| Maintenance | 30 | 30 | — | — | 40 | 100 |

- (a) You are required to calculate the total cost per unit of belts and braces, respectively, in accordance with the system operated by Kaminsky Ltd.
- (b) In addition to the above data, it has been decided that the selling prices of the products are to be determined on a cost-plus basis, as the unit total cost plus 20 per cent. Two special orders have been received, outside the normal run of business, and not provided for in the budget. They are as follows:

- (i) an order for 1000 belts from Camfam, an international relief organization, offering to pay £5000 for them,
- (ii) a contract to supply 2000 belts a week for 50 weeks to Mixon Spenders, a chainstore, at a price per belt of 'unit total cost plus 10 per cent'.

You are required to set out the considerations which the management of Kaminsky Ltd should take into account in deciding whether to accept each of these orders, and to advise them as far as you are able on the basis of the information given. (8 marks)

- (c) 'Normalized overhead rates largely eliminate from inventories, from cost of goods sold, and from gross margin any unfavourable impact of having production out of balance with the long-run demand for a company's products.'

You are required to explain and comment on the above statement. (5 marks)

ICAEW Management Accounting