

CHAPTER

1

Introduction to cost concepts

Sample pages

Learning objectives to meet competencies

After studying this chapter you should be able to:

- describe the difference between cost accounting and financial accounting
- distinguish between manufacturing and non-manufacturing costs
- classify manufacturing costs into direct and indirect costs
- describe the difference between product and period costs
- identify fixed costs, variable costs and semi-variable costs
- classify costs as prime costs and conversion costs
- calculate unit and total costs using fixed and variable costs
- demonstrate a basic knowledge of cost information and responsibility accounting systems
- calculate cost and selling price mark-ups, and
- explain the need for ethics.

Overview

There is an old saying that warns: 'Before you do anything, first count the cost.' Perhaps the warning could be extended to include: 'After you do anything you should also count the cost.' The wisdom of this bears more than a moment's thought as many business ventures have failed owing to lack of care in the area of cost planning and measurement. It is important for accountants, production managers, marketing managers, engineers and allied professionals to understand the concept of cost and the information objectives of a cost-management accounting system. The saying implies two areas of interest. The first is the planning and control of costs, which is a managerial function. The second involves the measurement of the actual cost, which is an accounting function. The accounts department has the responsibility of providing managers with useful information as feedback for cost control, pricing policy and performance measurement. This information must be accurate, timely, relevant, and presented in a way that is understood and can be used in making decisions. The cost-accounting system is an information database used by management (internal users) for decision-making, planning and control and for the valuation of inventories used in financial reports for shareholders (external users).

This chapter opens the study of cost accounting by outlining some basic concepts that are developed throughout the book. The function of cost accounting is developed in the context of an information system that is used for the costing of products and services and in management decisions. It is important to understand the way costs behave in different situations. Identifying the factors that cause costs to change means you are better able to control the cost. The latter part of this chapter identifies characteristics of cost and introduces a number of methods of product costing that will be discussed in detail in later chapters.

FUNCTIONS OF COST-MANAGEMENT ACCOUNTING

Cost-management accounting can be divided into two separate but interdependent functions: a 'cost function' and a 'management function'.

The 'cost function' is to accumulate and identify costs in a given accounting period and assign these costs to products and services. In doing so, the system measures the various costs that need to be shown in financial reports. Examples of such costs are the cost of goods sold, the cost of services provided and the valuation of inventories for finished goods, work in process and raw materials. The 'management function' is to provide an internal reporting system to be used by management so that problems and inefficiencies can be identified and action taken. The purpose of the accounting system is not only to calculate the cost of products and services but also to provide management with information.

The cost-accounting function provides information to be used in four areas: accounting reports, decision-making, planning and control. These areas will now be explained in more detail in

conjunction with Figure 1.1, which illustrates the interdependence of the cost and management functions.

Accounting reports

Accounting reports are historical documents as they show costs incurred in the past. This function has been described as ‘score-keeping’ where transactions of a given period are assigned to products and services with the objective of measuring costs. At the conclusion of a period, costs can be accumulated in a number of areas: unused raw material, work that is unfinished, finished goods either sold or still in stock and the cost of providing a particular service. In the case of a manufacturer, the cost of the goods sold is transferred to the profit statement to calculate the gross profit. Inventories of raw material, work in process and unsold finished goods appear in the statement of financial

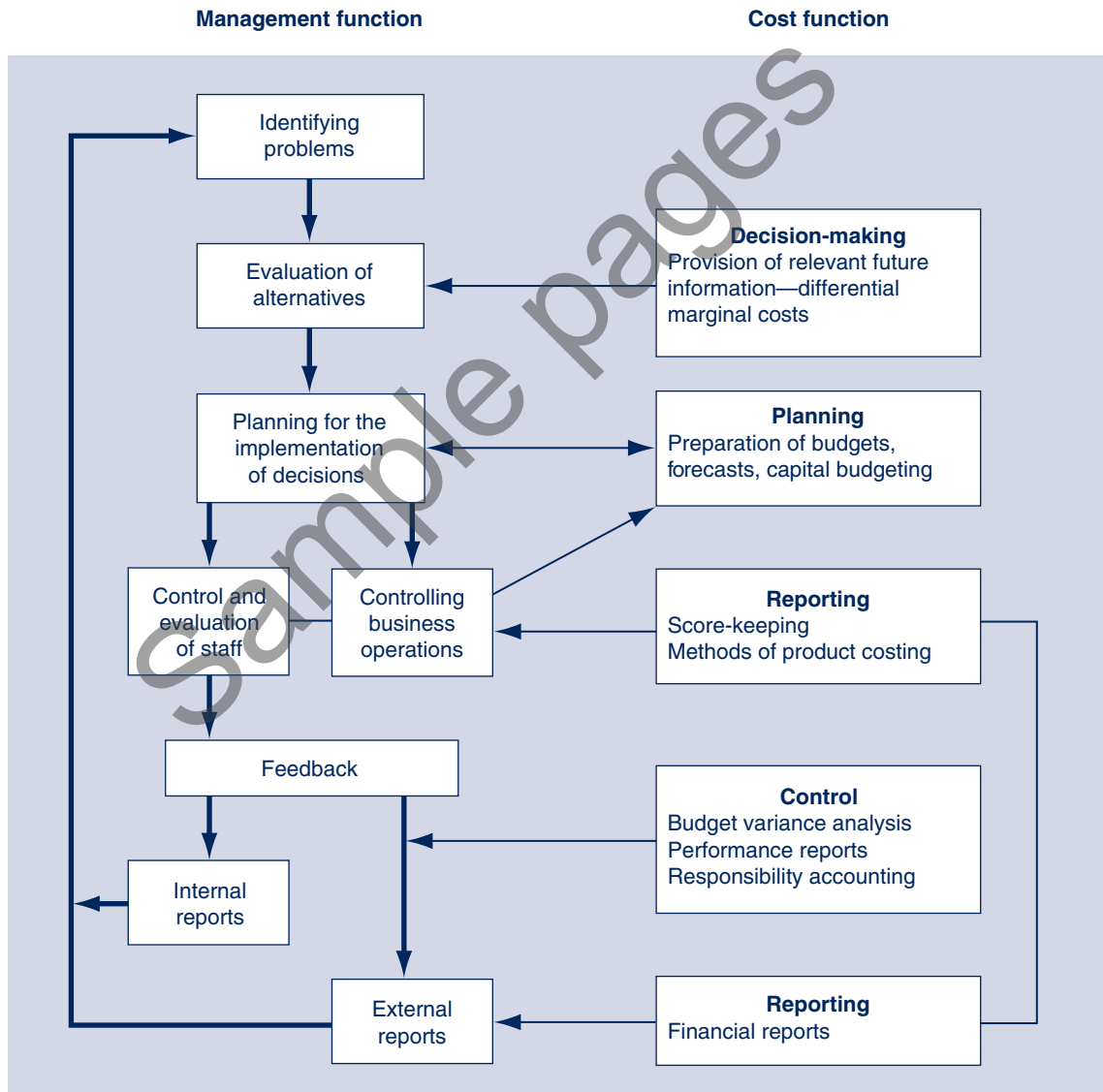


Figure 1.1 Functions of cost-management accounting

position as assets. The cost information is used in the external reports to owners. It is subject to the application of generally accepted accounting principles as presented by professional associations and government regulation. Cost and profit information is also important for managers who require more detailed reports that are segmented by department, product, region and so on, so that pricing policies, cost control and staff performance can be evaluated.

Manufacturing and service industries vary considerably in the type of products made, services provided and methods of operation. The construction industry has units of output (buildings) that are individually different from other units of output. Each building constructed has a separate customer and requires individual costing. A process manufacturer may mass-produce many units that are similar in character. In the latter case, total production costs have to be shared by all the output units. If a production process also has multiple units of output emerging from a single process, costs have to be split between the final products. The accountant's role is to apply the most appropriate costing method to determine the product cost for a period. Examples of such methods are job costing and process costing.

Service industries have different reporting needs from manufacturers. It is unlikely that service industries will need to keep work in process or finished goods inventories. For example, a transport firm will need to know the most economical routes to travel, a legal firm will need to establish a fee structure that considers all relevant costs and a vehicle repairer will want a charge-out rate to recover all overheads against work performed. All this information will need to be provided by the accounting system.

Decision-making

The management decision-making process starts with identifying problems caused by external factors (increased competition or change in government regulation) and internal factors identified by the reporting system (productivity losses or cost overruns). It is then management's function to develop and evaluate alternative courses of action to solve these problems. The cost information used in the decision-making process is different from that used in financial reporting. The historical nature of reporting costs may not be appropriate for decisions affecting the future. The information should represent the additional costs and benefits associated with the alternatives being considered. This is known as **differential costing**. In the evaluation of future alternative courses of action it is important to distinguish between the costs that are relevant to the decision and those that are not. For example, if a firm is considering purchasing a new machine for \$100 000 to replace an existing one, the fact that the old machine was purchased a year ago at a cost of \$80 000 is irrelevant as it has already happened and no decision by management can change it. What is relevant is the current market value of the old machine and the future cash flows expected from the use of the machine. The provision of problem-solving information is an important, although sometimes technically difficult, function of cost accounting.

Planning

A firm that does not take time to analyse past mistakes and plan for changed conditions cannot hope for long-term success. The planning process involves establishing long-term and short-term goals and formulating the processes required to meet these objectives. Planning will assist the development of the firm in the following areas:

- developing programs to implement management decisions
- creating organisation structures that are coordinated toward achieving corporate goals

- establishing a budget system for production planning, cost control and cash flow, and
- providing an organised approach to establishing future investment needs for non-current assets (capital budgets).

The planning process begins with setting corporate goals, such as a return on assets employed, profit margins and other measures of operational efficiency. Staff will then be involved in a bottom-up process whereby they develop strategies and procedures to meet these corporate needs within the prescribed parameters. Staff input is vital for the successful outcome of any planning process. Efficiency is often recognised by staff at the operating levels in a firm, and so communication and mutual cooperation between senior management and employees at all levels is important when planning for the future. The cost-accounting function in planning is to quantify a plan of action in terms of dollars, cents and profits. This is achieved through budgets.

Control

The control function is involved with monitoring achievements as the organisation's plans and budgets are put into practice. Control is exercised through establishing responsibility centres. Each centre is allocated certain resources, authority and tasks. The cost-reporting system provides feedback to management concerning the way plans are being met and identifies possible problem areas that might need attention. This feedback is then considered in the management decision-making process. The key factors in an effective control system are:

- structure and preparation of budget material
- independence of responsibility centres regarding cost control and authority
- quality and regularity of performance reports as feedback to management, and
- time required for corrective action.

The quality and timeliness of performance reports is important for control. These reports concentrate on variations between budget and actual performance. The exceptions to expected performance are of most interest to management in determining how effectively goals are being achieved.

COST ACCOUNTING AND FINANCIAL ACCOUNTING

The function of cost accounting is to determine either the cost of items produced from a manufacturing operation or the cost of providing a particular type of service. The cost-accounting system will also be used to provide management with information for business control and decision-making. The main focus on cost accounting is therefore an 'internal' one.

Financial accounting, on the other hand, is mainly concerned with profit measurement and providing reports to owners or shareholders. From this point of view, the main focus of financial accounting is an 'external' one. There is, however, a link between financial accounting and cost accounting through the valuation of inventories. Goods that are sold will appear in the income statement as 'cost of goods sold'. Unsold or incomplete items will appear in the statement of financial position as assets. The cost system will determine the cost of a product or service whereas the financial accounting system will measure the profit earned on the sale. Table 1.1 compares the cost-accounting and financial-accounting functions.

Table 1.1 Comparison of financial accounting and cost accounting

Attributes of reports	Financial accounting	Cost accounting
Focus groups	External users: <ul style="list-style-type: none"> • shareholders • accounts payable • government • financial institutions • regulatory bodies 	Internal users: <ul style="list-style-type: none"> • supervisors • heads of department • product managers • marketing managers • strategic managers
Format	External financial reports Statements of: <ul style="list-style-type: none"> • income statement • financial position • cash flows 	Internal management reports: <ul style="list-style-type: none"> • segmented performance reports by product, department and region • cost analysis • performance reports
Frequency	<ul style="list-style-type: none"> • Quarterly • Semi-annually • Annually 	<ul style="list-style-type: none"> • Monthly • As required
Function	<ul style="list-style-type: none"> • Provides general information • Meets reporting standards 	<ul style="list-style-type: none"> • Reports any special-purpose information required for decision-making, planning and control
Content	<ul style="list-style-type: none"> • Condensed information • Applies GAAPs and double-entry accounting practices • Focus on the entity as a whole 	<ul style="list-style-type: none"> • Detailed information • Uses all relevant data • Focus on the cost objective
Audit compliance	Independent external audit	Internal

WHAT IS A COST?

There is no simple definition for the term *cost*. The term *cost* must be understood in the context of a cost objective. The cost objective represents the purpose for which a cost measurement is required. Costs that are relevant to one objective might not be relevant to another. A firm has to make many different kinds of outlays, all of which have a ‘cost’ attached to them. The amounts paid for wages, raw materials and electricity could be regarded as ‘costs’ of the business. So too the price paid for an item of plant could in certain situations be described as a ‘cost’ to the business. The term *cost* can therefore be applied either to an expense or to an asset. However, the classification of a cost as either an expense or an asset is linked to the objective of profit measurement, which might or might not be the cost objective.

Therefore, in order to identify whether or not a particular transaction is a ‘cost’, you must first ask the question: what is being costed? It is critical that the term *cost* be understood in the context of the aims and purposes it is to serve. Any request for cost information must clarify the situation and purpose governing its use. The number of possible cost objectives is inexhaustible. Some examples of cost objectives are:

- cost of manufacturing a single product
- cost of manufacturing a group of products
- cost of providing a service to a customer
- cost of a special event (concert), and
- cost of introducing a new product line.

The meaning attached to a cost can also vary depending on the way it is classified or grouped with other costs. The word *cost* is often preceded by an adjective to indicate its particular meaning or use. For example, the cost of 'labour' can be classified in all or some of the following ways depending on how, where and when it is incurred:

- manufacturing or non-manufacturing cost
- direct or indirect cost
- product or period cost
- fixed or variable cost
- prime cost, and
- conversion cost.

These classification groups are described in detail later in the chapter.

Self-testing question 1.1

The following reports have been produced by the accounting system of Big Ken Manufacturing. Indicate whether the preparation of the particular report falls within the area of financial accounting or cost-management accounting.

- (a) sales forecast
- (b) raw material usage report
- (c) trading statement
- (d) capital expenditure budget
- (e) labour efficiency report
- (f) cost of production report
- (g) statement of financial position
- (h) statement of incomplete production
- (i) cost of goods sold
- (j) report on product cost variances
- (k) report on plant idle time
- (l) payroll calculation
- (m) bar chart of administration costs
- (n) divisional gross profits.

Solution

Financial accounting: (c), (g), (i), (l)

Cost-management accounting: (a), (b), (d), (e), (f), (h), (j), (k), (m), (n)

MANUFACTURING AND NON-MANUFACTURING COSTS

The first classification of costs will be to distinguish between manufacturing and non-manufacturing costs. Manufacturing costs will be incurred in a factory as part of the operation of making a particular product. Examples of manufacturing costs are depreciation of plant, factory insurance, raw materials used, factory labour and fuel for heating. Non-manufacturing costs represent marketing, distribution, finance and administration costs incurred in trading operations. Examples include advertising, interest, bad debts, sales, wages and office stationery.

Cost-management accounting systems apply to more than just manufacturing industries. Manufacturers share a common need with other types of business to have appropriate assets and management systems in place so that profit and other objectives can be achieved. However, a significant difference between a manufacturer and a wholesaler or retailer is that the manufacturer is responsible for the production of the goods or services for the market whereas other businesses acquire them as finished products. A retailer who purchases merchandise directly from the supplier can specify the quality of goods required and might be able to negotiate the cost.

The manufacturing process requires special planning and control systems to integrate input resources, coordinate production methods and maintain the desired quality of outputs. Meeting production schedules will need a planned system for the ordering of materials, a programmed set-up time and tooling for machines, appropriate line-level supervision to maintain operations at the desired levels of efficiency, and quality assurance inspections.

There are three broad groupings of manufacturing cost:

- 1 **Materials:** these are purchased and held in inventory until required. Materials may enter the production system at the start or be added as necessary throughout the production cycle.
- 2 **Labour:** this is incurred as production progresses. Labour costs involve wages at the operations level as well as supervision costs. Labour-related costs such as overtime premiums, sick pay and holiday pay also have to be considered.
- 3 **Manufacturing expenses:** these are also known as 'factory overheads', 'indirect manufacturing cost', 'factory expenses' and 'on costs', and they cover factory operating expenses such as heating, plant depreciation, rent, lighting and insurance.

A cost-accounting system must be implemented in such a way that these costs can be accumulated for the products manufactured. Figure 1.2 (p. 11) illustrates an overall view of how costs flow through the production system. The material, labour and manufacturing overheads are input costs to the production system and initially represent the value of work in process. As completed products emerge from the production system, costs are transferred out of the work in process inventory and placed in the finished goods inventory until the goods are sold. The cost of the goods sold can then be matched against sales to calculate the gross profit of the firm.

The material, labour and manufacturing expense cost classifications are very broad and need to be modified to reveal cost attributes that provide more details for cost analysis. Various cost attributes are described later in this chapter and throughout the book. The first of these is the distinction between direct and indirect costs.

Self-testing question 1.2

Identify whether the following costs are manufacturing or non-manufacturing:

- (a) advertising of products for sale
- (b) insurance on factory plant
- (c) raw materials used in production
- (d) furnace fuel
- (e) office stationery
- (f) delivery costs to customers

- (g) cartage inwards of components
- (h) a factory manager's salary
- (i) depreciation on sales staff vehicles
- (j) depreciation of warehouse forklift
- (k) sales commission
- (l) repairs to lathes
- (m) bad debts
- (n) discount allowed
- (o) interest on bank overdraft.

Solution

Manufacturing: (b), (c), (d), (g), (h), (j), (l)

Non-manufacturing: (a), (e), (f), (i), (k), (m), (n), (o)

For further practice you should now be able to do end-of-chapter questions 1.1, 1.2 and 1.3.

DIRECT AND INDIRECT COSTS

Direct costs



Direct costs are those costs that can be specifically identified as part of the cost of the finished product. There are two examples of direct costs. They are direct material cost and direct labour cost.



1 **Direct material cost:** this cost represents the cost of material used to manufacture the finished product. A builder can calculate the actual cost of the timber, tiles and bricks used in the construction of a home. A clothing manufacturer can account for the cost of fabrics used in the production of garments. These are examples of direct materials.



2 **Direct labour cost:** the cost of wages, which can be traced directly to the final product cost, is known as direct labour. An example of direct labour would be the wages of machine operators and those directly involved in the manufacture of goods and the provision of services. An analysis of factory payroll records separates the hours and rates of pay that apply to the direct labour employees.

As direct costs can be specifically measured and identified as part of the cost of a product, they can be directly assigned to the cost of work in process.

Indirect costs



Indirect costs are those costs that cannot be specifically identified with the cost of the finished product. Indirect costs therefore cover all other manufacturing costs that are not direct costs. Indirect costs are also known as *manufacturing expenses* or *overheads*. Included in the indirect costs will be certain material and labour costs where those costs cover a range of production activity. Indirect costs will include the following:

1 **Indirect material:** examples of indirect material costs include lubricants used to grease machines and the cost of timber pallets in the warehouse, cooling liquids, glues and sanding paper. Such costs are shared by all production units but cannot be measured directly against individual

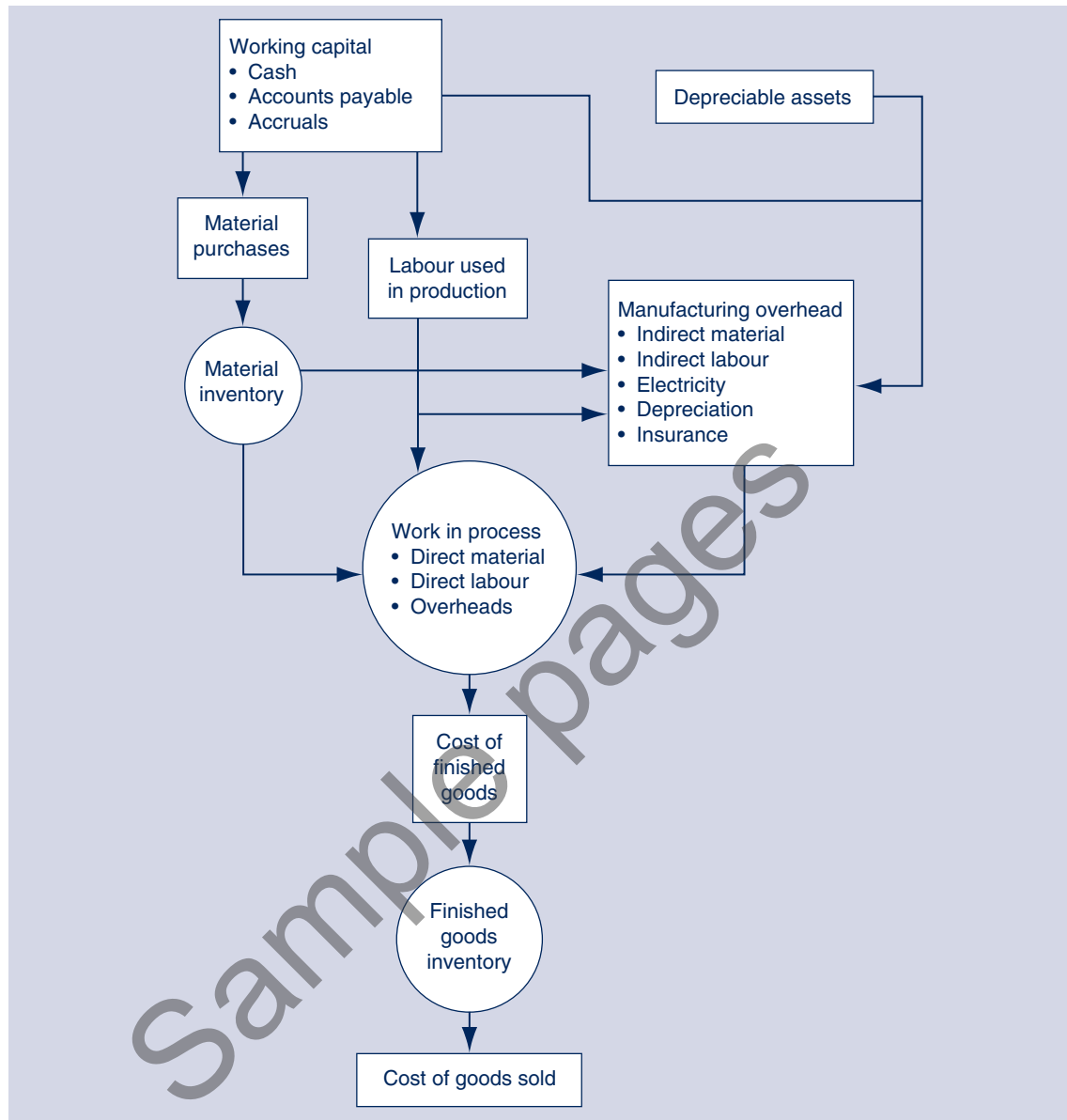


Figure 1.2 *Production cost flow*

items. Indirect material may also include materials that become part of the finished product, but because of their size, cost or measurability it is not economically feasible to classify them as direct costs. Examples of such items would be adhesives, nails or solder.

- 2 *Indirect labour*: examples of indirect labour costs include the wages of supervisors, cleaners and security staff who are not directly involved with the physical production of goods and services. The cost of idle time owing to delays and the provision of sick leave and holiday pay are also regarded as indirect costs.
- 3 *Other overheads*: all other indirect items fall within this area. Examples of other overheads are factory rates, insurance, depreciation of factory plant, repairs and factory power costs.

As indirect costs cannot be specifically measured or identified as part of the cost of a product, they are pooled and spread across the items produced using a predetermined application rate.

Self-testing question 1.3

Classify the following costs as direct or indirect:

- (a) a factory supervisor's salary
- (b) timber used in furniture making
- (c) guttering on a house
- (d) a mechanic's wages in a service station
- (e) lubricants for factory machinery
- (f) acid solution used for cleaning steel
- (g) lost time owing to machine breakdowns
- (h) a teacher's salary for a college
- (i) insurance on factory building
- (j) repair costs for a lathe
- (k) resistors used in making a Walkman radio
- (l) a programmer's salary for a computerised cutting machine
- (m) fuel used for a forklift used in a warehouse
- (n) nails used in building a house
- (o) oil filter replaced in servicing a car
- (p) labels in a cannery
- (q) special stationery used by a legal firm
- (r) rental of a photocopying machine used by a consultant
- (s) gas used for cooking in a restaurant
- (t) accounting fees paid by an electrician to a tax agent.

Solution

Direct: (b), (c), (d), (h), (k), (l), (o), (p)

Indirect: (a), (e), (f), (g), (i), (j), (m), (n), (q), (r), (s), (t)

For further practice you should now be able to do end-of-chapter question 1.4.

SERVICE INDUSTRIES

Cost accounting is not restricted solely to measuring the value of units of production. In many businesses the cost objective is to measure the value of a service performed. Some examples of the types of industries and professions providing services are legal, medical, repairers, hospitality, financial institutions, consultants and couriers. Although the above cost classifications of 'direct' and 'indirect' still apply to service industries, their operations tend to be more labour intensive with lower material costs and high overheads. As service industry operations are more time-based it is possible that direct labour will be the only direct cost item, with all other costs being pooled as overheads. This approach would be appropriate for (say) a law office or an accounting firm. In most service industries there will be no inventory items, such as work in process or finished goods. The costs accumulated against the service performed will most likely be recorded after delivery has occurred and the client invoiced.

PRODUCT COSTS AND PERIOD COSTS

The trading account of a manufacturer has an item called ‘cost of goods manufactured’ as part of the gross profit calculation. This account is similar to the purchases account of a retailer. In manufacturing, costs are accumulated against the products being produced. Depending on their stage of completion, these costs will appear as inventories of materials, work in process or finished goods. The flow of costs through these inventories is shown in Figure 1.2 (p. 11).



Product costs are manufacturing costs that are accumulated into an item of inventory. While these costs are held in inventories, they are regarded as ‘unexpired’ costs and appear in the statement of financial position as assets. Examples of product costs are direct material, direct labour, factory rates, depreciation of factory plant, indirect material, and a factory supervisor’s salary. These costs are at first accumulated into a work in process inventory account, then transferred to a finished goods inventory account until the goods are sold. When the goods are sold, the inventory cost of those goods will have ‘expired’. In other words, the costs have been consumed in the generation of sales revenue with the inventory representing those costs no longer held by the firm.



Period costs are not accumulated into inventories but ‘expire’ or are consumed in the period in which they are incurred. Period costs are not carried forward into another accounting period as would occur with an item of inventory. Examples of period costs are selling, distribution and general office administration costs. These costs are matched against income for the period and are shown in the firm’s statement of financial performance.

The distinction between product and period costs is illustrated in Figure 1.3 (p. 14). Product costs of direct material, direct labour and overheads are first accumulated in work in process and then passed on to the finished goods. The product costs will expire when finished goods are sold, the cost being recognised as the expense ‘cost of goods sold’. Period costs as indicated by the expenses are deducted from the gross profit to determine the net profit.

UNIT COSTS

The cost per unit is a simple calculation made by dividing the total cost, or various cost elements, by the units produced. For example:

		Unit cost
Total units produced		10 000
Costs:	\$	\$
Direct material	55 000	5.50
Direct labour	40 000	4.00
Manufacturing overhead	25 000	2.50
Total cost:	\$120 000	\$12.00

Unit cost information can be useful in decision-making or analysis. For example, it is helpful for management to know that the total cost per unit is \$12 when setting selling prices. Also, the cost per unit can be compared with corresponding unit costs in the previous year or against a budget forecast.

However, the unit cost represents an average cost and, as such, needs to be treated with some caution and understanding when interpreting results. Assume a business operates with the simple cost structure of an annual lease payment of \$1 000 and a material cost of \$10 for each item produced. Compare the unit costs if one unit is produced or 100 units produced. Will they be the same?

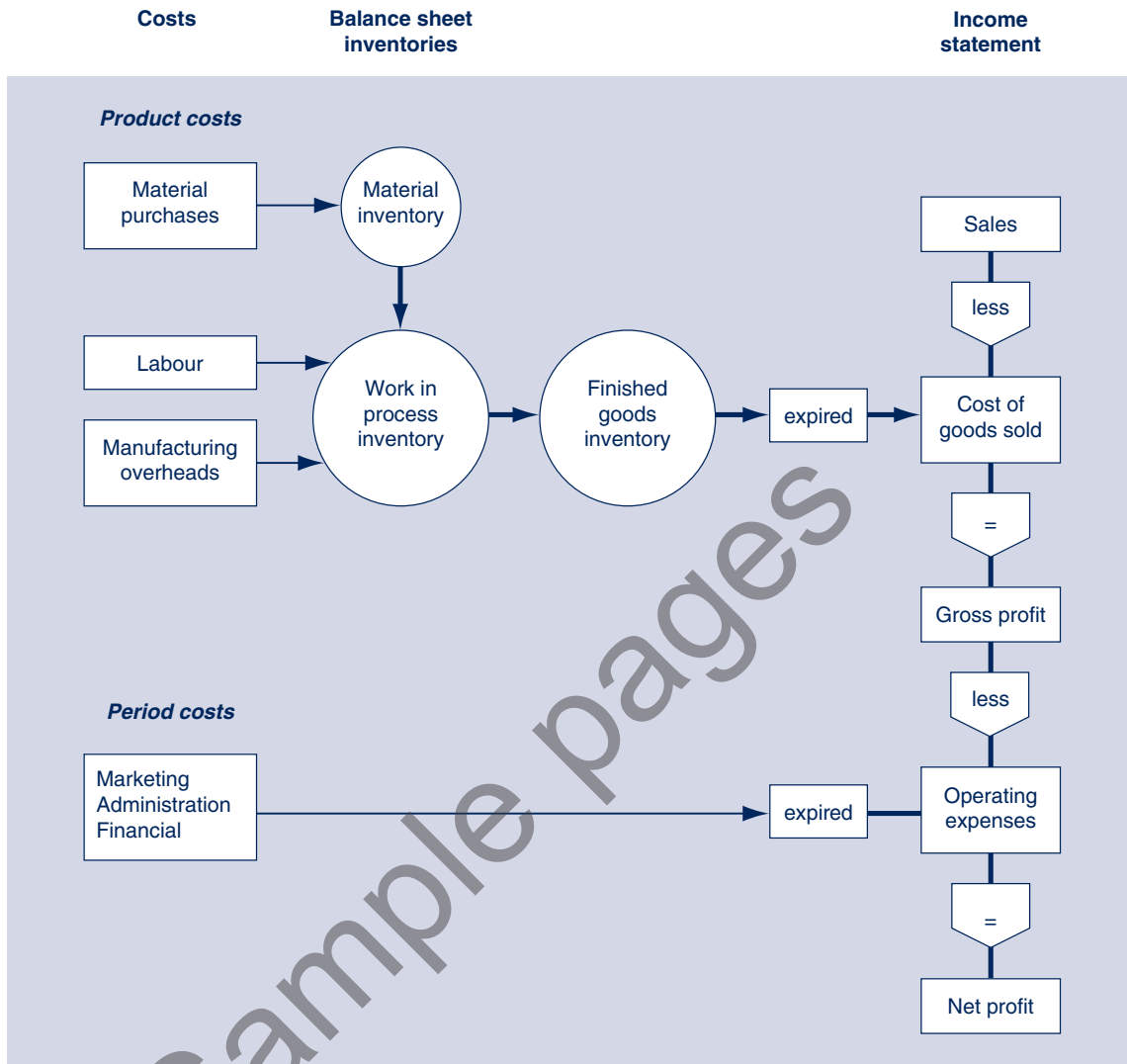


Figure 1.3 Distinction between product costs and period costs

	Units produced	
	1 unit	100 units
Lease cost	\$1 000	\$1 000
Materials cost (\$10 × 1 unit)	\$10	
(\$10 × 100 units)		\$1 000
Total cost	\$1 010	\$2 000
Cost per unit	(\$1 010 ÷ 1)	(\$2 000 ÷ 100)
	\$1 010	\$20

It is obvious from the solution that the higher the number of units produced, the smaller the unit cost will be. This is because unit cost is simply a function of the activity level associated with the cost objective.

Consider the situation in which, in the above example, only one item was sold at a price of \$200. Taking the first column in which one unit was produced, a loss of \$810 ($\$200 - \$1\,010$) would be recorded. If, however, a unit from the second column was sold, there would be a profit of \$180 ($\$200 - \20). The reason for the differences in profit has nothing to do with the number of units sold; it is related to the number of units produced. Unit costs are simple enough to calculate but should be used with care when making decisions. We will now examine the influence of changes in output levels on cost behaviour.

Self-testing question 1.4

Provide answers to the following multiple-choice questions.

- 1 Insurance will be a period cost if it:
 - (a) is paid for in the accounting period
 - (b) is a cost to the factory
 - (c) occurs annually
 - (d) is consumed in earning revenue for the period
 - (e) none of the above.
- 2 A product cost is one that:
 - (a) occurs in the factory
 - (b) relates to a product being manufactured
 - (c) is accumulated in inventories
 - (d) all of the above
 - (e) none of the above.

Solution

1 (d) 2 (d)

For further practice you should now be able to do end-of-chapter question 1.5.

COST DRIVERS



Most costs will occur as a result of some action or activity. A **cost driver** is defined as any factor whose change will cause an associated change to a particular cost being observed. In order to facilitate the better management of costs it is important to identify those things that cause costs to increase or decrease. A common factor influencing the level of costs is production volume. This can be measured in terms of units produced, labour hours worked or machine hours. For example, if direct material is used at a rate of \$15 per unit then the number of units produced will be a cost driver. In other words, the total material cost will increase as more units are made. Other cost drivers may be the number of parts, hours of service, number of orders, distance travelled, patients treated and so on.

FIXED AND VARIABLE COSTS

Total costs and unit costs will change in response to a change in a cost driver. The particular cost driver identified in this section is production output or volume. To interpret cost information and its use in decision-making, it is important to understand cost/volume relationships. Cost behaviour relating to changes in volume can be better understood when costs are identified by their fixed and variable characteristics.

Fixed costs



Total **fixed costs** are expected to remain constant over a given period of time. Costs falling within this category are not expected to alter with changes in the output cost driver. Fixed costs are demonstrated in Figure 1.4. As output increases, the total fixed costs remain constant. However, this relationship holds true only under the following circumstances:

1 *Fixed costs are constant for a given period of time.* Each year obligations and contractual arrangements that affect fixed costs are redetermined.



2 *Fixed costs are constant for the relevant range of output.* The **relevant range** refers to the most feasible area of production given the firm's current resources. If production is extended beyond the relevant range of output, additional investment will be required in plant, buildings etc. This will increase fixed costs.

The increase in fixed costs required to accommodate increases in capacity levels is also shown in Figure 1.4. Although fixed costs are drawn as an extended line at \$30 000, the line represents only the costs' behaviour over the relevant range of 2 000 to 8 000 units. Some examples of fixed costs are rent, supervisor's salary, straight-line depreciation and insurance.

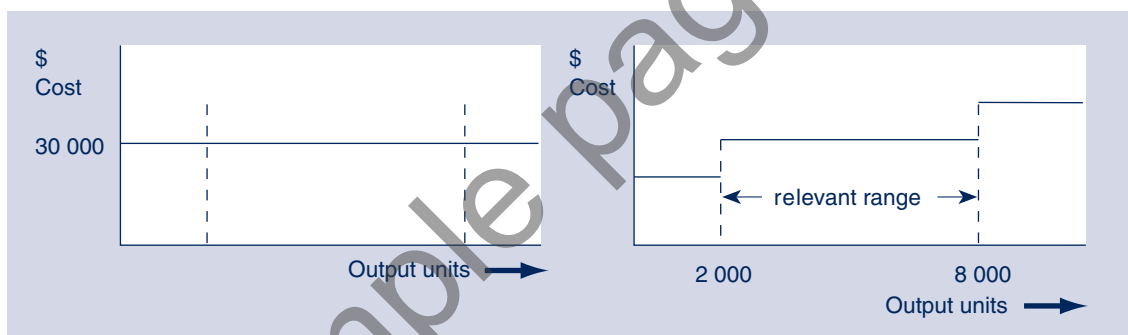


Figure 1.4 Fixed costs

Variable costs



Total **variable costs** change proportionally as the output cost driver varies. This relationship is shown on the left in Figure 1.5. When output is zero, there are no variable costs. As output increases, the total variable cost increases proportionally.

The linear relationship of the variable cost line is based on the assumption that the firm is operating within the relevant range of output. The right graph in Figure 1.5 depicts a more accurate economist's view of variable costs. Poorer economy in costs and lower operational efficiency will increase variable costs more steeply at the lower and higher levels of output. However, within the relevant range the variable cost relationship to output is assumed to be approximately constant. The straight variable cost line drawn through the origin in the left graph of Figure 1.5 reflects only the variable cost relationship between 2 000 and 8 000 units of output. Some examples of variable costs are direct material, direct labour, fuel and power.

A simplistic assumption about variable costs is that they vary only in relation to a single cost driver. It is possible that more than one factor might contribute to a change in the total costs. For example, machine repair costs might be a function of the number of machine hours and the

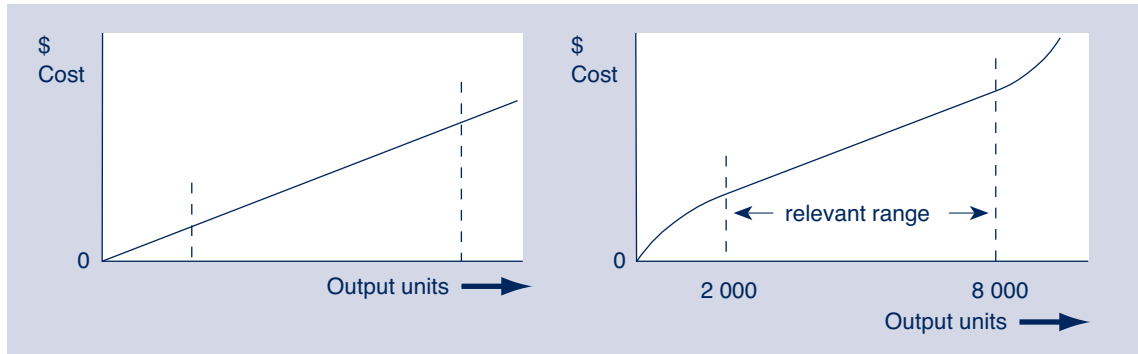


Figure 1.5 Variable costs

amount of material processed. However, at this introductory level, only the use of a single cost driver is followed.

By definition, direct material and direct labour will be variable costs. As production output increases, so too will the direct costs. However, the manufacturing overheads costs are different as they can be variable or fixed. Overheads such as repairs and power are variable costs whereas rates, insurance and depreciation are fixed costs.

Table 1.2 indicates how fixed and variable costs change as the units of production (cost driver) increases from zero to 4 000 units. The following important observations can be made from the cost schedule in Table 1.2:

- 1 A change in total costs resulting from an increase in output is caused by the variable costs. The total cost increase from 2 000 units to 3 000 units of \$10 000 (\$60 000 – \$50 000) is only owing to the change in total variable costs (\$30 000 – \$20 000).
- 2 The total unit cost decreases as production increases. The reduction in total unit cost from 2 000 units to 3 000 units of \$5 (\$25 – \$20) is owing to the change in unit fixed costs (\$15 – \$10). The fixed cost is spread over more units as output increases.
- 3 The unit variable cost remains constant as production increases whereas unit fixed cost falls.

Table 1.2 Fixed and variable cost schedule

<i>Production units</i>	<i>0</i>	<i>2 000</i>	<i>3 000</i>	<i>4 000</i>
Variable costs	\$	\$	\$	\$
Direct material		4 000	6 000	8 000
Direct labour		6 000	9 000	12 000
Variable overhead		10 000	15 000	20 000
Total variable costs		20 000	30 000	40 000
Fixed costs				
Fixed overhead	30 000	30 000	30 000	30 000
Total fixed costs	30 000	30 000	30 000	30 000
Total costs	30 000	50 000	60 000	70 000
Variable cost per unit		10.00	10.00	10.00
Fixed cost per unit	30 000	15.00	10.00	7.50
Total cost per unit	30 000	25.00	20.00	17.50

- 4 The only costs incurred at zero production will be the fixed costs. For this reason, fixed costs are sometimes referred to as 'shutdown' costs as they continue in the short run even though business activity is terminated. When production losses are incurred, a shutdown decision must acknowledge the firm's fixed costs commitment.

Self-testing question 1.5

(a) The cost of producing 5 000 units is:

	\$
Variable costs	8 000
Fixed costs	<u>7 000</u>
Total cost	<u>15 000</u>

What will be the expected total cost of producing 8000 units?

(b) The unit cost of producing 3 000 units is:

	\$
Variable costs	5.00
Fixed costs	<u>8.50</u>
Total unit cost	<u>13.50</u>

What will be the expected total cost if 1750 units were produced?

Solution

		\$
(a) Variable cost	$(8\ 000 \div 5\ 000) \times 8\ 000$	12 800
Fixed cost		<u>7 000</u>
		<u>19 800</u>
(b) Variable cost	$5.00 \times 1\ 750$	8 750
Fixed cost	$8.50 \times 3\ 000$	<u>25 500</u>
		<u>34 250</u>

For further practice you should now be able to do end-of-chapter questions 1.6, 1.7, 1.8 and 1.9.

Semi-variable costs

It would be ideal to be able to classify all costs neatly as either fixed or variable. However, the reality is that some cost items do not respond directly to a change in a cost driver nor do they remain static. This is because they contain both fixed and variable elements in the cost structure. For example, lubrication of machinery might be necessary not only during production, to prevent wear, but also for preservation while the machinery is not in use. Electricity costs vary in proportion to production levels but might also include lighting for the factory. Repair costs increase with machine use, but there might also be regular service periods. Such costs are known as **semi-variable costs**. Semi-variable costs are discussed further in Chapter 6.



Self-testing question 1.6

Indicate whether the following costs are fixed, variable or semi-variable.

Units produced	4 000	6 000
Costs	\$	\$
(a) rates	4 000	4 000
(b) repairs of machinery	600	800
(c) power	5 000	7 500

(d) depreciation	1 500	1 500
(e) production wages	9 000	13 500
(f) indirect material	150	200
(g) fertiliser	2 000	2 800
(h) telephone	300	400
(i) supervisor	8 000	9 000

Solution

Fixed cost: (a), (d)
 Variable cost: (c), (e)
 Semi-variable cost: (b), (f), (g), (h), (i)

For further practice you should now be able to do end-of-chapter questions 1.10, 1.11 and 1.12.

PRIME COSTS AND CONVERSION COSTS



We have just observed how cost will behave in regard to a change in output or production volume. Another way of observing costs is in their relationship to the product. The three elements of manufacturing costs are direct material, direct labour and factory overheads. Direct material and direct labour costs can be combined into what is known as **prime cost**. Factory expenses are classified in the normal way as indirect costs or overheads.

$$\text{Prime cost} = \text{direct material} + \text{direct labour}$$



Another combination of costs can occur between direct labour and factory overheads. These costs are classified as **conversion costs** as they reflect the process of converting the direct material into a finished product. The conversion cost classification can be used where there are high levels of automation in the production cycle resulting in less significant direct labour costs and proportionally higher overheads.

$$\text{Conversion cost} = \text{direct labour} + \text{overhead costs}$$

Table 1.3 summarises the cost classifications covered so far. The left side indicates cost classifications based on activity associated with a cost driver. The right side shows a summary of product cost classifications that are useful for general reporting.

Table 1.3 Classification of costs

Activity-based		Product-based	
Variable costs	Direct material	} Direct costs	} Conversion costs
	Direct labour		
	Manufacturing overhead	} Indirect costs	
—Repairs			
—Power			
Fixed costs	—Rent		
	—Insurance		

Self-testing question 1.7

The following production costs were incurred during one month:

	\$
Labour cost for machine operators	10 000
Factory power	1 500
Council rates for factory	2 000
Raw materials issued to production	18 000
Supervisor's salary	3 000
Repair costs for factory plant	500
Depreciation of factory plant	350
Factory insurance	3 800
Cost of lubricants and cooling liquid	820

You are required to calculate the value of the following:

- prime cost
- conversion cost
- total fixed costs.

Solution

(a) Raw material	\$	18 000
Labour for machine operators		10 000
Prime cost		<u>28 000</u>
(b) Labour for machine operators		10 000
Overheads:		
Power	1 500	
Rates	2 000	
Supervisor	3 000	
Repairs	500	
Depreciation	350	
Insurance	3 800	
Lubricants	<u>820</u>	
Conversion costs		<u>11 970</u>
		<u>21 970</u>
(c) Council rates		2 000
Supervisor		3 000
Depreciation		350
Insurance		<u>3 800</u>
Fixed costs		<u>9 150</u>

For further practice you should now be able to do end-of-chapter questions 1.13, 1.14, 1.15, 1.16 and 1.17.

APPLICATION OF OVERHEADS

Direct material and direct labour can be easily assigned to production as they are, by definition, identified in the cost of the finished product. Invoices and wages sheets provide the relevant information concerning these costs. The assignment of overhead costs, however, is a little more difficult because they bear no direct attachment to the finished product. It would not be possible to pinpoint the amount of factory insurance or cleaning costs incurred in making a given unit of product. Two possible approaches to assigning overhead costs to production or services are the reporting of overheads as 'actual' or 'applied'.

Under an actual costing system, overhead costs are accumulated over a period and shown in the report along with the total direct cost items. One of the difficulties with this approach is that overhead costs are not incurred uniformly throughout the year. Some costs might occur annually (insurance, rates, depreciation), others quarterly (power, water, telephone), while others might be monthly (supervisor's salary, maintenance). Actual costing means that a business will have to wait until the end of the year before it can calculate the cost of its product or service. For some types of business this is not appropriate.

The use of an applied cost method for assigning overhead costs overcomes some of the problems just described. A budget or forecast of overhead costs is prepared at the start of the period. The budgeted overhead costs are then divided by an appropriate cost driver, such as labour hours or number of units. This calculates what is called a predetermined application rate for overheads. The overhead costs are applied to work produced according to the amount of activity (hours, units) associated with their production. This method allows overhead costs to be controlled on a more regular basis and provides for better monitoring of the cost of production or services.

For example, a firm might have the following budget for their overhead costs for the year ahead:

Budget manufacturing overheads	
Variable overheads	\$15 000
Fixed overheads	\$13 000
Total overheads	\$28 000
Cost driver: Estimated machine hours	4 000

The planned overhead application rate will be \$7.00 per machine hour (\$28 000/4 000).

For a product that required 15 machine hours to make, and incurred direct materials costs of \$80 and direct labour costs of \$150, the total cost of production will be:

Direct material	\$80
Direct labour	\$150
Manufacturing overhead applied ($\$7 \times 15$ hours)	\$105
	\$335

DIRECT AND ABSORPTION COSTING



The approach so far has been to treat all factory overheads as product costs. This method is called **absorption costing**. When production increases, the cost per unit declines. This is because the fixed overhead costs are divided over a greater number of units of output. Therefore, if the number of units produced varies from one period to another, the unit cost will change even though the fixed costs might be the same. For this reason absorption costing has its critics, who say that the unit cost of finished products should not be allowed to vary from period to period simply because of the influence of fixed costs resulting from different levels of production. It is argued that fixed costs are not product costs but relate more to an accounting period. Fixed overheads, such as rent, insurance and depreciation, should therefore be treated as period costs. The method of cost accounting that treats fixed overheads as period costs rather than product costs is known as **direct costing**.



Table 1.4 (p. 22) gives a comparison of financial reports using the two methods.

The presentation of information in a direct costing report is more useful for decision-making because it highlights variable or marginal costs. An example of this is the calculation of the break-even point. The *break-even point* refers to the level of sales that will provide a net profit of zero. This can be determined by examining the relationship between the sales, variable and fixed costs. The direct cost statement can be summarised as follows:

		\$	%
Sales		100 000	100
Variable costs			
Cost of goods sold	55 000		
Marketing	<u>5 000</u>	<u>60 000</u>	<u>60</u>
Contribution margin		<u>40 000</u>	<u>40</u>
Fixed costs		<u>24 000</u>	
Net profit		<u>16 000</u>	

The contribution margin is the difference between the sales and the variable costs and is the amount available to cover the fixed costs. To make a zero profit, the following equation will apply:

$$\text{Sales} = \text{variable costs} + \text{fixed costs}$$

Table 1.4 Absorption and direct cost comparative statement

		<i>Cost method</i>	
		<i>Absorption</i>	<i>Direct</i>
		\$	\$
	Sales	100 000	100 000
<i>Less</i>	Cost of goods sold		
	Direct material	10 000	10 000
	Direct labour	35 000	35 000
	Variable overhead	10 000	10 000
	Fixed overhead	<u>15 000</u>	<u>—</u>
		<u>70 000</u>	<u>55 000</u>
	Gross profit	<u>30 000</u>	<u>45 000</u>
<i>Less</i>	Variable marketing expenses	<u>5 000</u>	<u>5 000</u>
	Contribution margin		<u>40 000</u>
<i>Less</i>	Fixed overhead	<u>—</u>	<u>15 000</u>
	Fixed marketing	1 000	1 000
	Fixed administration	<u>8 000</u>	<u>8 000</u>
		<u>14 000</u>	<u>24 000</u>
	Net profit	<u>16 000</u>	<u>16 000</u>

Let 'X' be the sales required to break even. Using the percentage figures shown above, the equation will become:

$$100\% X = 60\% X + 24\,000$$

therefore:

$$40\% X = 24\,000$$

$$X = \frac{24\,000}{0.40}$$

$$X = 60\,000$$

The break-even sales level is \$60 000.

Self-testing question 1.8

The budget for overheads at a production level of 6 000 direct labour hours is:

fixed	\$18 000
variable	\$24 000
total	\$42 000

- What is the overhead application rate per hour at a budget based on 6 000 hours?
- What would be the total budget for overheads at 5 000 hours?
- What would be the application rate per hour at a budget based on 5 000 hours?

Solution

- (a) Application rate $(42\ 000 \div 6\ 000) = \7.00 per direct labour hour.
- (b) Fixed costs 18 000
 Variable costs $(24\ 000 \div 6\ 000) \times 5\ 000$ 20 000
38 000
- (c) Application rate $(38\ 000 \div 5\ 000) = \7.60 per direct labour hour.

For further practice you should now be able to do end-of-chapter questions 1.18, 1.19, 1.20 and 1.21.

COSTS AND PRICING

A business exists to make profits, and profits will depend on costs and prices. If prices are too high, then sales and therefore profits might fall. If prices are too low, then sales might increase, but profits might still fall as the profit margin between the cost and selling price is reduced. It is therefore important to have a correct balance between costs, prices and profits within the constraints of a competitive market and the cost structure of the firm.

Costs, prices and profits can be expressed in a number of ways. When a quotation is being prepared, the cost of the job is calculated and a profit margin added to establish the selling price. The profit margin calculated in this way represents a mark-up on cost. Another way of describing a profit is to show it as a percentage of sales. This is known as a *gross profit margin*. The following examples illustrate how costs, profits and sales figures can be calculated.

example 1.1

A firm always provides a 25% mark-up on cost when quoting prices to customers. If the cost of a job is \$800, calculate the following:

- the gross profit on the job
- the selling price quoted
- the profit as a percentage of sales, and
- the cost as a percentage of sales.

solution



- (a) gross profit $= 25\%$ mark-up on cost
 $= 25\% \times \$800$
 $= \$200$
- (b) selling price $= \text{costs} + \text{gross profit}$
 $= \$800 + \200
 $= \$1\ 000$

$$\begin{aligned}
 \text{(c) gross profit margin} &= \frac{\text{gross profit}}{\text{sales price}} \times \frac{100}{1} \\
 &= \frac{200}{1\,000} \times \frac{100}{1} \\
 &= 20\% \\
 \text{(d) cost as percentage of sales} &= \frac{\text{cost price}}{\text{selling price}} \times \frac{100}{1} \\
 &= \frac{800}{1\,000} \times \frac{100}{1} \\
 &= 80\%
 \end{aligned}$$

example 1.2

A firm calculates the selling price by a mark-up of 25% on the cost price. If the selling price is \$120, what is the cost price?

solution

As the mark-up (or gross profit) is 25% on cost, the cost price will be 100% of itself. Therefore, the cost, profit and price relationship can be expressed in the following equation:

$$\begin{array}{rclcl}
 \text{Cost price} & + & \text{gross profit} & = & \text{selling price (\$120)} \\
 (100\%) & + & (25\%) & = & (125\%)
 \end{array}$$

As the \$120 selling price is 125% of the cost price, the cost price will be:

$$\frac{100}{125} \times \frac{120}{1} = \$96$$

example 1.3

A firm maintains a gross profit margin of 30% of the sales price. If the goods have a cost of \$140, what will be the selling price?

solution

As the gross profit margin is 30% on the selling price, the selling price will be 100% of itself. Therefore, the cost, profit and price relationship can be expressed in the following equation:

$$\begin{array}{rclcl}
 \text{Cost price (\$140)} & + & \text{gross profit} & = & \text{selling price} \\
 (70\%) & + & (30\%) & = & (100\%)
 \end{array}$$

As the \$140 cost price is 70% of the selling price, the selling price will be:

$$\frac{140}{70} \times \frac{100}{1} = \$200$$

Self-testing question 1.9

It is the policy of a firm to mark up all items by $33\frac{1}{3}\%$ on cost. If the selling price is \$220, calculate the following:

- the cost price as a percentage of the selling price
- the gross profit margin
- the cost price
- the gross profit.

Solution

(a) Cost price percentage	$(100\% \div 133\frac{1}{3}\%) \times \frac{100}{1}$	=	75%
(b) Gross profit margin	$\frac{33\frac{1}{3}}{133\frac{1}{3}} \times \frac{100}{1}$	=	25%
(c) Cost price	$(75\% \times 220)$	=	\$165
(d) Gross profit	$(25\% \times 220)$	=	\$55.00

For further practice you should now be able to do end-of-chapter questions 1.22, 1.23, 1.24 and 1.25.

Multiple products

The gross profit margin is affected by two factors: the unit selling price and the unit cost price. Where more than one product is being sold, the total gross profit margin will be the same provided all products have the same mark-up on cost. This condition will hold even if the products have different costs and selling prices. Where there is not a consistent mark-up on cost for all product items, the amount of the gross profit margin will depend on sales volume for each item and the sales mix.



The **sales volume** refers to the number of items sold for a particular item, or the activity level associated with a particular service provided (150 model Z vehicles, 50 Big Macs). The **sales mix** refers to the proportion in which the various items are sold or the variety of services provided, in relation to the other product or service items of the business.

Where a business markets a number of items or services at different prices, the total sales revenue and the average sale will also depend on the sales volume for each item and the sales mix. The average sale represents the average selling price of all items.

COST-ACCOUNTING SYSTEMS

Cost-accounting systems have been developed that can be applied to a variety of production methods sharing common characteristics. These systems will be presented only briefly at this stage as they are developed more fully in later chapters.

Job cost systems



The job cost system applies to situations in which production is geared to customer specification. For example, printers produce orders to comply with customers' requests and builders construct dwellings according to owners' house plans. The attributes of each job will differ in terms of the consumption of material, the labour employed and the overheads. The **job cost system** provides for the accumulation of costs around each job or order. This is achieved by means of the job cost card. The inventory value of work in process or finished goods can be determined by adding together the individual job cards.

Process cost systems



A **process cost system** will apply where there are large volumes of similar products in a continuous stream. Examples of industries that employ this mass production method are vehicle and appliance manufacturers, oil refineries, and manufacturers of soaps and cleaning agents. Raw materials enter the process production system and are then converted into large quantities of identical finished products. As all units of output are the same, a unit cost can be determined by dividing the production costs by the number of units produced. When not all units are completed in a period, the unit cost for the remaining work in process and the finished goods is determined by dividing the input costs by equivalent units of completed production.

Standard costing



Standard costing is not a third product cost system but a system of cost control that can be applied in both job and process cost situations. The previous cost systems determine how much it *actually* costs to make a product but do not indicate how much it *ought* to have cost. A standard cost system, through budgets and planning, derives predetermined costs for direct material, direct labour and factory overheads (based on 'efficient' production and spending). These 'standard costs' are then used to cost production. At appropriate periods, actual costs are compared with standards to determine cost *variances*. A proper analysis of variances provides management with feedback on cost control and efficiency and highlights problem areas that need attention.



Operation costing

Operation costing is a hybrid of job and process costing. It applies to situations in which a job or order might be required to pass through two or more different processes before it is completed. Each process will add different features to the product, and the outcome depends on the number of operations used. An example of operation costing would be the manufacture of skirts where some items are required to be lined and some unlined. Another example would be the manufacture of pine wood furniture where some pieces are made for self-assembly, others are assembled in the factory but not polished and others are assembled and polished. In these examples, the cost of skirt material and timber would be incurred at the start of the process with conversion costs applied according to the amount of processing carried out.



Activity-based costing

Activity-based costing has been adopted in recent years as an alternative method of distributing overhead costs to products. The traditional approach applied overheads using a volume-based cost driver such as labour cost, labour hours or machine hours. Overheads were then applied on a single plant-wide basis or on a departmental basis. Activity-based costing is based on the premise that activities consume costs and products consume activities. By dividing the business operations into activities, more appropriate cost drivers can be identified that better measure the degree to which overhead costs are incurred. Overhead costs can then be assigned to work done on the basis of the number of activities required to complete the task.

MANAGEMENT SYSTEMS AND COST ACCOUNTING

The types of management systems discussed here are not necessarily independent of each other. They represent management approaches that, depending on individual situations, can be used simultaneously. For example, it would not be uncommon for a business using total quality management principles to adopt activity-based costing in response to benchmarking.

Just-in-time



The just-in-time approach to management provides an initial focus on inventories. Levels of inventory should be kept at a minimum with the ideal situation being that no inventories are kept at all. The rationale for this ideal is that by holding inventory the firm is adding an **avoidable cost** to its cost of production. The inventory holding cost does not add value, and by reducing or eliminating the need for inventories this cost will be saved.



The strict operation of **just-in-time** will mean that orders are manufactured to meet customer demands and that raw materials are purchased 'just in time' to be included in the manufacturing process. The reality, of course, might be different owing to problems associated with the time needed to order and receive materials, the nature of the product and the market. However, the principle of searching out and eliminating all costs that do not 'add value' is a profitable management strategy.



Benchmarking

Businesses are becoming increasingly aware of the need to maintain a competitive edge in a changing world market. One way of achieving this is by constantly reviewing business operations so that 'best practice' is maintained through 'continuous improvement'. By comparing the various segments of the business with competitors or firms with similar operating functions, management will be able to identify gaps in its own operations where procedures could be improved or costs reduced. A benchmark is some achievable level of performance, identified in another firm, which can be used as a criterion for improved practice within the business.



Total Quality Management

The name **Total Quality Management (TQM)** is an umbrella term that covers a wide spectrum of management initiatives. These would include the principles of just-in-time and benchmarking. The Total Quality Management Institute of Australia describes TQM as ‘the management philosophy that seeks continuous improvement in the quality of performance of all processes, products and services of the organisation’. Key elements of this management philosophy are:

- the customer orientation of business decisions
- employees’ involvement in decision-making at all levels
- teamwork and training
- that management makes decisions using factual information, and
- that process and product improvement should be continuous.

ETHICS

Some would ask: Why discuss ethics? Everyone knows the difference between right and wrong, don’t they? You might be surprised at the answer. Consider these two situations. In the first a person has deliberately overstated a tax deduction by \$20, and in the second \$20 000 has been misappropriated from a business to a personal bank account. Both actions are fraudulent, but there will be differences of opinion as to how serious each is. The decline in ethics often goes unnoticed in the hustle and bustle of business life and it is often only with the benefit of hindsight that the decline becomes evident. The collapse of investment companies such as the Westpoint Group and Fincorp, following on from the large corporate implosions of HHH and OneTel, as well as international examples such as Enron, show the importance of accountants and other professionals being continually aware of ethical issues and conduct.

An important part of the accounting function is to provide for the proper stewardship of business assets. This means that the accounting system must provide the controls necessary to ensure accurate and factual reporting of profits, assets and liabilities. Financial information and business decisions affect many individuals and organisations. Examples of such stakeholders are managers, shareholders, staff, financial institutions, governments, insurance companies and the general public.

Business leaders need to resist the lures of self-interest and the pressure of opinion within the business world, and act with integrity in a way that is not only legal but is also moral, just, honest and fair, even if it requires personal sacrifice. The professional accounting bodies such as CPA Australia, the Institute of Chartered Accountants in Australia (ICAA) and the Institute of Public Accountants (IPA) have issued ethical standards for their members in order to engender proficiency, competence and personal moral integrity in the profession.

Self-testing question 1.10

Discuss the following problem.

The accounts of True Blue Trading indicate the following operating expenses for the month:

	\$
Direct labour	8 700
Marketing	7 400
Overheads	12 500
Distribution	3 200
Administration	2 400
Direct material	10 800

The business operates on just-in-time principles and therefore does not carry any inventories. It is the pricing policy of the firm to quote all orders at cost plus 50%.

The general manager is soon to retire, and the production manager is interested in applying for the position. The production manager approaches you with recommended adjustments to the latest production costs. It is pointed out that an amount of \$4 000 included in the overheads relates to the salary of the factory supervisor and therefore this amount should be shown as part of the administration costs. The production manager stresses that there is nothing illegal about transferring this cost as it will make no difference to the bottom line.

- What is the gross profit and net profit based on the original figures?
- How would the proposed changes affect the gross and net profits?
- How will the proposed changes advantage the production manager?
- What ethical questions arise?

Solution

(a)	Sales	(32 000 × 150%)	\$	\$	48 000
	Cost of goods sold				
	Direct material		10 800		
	Direct labour		8 700		
	Overhead		<u>12 500</u>		<u>32 000</u>
	Gross profit				16 000
	Marketing expenses		7 400		
	Distribution expenses		3 200		
	Administration expenses		<u>2 400</u>		<u>13 000</u>
	Net profit				<u>3 000</u>
(b)	Sales	(28 000 × 150%)			42 000
	Cost of goods sold	(32 000 – 4 000)			<u>28 000</u>
	Gross profit				14 000
	Expenses	(13 000 + 4 000)			<u>17 000</u>
	Net loss				<u>(3 000)</u>
(c)	Understates the actual cost of production.				
(d)	Moral versus legal The use of influence by a manager to put pressure on an employee to incorrectly present the accounting treatment of costs.				

For further practice you should now be able to do end-of-chapter questions 1.26, 1.27, 1.28, 1.29, 1.30, 1.31, 1.32, 1.33 and 1.34.

SUMMARY

This chapter introduced a number of concepts and terms that form a basis for understanding the purpose and function of a cost-management accounting system. Accounting systems generate internal reports that are used by management for decision-making, planning and control and external reports (financial statements) for use by owners.

The cost-accounting system not only provides a method of product costing but also carries out an attention-directing and problem-solving function for management.

The term *cost* is identified by the cost objective, so the required purpose of cost information should always be stated. Costs are observed in their relation to the product being costed and can be classified as direct material, direct labour or manufacturing overheads. The same costs can also be observed in their relationship to changes in activity and can be described as variable or fixed, product or period.

Job, process and standard costing are methods for determining the cost of products. These methods often use an absorption costing technique for the treatment of fixed factory overheads. Direct costing is an alternative approach that recognises variable costs as product costs and treats fixed factory overheads as period costs.

Costs will be accumulated and controlled through cost centres, which form part of a responsible accounting system.

QUESTIONS

1.1 Theory

What role does the cost/management accountant have in the business organisation?

1.2 Theory

Outline three differences between financial accounting and cost accounting.

1.3 Manufacturing costs

Indicate whether the following are manufacturing/service costs or non-manufacturing costs:

- (a) windows for a house
- (b) sales wages
- (c) depreciation of a computer lathe
- (d) advertising expense
- (e) petrol used in the general manager's car
- (f) lighting for the showroom
- (g) soap powder used in a commercial laundry
- (h) repairs to the factory office air conditioner
- (i) oil used by a car dealership to service a vehicle
- (j) postage of products to customers
- (k) cable used by an electrician
- (l) vegetables used by a restaurant
- (m) interest on a bank overdraft
- (n) wages of a cabinet maker in a furniture-making business
- (o) sand used by a bricklayer to mix concrete.

1.4 Direct and indirect costs

Classify the following costs as either direct or indirect in relation to a product/service:

- (a) factory rent
- (b) integrated circuit in a Walkman radio
- (c) tiles used in making a house
- (d) wages of a factory supervisor
- (e) eggs used in making a cake
- (f) telephone calls made by a solicitor
- (g) wages of the factory store manager
- (h) hospital nurses' wages
- (i) CD player in a motor vehicle
- (j) copper pipe used by a plumber
- (k) depreciation on a builder's utility vehicle
- (l) reinforcement steel used in concrete paths
- (m) house cleaners' wages for a hotel
- (n) furnace fuel for a foundry
- (o) ink cartridge for a printer.

1.5 Product and period costs

Classify the following as product or period costs:

- (a) sales commissions
- (b) butter used in a bakery
- (c) bad debts
- (d) showroom office photocopying
- (e) depreciation of factory buildings
- (f) rates for repair workshop
- (g) safety training machine operators
- (h) tax agent's fees
- (i) staples used in furniture making
- (j) insurance on delivery vehicles.

1.6 Classifying costs

Complete the following table indicating by an 'X' how you would classify the particular cost item. It is possible that more than one cost classification could apply to each item.

- (a) reducing balance depreciation of factory equipment
- (b) registration of delivery vehicles
- (c) electricity used by drilling machines
- (d) work cover insurance for factory office staff
- (e) parts used by a mechanic to repair a refrigerator
- (f) straight-line depreciation of computer lathe
- (g) factory insurance
- (h) safety signs for a printing press
- (i) product advertising
- (j) sales commission
- (k) repairs and maintenance for factory machine
- (l) cook's wages in a bakery.

Item	Cost classification					
	Manufacturing	Non-manufacturing	Direct	Indirect	Fixed	Variable
(a)						
(b)						
(c)						
(d)						
(e)						
(f)						
(g)						
(h)						
(i)						
(j)						
(k)						
(l)						

1.7 Fixed and variable costs, flexible budget

Complete the following table.

Units produced	3 000		5 000	
	Total cost	Unit cost	Total cost	Unit cost
Fixed cost	?	\$19.00	?	?
Variable cost	\$72 000	?	?	?
Total cost	?	?	?	?

1.8 Fixed and variable costs

At a production level of 4 000 units the budgeted overhead costs were:

	\$
Fixed cost	5 000
Variable cost	6 000
Total cost	11 000

Required:

What will be the total budget for overheads at a production level of 6 250 units?

1.9 Fixed and variable costs

A business has estimated that the following costs will be incurred if 2 500 units were produced.

	\$
Fixed cost	5 000
Variable cost	10 000
Total cost	15 000

Required:

What will be the expected unit cost of producing 2 000 units?

1.10 Fixed and variable costs

A firm has the following cost structure at a production level of 4 000 units:

Direct material	\$1.75 per unit
Direct labour	\$2.45 per unit
Manufacturing expense	
Variable	\$1.40 per unit
Fixed	\$4 800

Required:

What would the unit cost be if 4 800 units were produced?

1.11 Fixed and variable costs

It is estimated that the unit cost of producing 20 000 units is \$120.00, of which \$90.00 is the unit variable cost.

Required:

- (a) What is the expected total cost if 25 000 units are produced?
- (b) What is the expected cost per unit if 30 000 units are produced?

1.12 Fixed and variable costs

At an output of 6 000 units, the total overhead costs are expected to be \$12 000. If only 4 000 units are made, the total costs are expected to be \$9 000.

Required:

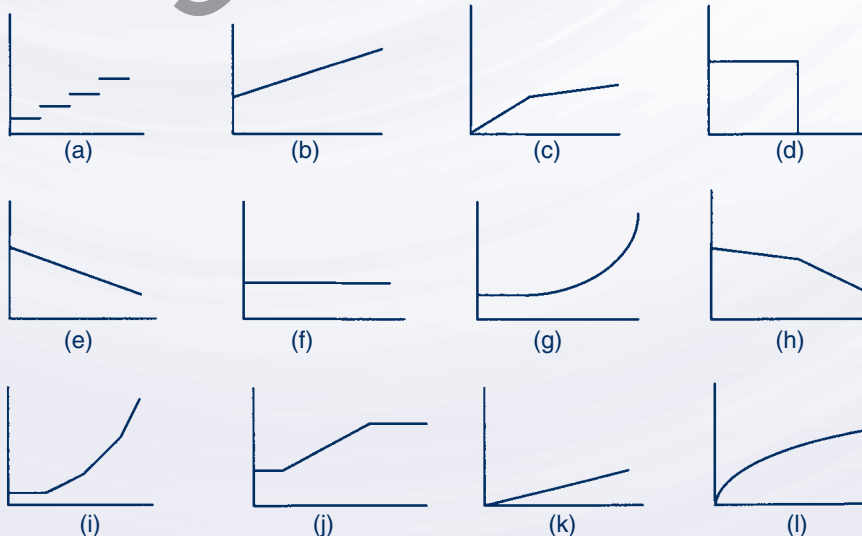
- (a) What is the variable cost per unit?
- (b) What are the fixed costs?
- (c) What will be the expected total cost of producing 5 000 units?

1.13 Fixed and variable costs

The budgeted total overhead cost of making 50 000 items is \$740 000. The expected budget for 75 000 items is \$1 040 000. What will be the estimated cost of making 90 000 items?

1.14 Cost behaviour graphs

You are required to select the graph that best describes the cost behaviour of the items indicated below. For each graph, the vertical axis represents total dollars and the horizontal axis indicates the production, the rate of consumption or output activity during a year. A graph may be used more than once.



- 1 The cost of fuel where the first 10 000 litres will cost \$6 per litre. The price will then fall to \$4 per litre for any fuel purchased in excess of 10 000 litres during the year.
- 2 Direct labour cost where employees are paid a fixed hourly rate of \$25 for each hour worked.
- 3 The telephone usage where there is a fixed rental plus a 20¢ charge per call.
- 4 Rental cost for retail store space in a shopping complex where the cost is calculated on annual sales figures. Until sales reach \$50 000, the rent is \$8 000. At that point the rent will increase by 5% on the sales in excess of \$50 000 until a sales level of \$200 000 is reached, at which time no additional rent will be payable.
- 5 Depreciation of plant using the straight-line method.
- 6 Service charges on a printing machine. A service is required after every 100 000 copies are printed. The service contract requires an initial payment of \$400 and further payments of \$400 every time a service is provided.
- 7 Depreciation of factory plant using the reducing balance method of depreciation.
- 8 The cost of direct material where the cost per unit decreases by 2¢ per item for each additional item purchased; for example, the cost of the first item is \$50.00, the second item \$49.98, the third item \$49.96 and so on.
- 9 Water rates are calculated on the number of litres used, as follows:

the first 1 000 000 litres	\$800 minimum charge
next 1 000 000 litres	0.2¢ per litre
next 1 000 000 litres	0.4¢ per litre
next 1 000 000 litres	0.8¢ per litre, and so on.
- 10 A supplier has donated an item of equipment to promote its product. A fixed rental fee of \$3 000 will apply to cover installation and delivery. However, if the equipment is demonstrated for more than 1 000 hours no rent will be paid.

1.15 Prime cost and conversion cost

The following cost information has been provided for a new product line:

	Unit cost (\$)
Direct materials	2.50
Direct labour	1.50
Variable factory overhead	3.00
Fixed factory overhead	1.50

The unit costs are based on a production of 10 000 units.

Required:

If 12 000 units were produced what would be the expected:

- (a) total prime cost
- (b) conversion cost per unit?

1.16 Cost classification

For each of the following you are required to circle the correct cost classification.

Cost description	Cost classification	
	direct	indirect
Factory security wages	direct	indirect
Factory electricity used to drive machines	fixed	variable
Interest on mortgage used to finance plant	product	period
Components used to make computers	conversion	prime
Idle time by plant operators	direct labour	overhead
Overhead applied that includes fixed costs	actual	absorption

1.17 Cost classification

Mark with an 'X' in the table below the appropriate cost classifications for the transactions listed.

- (a) factory electricity paid
- (b) cost of product samples used in marketing
- (c) payment of production bonuses to employees
- (d) petrol for a van used by an electrician
- (e) advertising on a builder's truck
- (f) factory rates
- (g) wages for staff in the factory cafeteria
- (h) grease and lubricants used in a machine
- (i) cutting and sanding material used by a panel beater
- (j) salary of the customer service officer.

Item	Product cost		Period cost	Prime cost	Conversion cost
	Direct cost	Indirect cost			
(a)					
(b)					
(c)					
(d)					
(e)					
(f)					
(g)					
(h)					
(i)					
(j)					

1.18 Cost classification

A manufacturer has the following summarised costs:

	\$
Administration expense	39 000
Fixed marketing expense	20 000
Direct factory labour	45 000
Depreciation of factory plant (reducing balance)	12 500
Variable marketing	17 500
Direct factory materials used	40 000
Insurance on factory premises	22 500
Variable factory overhead	25 000

Required:

Calculate the following amounts:

- (a) total fixed factory overhead
- (b) conversion cost
- (c) total variable manufacturing costs
- (d) total product costs
- (e) total period costs.

1.19 Cost classification

A business incurred the following manufacturing costs:

	\$
Prime costs	368 000
Total product costs	690 000
Conversion costs	518 000
Fixed factory overhead	190 000

Required:

Calculate the following amounts:

- (a) total factory overhead costs
- (b) direct labour costs
- (c) direct material costs
- (d) total of all the variable manufacturing costs.

1.20 Cost classification

Wong Production has prepared the following budget information:

Units produced:	4 000	7 000
Costs:	\$	\$
Direct material	20 000	35 000
Rental of showroom	3 000	3 000
Direct labour	16 000	28 000
Indirect labour	8 400	12 600
Factory depreciation	15 000	15 000
Marketing	6 000	10 500

Required:

- (a) Use the above information to identify which costs are:
 - (i) a variable conversion cost
 - (ii) a semi-variable product cost
 - (iii) a variable period cost
 - (iv) a fixed product cost.

- (b) The following overhead budget has been prepared for the year:

Fixed costs	\$27 000
Variable costs	\$45 000
	<u>\$72 000</u>

Cost driver: 18 000 machine hours

What overhead recovery rate will be used for the year?

1.21 Absorption, direct costing

Andrew Engineering incurred the following costs in making and selling 420 units of finished product. There was no incomplete work during the period.

	\$
Plant maintenance costs	1 659
Direct material	4 536
Marketing	2 400
Factory insurance	1 748
Factory power	3 465
Direct labour	7 560
Factory rent	4 552

Required:

- (a) Calculate the total cost and the unit cost where the firm uses:
 - (i) absorption costing, and
 - (ii) direct costing.
- (b) If the selling price was \$70 per unit, calculate the gross and net profits under each method.

1.22 Costs and prices

The gross profit margin is 20%. If the selling price is \$70, calculate the following:

- (a) the cost price
- (b) the gross profit
- (c) the cost as a percentage of sales
- (d) the profit as a percentage of the cost.

1.23 Costs and prices

A firm operates on a mark-up of 30% on cost. If the required profit is \$120 per item, what will be:

- (a) the selling price per item
- (b) the cost price per item?

1.24 Costs and prices

A firm always provides a 50% mark-up on cost when quoting prices to customers. If the cost of a job is \$1 200, calculate the following:

- (a) the gross profit on the job
- (b) the selling price quoted
- (c) the profit as a percentage of sales
- (d) the cost as a percentage of sales.

1.25 Costs and prices

A firm calculates the selling price by a mark-up of 60% on the cost price. If the selling price is \$800, what is the cost price?

1.26 Costs and prices

A firm maintains a gross profit margin of 75% of the sales price. If the goods have a cost of \$45, what will be the selling price?

1.27 Costs and prices

It is the policy of a firm to mark up all items by 150% on cost. If the selling price is \$750, calculate the following:

- (a) the cost price as a percentage of the selling price
- (b) the gross profit margin
- (c) the cost price
- (d) the gross profit.

1.28 Costs and prices

- (a) A business calculates its selling price by a 25% mark-up on cost. If an item has a selling price of \$90.00, what was its cost price?
- (b) A product has a gross profit margin of 40%. If the unit cost price is \$72.00, what is the selling price per unit?

1.29 Costs and prices

The costs associated with the manufacture and sale of a product are:

		Unit cost
Direct material	5 units at \$18.00 per unit	\$90.00
Direct labour	8 hours at \$25 per hour	\$200.00
Variable overhead	50% of direct labour	\$100.00
Fixed overhead	30% of direct labour	\$60.00

During the month, 1 500 items were sold at a mark-up of 80% on cost. The additional costs of selling these items included variable costs of \$60 000 and fixed cost of \$20 000.

Required:

Calculate:

- (a) the sales price
- (b) the gross profit
- (c) the contribution margin per unit
- (d) the net profit.

1.30 Unit cost, cost classification, contribution and profit margin

- 1 The following manufacturing costs were incurred at a production level of 50 000 units:

	\$
Prime cost	242 800
Fixed factory overhead	80 000
Variable factory overhead	77 200

What would be the expected total cost of production if 40 000 units were produced?

- 2 You are required to indicate whether the costs described below are direct manufacturing, indirect manufacturing or non-manufacturing:
- oil used to lubricate machines used in production
 - oil used in servicing a vehicle used to deliver items sold to customers
 - oil added to the engine of a motor vehicle in a car assembly plant.
- 3 A popular hamburger restaurant calculates the selling price of its Mighty Burger by marking up 125% on the variable costs of production. If the hamburger sells for \$4.50, calculate:
- the variable cost of producing a Mighty Burger
 - the contribution margin made on each Mighty Burger sold.

1.31 Overheads, job quotation

The following budget information has been prepared for the year.

Activity	Overhead budget	
	Assembly	Polishing
Expected overheads	\$40 000	\$108 000
Cost drivers	5 000 parts	7 200 direct labour hours

A quotation is being prepared for a particular job involving the following items:

Direct materials:

12 components @ \$6.50 each to be used in the assembly activity

Direct labour:

Assembly—4 hours @ \$14.25 per hour

Polishing—2 hours @ \$18.50 per hour

The firm has a standard mark-up of 30% on cost for all products quoted.

Required:

- Calculate the cost of the job.
- What will be the quoted price?

1.32 Theory

Give a brief description of the following:

- the break-even point
- a contribution margin
- sales volume
- sales mix
- gross profit rate.

1.33 Theory

(a) Give a brief description of the following:

- a cost centre
 - a profit centre
 - an investment centre
 - controllable costs.
- (b) Give a brief outline of how the management reports will vary for these three areas of responsibility.

1.34 Definitions

Each of the statements in Column 2 describes one of the terms listed in Column 1. You are required to match the best description for each term by writing the number of the term against the description.

Column 1		Column 2	Number
1	Cost centre	Part of the cost of production that is the cost of changing raw material into a finished product.	
2	Factory overhead	Costs that remain constant per unit as output volume changes.	
3	Sales mix	A product costing method that allocates all manufacturing costs to the product.	
4	Absorption costing	A level of sales that equates to the sum of all the fixed costs plus all the variable costs.	
5	Fixed costs	The unit cost of this item will vary as changes occur to output or volume.	
6	Period cost	The proportion of sales that each product has in relation to the total sales of the business.	
7	Conversion cost	The production volumes that can be achieved without changing the existing factory capacity or fixed resources.	
8	Break-even	An area of management responsibility that is concerned with the control of costs but not profits or revenue.	
9	Relevant range	Costs of operating a factory that cannot be directly traced to a product.	
10	Variable cost	A cost that is not carried forward to the next accounting period but is matched against revenue in the period in which it is incurred.	