Chapter 10

# Relevant costs, pricing and decisions under uncertainty

## Real world case 10.1

**This case study shows a typical situation in which management accounting can be helpful. Read the case study now but only attempt the discussion points after you have finished studying the chapter.**

*From April 2005 the Office of Gas and Electricity Markets (Ofgem) in the UK has put in place its British Electricity Trading and Transmission Arrangements (BETTA). The following article was written during the consultation period leading up to the implementation of BETTA.*

It is an immutable physical fact of transmitting power by wire over long distances that costs rise and heat losses increase the further away you are from your customers. With 56 per cent of existing UK generating capacity lying above a line between the Wash and the Severn, but 53 per cent of the demand sitting below that line, Ofgem wants a pricing regime that encourages new generating plant to be built closer to where the main demand is.

But that ambition – in itself a thoroughly green approach to shaping future investment intentions – risks conflict with the government's determination to dramatically accelerate the share of UK electricity generation accounted for by renewable sources like wind and wave power.

The so-called locational pricing principle means generators furthest away from the main markets pay the biggest user charges, while those closest to the main centres of demand will, in some cases, attract a subsidy. So some of the generators paying the highest transmission charges will be the wind farms in the north of Scotland.

Ofgem [the price regulator] points out that a whole series of other charges – covering access to the transmission system, line losses and access to the interconnector – are all being abolished when BETTA comes into effect. Ofgem insists the net effect of even the current, unapproved, NGC pricing proposals on Scottish generators will be broadly neutral.

Source: *The Herald* (Glasgow), 20 January 2005, p. 24, 'Time for regime change if things can only get BETTA', Alf Young.

### Discussion points

1 What are the cost-based arguments to support charging a higher price for carrying electricity longer distances?

2 What are the non-cost consequences of the decision to apply the 'locational pricing' principle?

## Contents



## Learning outcomes

After reading this chapter you should be able to:

- Explain the meaning of 'relevant costs' and show how relevant costs are used for analysis in decision making.
- Explain how pricing decisions may be related to cost considerations.
- Explain how uncertainty and risk can be incorporated in decision-making techniques.
- Describe and discuss examples of research.

## 10.1 Introduction

Chapter 9 showed how the distinction between fixed costs and variable costs allowed the use of relevant costs to help with decision making. The variable costs were relevant to a short-term decision, but the fixed costs were generally not relevant because they would continue regardless of what decision was taken. This chapter continues the explanation of the need to concentrate on relevant costs. This chapter also explains how pricing policies may be linked to cost considerations. Finally, this chapter also explains how management accounting can help in organising the analysis where several options exist under conditions of uncertainty.

## 10.2 Relevant costs and revenues

When decisions are made, they relate to the future. Decisions will affect future costs and revenues of an organisation. Future costs and revenues will be **relevant costs** and **relevant revenues** in making a decision. Decisions can never change what has already happened. We may learn useful lessons from historical events but we can never change the costs and revenues of the past. To emphasise the non-relevance of the past, the term **sunk costs** is used to describe costs that have already been incurred.

Many decisions involve change. The costs and revenues will increase or decrease compared with the present position. This is called an 'incremental' change and so the decision requires analysis of incremental costs and revenues, or **incremental analysis**.

Making a decision about one course of action will often involve making another decision about *not* taking another course of action. The action not taken represents a lost opportunity. The benefit sacrificed with that lost opportunity is called an **opportunity cost**.

### 10.2.1 Definitions

Definitions

**Relevant costs** are the costs appropriate to a specific management decision. They are those future costs which will be affected by a decision to be taken. Non-relevant costs will not be affected by the decision.

**Relevant revenues** are the revenues appropriate to a specific management decision. They are those future revenues which will be affected by a decision to be taken. Non-relevant revenues will not be affected by the decision.

**Sunk costs** are costs that have been incurred or committed prior to a decision point. They are not relevant to subsequent decisions.

**Incremental analysis** means analysing the changes in costs and revenues caused by a change in activity.

**Opportunity cost** is a measure of the benefit sacrificed when one course of action is chosen in preference to another. The measure of sacrifice is related to the best rejected course of action.

### 10.2.2 Case study

Fiona McTaggart now explains how she advised on a decision where relevant costs and revenues were important considerations.

FIONA: *I have been working in a team advising an entrepreneur who wants to bring 'capsule' hotels to the business centres in our big cities. These capsule hotels provide sleeping pods which are prefabricated as self-contained units and then slotted together inside the shell of a hotel building. Each pod has a sofa that converts into a bed, a desk that swings out from the wall, and an ensuite mini-bathroom. The entrepreneur tells us that guests don't care about the amount of space when they are only staying for one night. He says people keep coming because of the quality of service. This idea has worked in Japan and with the right level of quality it ought to work here. The alternative is to use the hotel building shell to build a conventional budget hotel, so the opportunity cost is the lost revenue from renting rooms in a comparable budget hotel. The benefit of the capsule hotel is that it will give 20 per cent higher occupancy rates for the same building space, so the decision is based partly on the incremental revenue available. The cost of the hotel building itself is a sunk cost because the entrepreneur already owns that. Relevant costs include the additional design costs in matching the sleeping pod to the requirements of business travellers in this country. The entrepreneur tells us there will be overall cost savings because the cost of constructing the pods will be less in total than the cost of refurbishing the existing hotel building to present-day standards. These are all relevant costs for the decision.*

*The decision involves more than costs, of course. What appeals to business people in one country may not appeal to those in another. If it does succeed, then other operators may set up in competition, forcing down prices and squeezing profit margins. However, at this early stage it is important to reassure potential investors that the decision will bring incremental revenues that exceed the incremental costs sufficiently to reward the investment adequately.*

## 10.2.3 Example

A ferry company knows that many of its customers are taking their cars to the continent by ferry but are returning by train through the Channel Tunnel. The company is considering whether or not to make a special offer of 'return journey for the price of a single journey' for a period of one month. It is predicted that this will attract 200 additional customers in the month but will lose the return fare portion of journeys by 50 existing customers. The net gain in fare revenue in the month is estimated as £3,750. Additional staff will be required to manage car flow at the port, but these staff can be transferred from other work to cover the additional activity during the month. It is estimated that the time they spend on this exercise will be worth £800 of their salary bill. The additional customers will spend money in the bar and restaurants during the ferry crossing. It is estimated that the additional gross profit will be £4,000 in the month. One additional catering employee will be hired from an agency at a cost of £600 for the month. Fixed overhead costs of £8,000 for the month will not be affected by the special offer. For the purposes of cost recording the fixed overhead will be apportioned over all journeys to give a cost per journey of £60.

The relevant benefits and costs are:

| | £ |
|---|---|
| *Relevant benefits* | |
| Incremental revenue from fares | 3,750 |
| Incremental revenue from catering | 4,000 |
| *Relevant costs* | |
| Incremental wages | (600) |
| Net incremental benefit | 7,150 |

Note that time spent on this activity by car parking staff is not relevant because their salaries would be paid in any event. Also the allocation of fixed overheads is not relevant because these do not change as a result of the proposed course of action.

## 10.2.4 Method of analysis

In analysing the example for relevant and non-relevant costs and benefits ask yourself:

- Is this a future cost or benefit?
- Will the future cash flow change because of the decision?

The answer has to be 'yes' to both if the cost or benefit to be classed as 'relevant'.

The text of section 10.2.3 is set out in Exhibit 10.1 and marked up to show how you would highlight and analyse each cost and benefit in the narrative.

**Exhibit 10.1**
**Analysis of text for relevant and non-relevant costs and benefits**

> A ferry company knows that many of its customers are taking their cars to the continent by ferry but are returning by train through the Channel Tunnel. The company is considering whether or not to make a special offer of 'return journey for the price of a single journey' for a period of one month. It is predicted that this will attract 200 additional customers in the month but will lose the return fare portion of journeys by 50 existing customers. The net gain in fare revenue in the month is estimated as **£3,750** [YES] Additional staff will be required to manage car flow at the port, but these staff can be transferred from other work to cover the additional activity during the month. It is estimated that the time they spend on this exercise will be worth **£800** [NO] of their salary bill. The additional customers will spend money in the bar and restaurants during the ferry crossing. It is estimated that the additional gross profit will be **£4,000** [YES] in the month. One additional catering employee will be hired from an agency at a cost of **£600** [YES] for the month. Fixed overhead costs of **£8,000** [NO] for the month will not be affected by the special offer. For the purposes of the cost recording the fixed overhead will be apportioned over all journeys to give a cost per journey of **£60**. [NO]

It may be useful to use a table to compare two decisions using a table of the type set out in Table 10.1.

**Table 10.1**
**Comparison table for two decisions**

| | ***Decision 1***<br>*Make special offer* | ***Decision 2***<br>*Do not make offer* | ***Difference (relevant cost)*** |
|---|---|---|---|
| Cost item 1: wages | +£800 | +£800 | 0 |
| Cost item 2: additional catering employee | +£600 | – | +£600 |
| Cost item 3: fixed overheads | +£8,000 | +£8,000 | 0 |
| Total relevant costs | | | +£600 |
| Benefit 1: additional fare revenue | +£3,750 | – | +£3,750 |
| Benefit 2: additional bar gross profit | +£4,000 | – | +£4,000 |
| Total relevant benefits | | | +£7,750 |
| Net gain/loss | | | +£7,150 |

## 10.2.5 Limitations of decision-relevant approach

An evaluation of relevant costs may involve considering the costs of alternatives that are not taken up. This information may be difficult to find. The manager making the decision must be careful to think about the time scale involved. In a short-term decision, some costs may be non-relevant because they are fixed, but for a longer-term decision those costs would become relevant. Labour costs, for example, might not be relevant to a decision for a six-month project because the staff having the appropriate skills are already hired and must be paid. However, labour costs would become relevant to a decision for a six-year project because staff may have to be hired or replaced and will require training.

### Real world case 10.2

**The following extract is taken from a report prepared for the Auditor General for Scotland in November 2008. It analyses the case for a change to a rail service.**

**Additional North Berwick services and Musselburgh stops**

Transport Scotland identified a need for an additional evening service on the Edinburgh to North Berwick route, together with two additional stops at Musselburgh, to meet the needs of the relocated Queen Margaret University College. However, First ScotRail could not justify the expenditure as the £100,000 in costs to provide the services was greater than its likely share of revenue. The estimated revenue from the services was £172,000. Given revenue performance at the time, it was likely that First ScotRail would have to return 50 or 80 per cent of the revenue to Scottish ministers, allowing it to retain, at most, £86,000 of the revenue, resulting in a loss to First ScotRail of at least £14,000 and up to £64,600. Acknowledging that the services were required, Transport Scotland had to allow a reduction in the franchise subsidy payment to First ScotRail and an increase in the level of revenue First ScotRail could retain (specific to the service). This was necessary in order for First ScotRail to earn enough in profit from the services to make them a viable addition.

Source: http://www.audit-scotland.gov.uk/docs/central/2008/nr_081128_rail_franchise.pdf.

#### Discussion points

1 What are the relevant costs in deciding whether to provide the rail service required?

2 Is it justifiable to decide the revenue to the rail company by calculating the amount of profit needed?

Non-financial factors may be important to a decision and may be relevant in the broader sense of maintaining good employee relations or maintaining a good reputation with customers.

### Activity 10.1

*Think of a decision you have made recently, such as going on holiday or renting a new flat. What were the relevant costs and benefits that you considered in making the decision?*

## 10.3 Pricing decisions

One of the most important decisions taken by a business is that of pricing its product. If the price is too high, there will be no demand. If the price is too low, the organisation will be making a lower profit than could be achieved.

### 10.3.1 Economic factors affecting pricing

The method of arriving at a price depends on economic factors. If the business has a monopoly position (where one supplier has control of the market), it will be able to dictate its own price. However, the higher the price, the greater the attraction to incomers to break down the monopoly powers in seeking to share the benefits enjoyed by the monopolist.

Where the business is a market leader, it may be able to set its price by reference to covering its full costs and making a satisfactory profit. If there are only a few large sellers, each with a significant share of the market, the situation is described as an oligopoly. These few large sellers may compete with each other on price or they may prefer to set their prices at a level which covers all costs and to keep the price reasonably constant while competing on non-price factors such as quality of the product.

In a perfectly competitive market, no one supplier is in a position to dictate prices. Economic theory shows that the optimal price will be achieved where marginal cost equals marginal revenue. In other words, the additional cost of producing one more item of output equals the additional revenue obtained by selling that item. While the additional revenue exceeds the additional cost, the economist argues that it is worth producing more. When the additional revenue is less than the additional cost, production will not take place in the perfectly competitive market.

Pricing policy depends primarily on the circumstances of the business. In many situations there is strong competition and the organisation must accept the market price and try to maximise its profit by controlling cost. In that situation, the most efficient organisation will achieve the highest profit as a percentage of sales. Sometimes the organisation may be faced with pressure from customers to reduce selling price. The decision to do so will require an evaluation of the lower price against costs. In other cases, the organisation may have some ability to control price and therefore has to decide on a price related to what the market will bear and related to covering its costs.

There are therefore some situations in which a full cost pricing formula may be appropriate. These are now considered.

### 10.3.2 Full cost pricing

**Full cost pricing** is also called **cost-plus pricing**. The manager who is setting the price for goods or services calculates the total cost per unit of output and adds a percentage to that cost called the **percentage mark-up on cost**.

Calculation of total cost requires allocation of overhead costs. It was shown in Chapter 4 that there is more than one method of allocating production overhead costs. The same variety of method may be found in allocation of non-production overhead. Different organisations will have different ideas on which costs they want to cover in a full cost pricing approach. What really matters is that the organisation understands its cost structure and ensures that all overhead costs are covered in some way by revenue in the longer term.

When the company is a price taker and is asked to take a lower price, or not to raise its existing price, then full cost pricing is still important, but it is also important for the organisation to ensure that it makes a decision using relevant costs. If the pricing decision is based on a short-term perspective, then the organisation may decide to accept

any price provided that the additional revenue covers the variable costs. That is the accountant's version of the economist's rule that marginal cost should equal marginal revenue. In management accounting terms, the item should make a contribution to fixed costs but does not necessarily need to cover all fixed costs. In the longer term, the business must cover all costs, whether fixed or variable, but it is possible that some fixed costs may be avoidable. If, for example, a reduced price is forced upon the business, it may accept this in the short term, but may also take a long-term decision to cut back on permanent staff and rental of premises. Such a decision may be unpleasant to take, in terms of human consequences for staff, but may allow the business to survive in a harsher economic situation.

## 10.3.3 Sales margin pricing

Section 10.3.2 explains how a percentage mark-up is applied to cost. Some business managers express the desired profit percentage in a different way. They might say 'we aim to achieve a 20 per cent margin on sales'. That means they want a profit that is 20 per cent of the *selling price*. So what percentage must be added to *cost price*? The answer is 25 per cent of the cost. Check the following calculation:

| | £ | |
|---|---|---|
| Selling price | 100 | |
| Cost | 80 | |
| Profit | 20 | which is 25% of £80 |

If you are given a sales margin percentage and asked for the percentage on cost, use the following pattern:

*What is the percentage on cost equivalent to a sales margin of 30 per cent?*

| | £ | |
|---|---|---|
| Imagine a selling price of £100 | 100 | (A) |
| Calculate the profit based on the sales margin, 30% | 30 | (B) |
| Deduct to give the cost | 70 | (C) |

Divide (B) by (C) and express as a percentage $\frac{30}{70} \times 100 = 42.8\%$ of cost

A sales margin of 30% is equivalent to 42.8% on cost.

The answer can also be calculated as:

$$\frac{\text{Sales margin}}{100 - \text{sales margin}} \times 100 \frac{30}{100 - 30} \times 100 = 42.8\%$$

## 10.3.4 Mark-up percentages

The full cost approach to pricing requires a percentage to be added to cost. Where does this percentage come from? The answer is that it depends very much on the type of business and the type of product. Where the market is competitive, mark-up percentages will be low and the organisation relies for its success on a high volume of sales activity. This may be seen in the operation of supermarkets, which charge lower prices than the small shops and therefore have lower margins on the items sold, but customers take away their purchases by the car load rather than in small parcels. In the case of supermarket chains there is another aspect to pricing in that they themselves buy from suppliers. The supermarkets may use the strength of their position to dictate price terms to the suppliers, so that the margins are not as low as they would seem from the prices charged to the customers.

In some industries, or for some products, there appears to be a 'normal' mark-up which all companies apply fairly closely. This 'normal' mark-up may be so characteristic that it is used by the auditor as a check on how reasonable the gross profit amount appears and is also used by the tax authorities as a check on whether all sales and profit are being declared for taxation purposes.

For those businesses which are in a position to apply full cost pricing, it may encourage stability in the pricing structure because other businesses in the same industry may be in a position to predict the behaviour of competitors. Companies in an industry will know the mix of variable and fixed costs in the industry and will therefore have a good idea of how competitors' profits will be affected by a change of price.

## 10.3.5 Limitations of full cost pricing

Full cost pricing, used without sufficient care, may not take into account the demand for the product. A business may charge a profit margin of 20 per cent on sales when market research could have shown that the potential customers would have accepted up to 25 per cent as a profit margin and still bought the goods or services.

Apportionment of fixed costs is an arbitrary process, with more than one approach being available. The profit estimated using the cost-plus basis will depend on the apportionment of fixed costs. If the price is distorted by the costing process, an optimal level of sales may not be achieved.

There may be a lack of benefit to customers where businesses are able to set prices on a cost-plus basis and, as a consequence, a group of companies works together to 'agree' a price. Such a situation is described in economics as a 'cartel', and in some situations a government will legislate against price fixing by cartels because it creates a monopoly position in a situation which appears at first sight to be competitive.

## 10.3.6 Marginal cost pricing

Chapter 9 showed that, in the short term, a business may decide to accept a price that is lower than full cost providing the price offered is greater than the variable cost, so that there is a contribution to fixed overhead costs. This reflects the economist's position that a business will continue to sell providing the marginal revenue exceeds the marginal cost. It is therefore called marginal cost pricing. The most likely situation is that a customer, knowing that the business has spare capacity, will offer a contract at a reduced price to take up some of the spare capacity. The manager will accept the offer provided there is a contribution to fixed costs and profits and providing no additional fixed costs are incurred because of the extra contract.

## 10.3.7 A range of prices

Full cost pricing and marginal cost pricing are two extremes of a range of potential prices. If the business is a market leader, even where there is competition from other suppliers, the business may be able to charge a higher price (a premium) for its reputation or quality. Customers will pay more for a Coca-Cola than for a supermarket's 'own brand' cola drink. This is called **product differentiation**.

A business may lower its prices below those of competitors for a short period to gain market share and hopefully retain customer loyalty when prices start to increase again. This is seen when two bus companies are competing for business on a well-populated route.

The **product life cycle** will also have an influence on the price that can be obtained. When a product is relatively new there will be a period when customers are learning about it. The price will be low relative to the market and costs will be high because of development and marketing costs. As the product becomes better known, the volume

of sales will increase but profits will still be relatively low because of continued marketing costs. As the market matures the rate of increase in sales will slow down to a steady state. Profits will increase because the heavy start-up costs have been recovered and the business begins to benefit from the economies of scale. Eventually the market becomes saturated, perhaps because competitors start to produce similar products. The price becomes closer to marginal cost. Finally the product declines in popularity and sales volumes decrease even when prices are reduced, because customers no longer want the product. This product life cycle is particularly visible in the pharmaceuticals industry when new medicines are developed, or in the motor industry when a new car comes to the market.

## Real world case 10.3

**Marlane Villa-Real, chairman and chief executive officer of Buena Mano Crafts, Inc., a manufacturer and exporter of handicraft, said that while export sales declined to stiff competition from China and other Asian countries three years ago, exporters have been participating more in domestic trade fairs.**

**Villa-Real disclosed that the local market now comprises around 20 per cent of its total sales, while that of a furniture company is much higher at 40 per cent.**

'Over the years, we have found out what the Filipinos are looking for. We already produce for the domestic market and it is enough to cover our **overhead cost**. Thus, when we price our products for exports, we don't have to add as much anymore', she said.

She pointed out that this brings down cost of exportable products, making Philippine goods become more competitive in the international market.

Source: *Business News*, 'Handicraft exporters turn to local market', 27 December 2008, *Manila Bulletin*, Manila Bulletin Publishing Corp.

### Discussion points

1 Why is the company using marginal cost pricing for its export goods?

2 How might the company raise its prices to make a higher contribution fo fixed costs?

## Activity 10.2

*Write down two products or services where the pricing might be based on cost plus a percentage to cover profits. Write down two products or services where the prices are determined in a highly competitive market. Write a short explanation (100 words) for an employee newsletter in a soap manufacturing business explaining why your product price is always a few pence higher in the shops than that of other leading brands.*

## 10.4 Decision making under risk and uncertainty

All the quantitative examples studied so far have assumed that forecasts of future cash flows can be made with certainty. In the real world that is rarely the case. When we talk about 'uncertainty' relating to making a decision we are thinking of more than one possible outcome from that decision but with little or no evidence on which to predict the actual outcome. When the experts talk about 'risk' relating to making a decision, it usually means that they can attach probabilities to the possible outcomes, based on statistical analysis of previous events. So when the weather forecaster says there is a five per cent risk of rain, it may well be based on analysis of records showing that the predicted pressures, temperatures and wind direction have previously been associated with rain in five cases out of 100.

Most forecasting in business is based on a mix of the evidence needed for statistical prediction of risk and the intuition that is often applied to decisions in the face of uncertainty. Rather than spend too much time debating the meanings of 'risk' and 'uncertainty' it is more important to be aware of the extent of the estimation involved and to ask questions about the basis on which probabilities are quantified.

It is also important to be aware of managers' attitudes to risk. Some will seek the safest options because they are **risk averse**. A person who is risk averse will choose the less risky of two choices that have equal money value. Others will seek the most likely outcome because they are **risk neutral**. A person who is risk neutral is prepared to accept the level of risk which accompanies the most likely outcome. Some may feel that they can balance taking risk with the potential for greater rewards and so are described as **risk seekers**. A person who is a risk seeker enjoys the thrill of higher risk because it is associated with higher rewards if successful (despite facing greater losses if not successful).

### 10.4.1 Best, worst and most likely outcome

One way of indicating the risk and uncertainty relating to a proposed decision is to estimate a range of outcomes. Managers are asked 'what is the best outcome, what is the worst outcome, and what is the most likely outcome?' This is sometimes called three-level analysis.

Suppose that the manager of a town council's refuse collection and disposal department has been asked to make a decision on the allocation of the departmental budget for the year ahead. There are three possible states of demand, depending on factors beyond the control of the manager:

1. There is a possibility that the government will put in place a national campaign to encourage recycling.
2. There is a possibility that the government will do nothing about recycling and the number of households in the town remains the same.
3. There is a possibility that the government will do nothing about recycling and a new housing development will be completed faster than expected.

The manager estimates demand under each of these three possible states, in terms of wheelie bins per week for emptying as shown in Table 10.2.

There is another factor beyond the control of the manager. There is a labour dispute in progress, so the manager has to make a range of estimates of the labour cost of collecting and emptying one wheelie bin. The council finance committee has threatened to impose a pay freeze and then make the local award for the final six months only. If the opposition councillors win the debate in the finance committee the local pay award will be made at the start of the year. A more expensive possibility is that the major unions will force a relatively higher national pay increase taking effect at the start of the year under budget. The estimates are shown in Table 10.3.

**Table 10.2**
**Estimates of demand for refuse collection**

| *Outcome* | *Condition* | *Predicted bins per week for emptying* |
|---|---|---|
| Worst possible | No government campaign for recycling, plus higher than expected increase in house completion | 100,000 |
| Most likely | Normal conditions, based on no government campaign and no change in housing completion | 80,000 |
| Best possible | Government's national campaign to encourage recycling | 70,000 |

**Table 10.3**
**Estimates of cost per collection based on varying wage settlements**

| *Outcome* | *Condition* | *Predicted labour cost per bin collected* |
|---|---|---|
| Worst possible | National pay increase agreed at start of year | £0.50 |
| Most likely | Normal conditions, local pay award at start of year | £0.35 |
| Best possible | Pay freeze for 6 months, local award for next 6 months | £0.25 |

Combining the effects of government policy, house completions and labour negotiations, the best, worst and most likely outcomes are calculated in Table 10.4.

**Table 10.4**
**Best, worst and most likely outcomes**

| | *Condition* | *Predicted cost per week* |
|---|---|---|
| Worst possible | No campaign for recycling, plus higher than expected increase in house completion<br>+<br>National pay increase agreed at start of year | 100,000 × £0.50 = £50,000 |
| Most likely | Normal conditions, based on no government campaign, no change in housing completion, and local pay award at start of year | 80,000 × £0.35 = £28,000 |
| Best possible | Government campaign to encourage recycling<br>+<br>Pay freeze for 6 months, local award for next 6 months | 70,000 × £0.25 = £17,500 |

The departmental manager who seeks to be cautious in budgeting might focus on the worst possible outcome and budget £50,000 per week. The finance department, in scrutinising the budget, would almost certainly say that they expect senior management to persist with the pay freeze and local award, so that the budget should include only £17,500, representing the best possible cost outcome. The employee representatives, taking part in the pay negotiations, would seek inclusion of £50,000 per week in the budget as an indication of management support for the national pay award rather than a locally determined, lower, award.

The three-way analysis provides a basis for discussing a range of outcomes but does not cover all combinations of demand and labour cost. Also it gives no feeling for the probability of the best, worst or most likely outcome occurring. The next section takes the analysis a stage further by adding probability estimates.

## 10.4.2 Probability analysis

The manager is now asked to estimate probabilities of each of the possible outcomes occurring. The probabilities will reflect the manager's best view of the quantifiable risks and the potential effects of uncertainties. If there is strong evidence on which to base the estimates these will be **objective probabilities**. If there is a strong element of the manager's intuition these will be **subjective probabilities**. Although subjective opinions are based on judgement and lack strong supportive evidence, they may nevertheless be based on skilled judgement which is relevant and useful to a decision.

**Definitions**

**Objective probabilities** are based on verifiable evidence.

**Subjective probabilities** are based on opinions.

The probabilities are used to calculate expected inflow and expected outflow. The word 'expected' has a meaning from statistics as the weighted average of the predicted cash flow and the probability of each. The expected flow is calculated by multiplying each predicted flow by its respective probability and adding all the results. The probabilities must add up to 1.0 (indicating certainty) because it is certain that one of the three outcomes will happen.

The rules of probabilities allow Tables 10.5 and 10.6 to be combined. It is important that the two sets of events are independent – the eventual wages settlement will not

Table 10.5
**Estimates of demand for refuse collection**

| | *Condition* | *Predicted bins per week for emptying* | *Probability* |
|---|---|---|---|
| Worst possible | No government campaign for recycling, plus higher than expected increase in house completion | 100,000 | **0.2** |
| Most likely | Normal conditions, based on no government campaign and no change in housing completion | 80,000 | **0.7** |
| Best possible | Government campaign to encourage recycling | 70,000 | **0.1** |

Table 10.6
**Estimates of cost per collection based on varying wage settlements**

| | *Condition* | *Predicted labour cost per bin collected* | *Probability* |
|---|---|---|---|
| Worst possible | National pay increase agreed at start of year | £0.50 | **0.4** |
| Most likely | Normal conditions, local pay award at start of year | £0.35 | **0.4** |
| Best possible | Pay freeze for 6 months, local award for next 6 months | £0.25 | **0.2** |

affect the number of wheelie bins emptied. Provided that condition is satisfied we can apply the rule of joint probabilities.

Definition

**Joint probabilities:** The probability of BOTH condition 1 AND condition 2 is calculated by MULTIPYING the two separate probabilities.

So the joint probability of BOTH (No campaign for recycling, plus higher than expected increase in house completion) AND (National pay increase agreed at start of year) is equal to 0.2 multiplied by 0.4, which equals 0.08.

In Table 10.7, columns 1 and 2 are taken from Tables 10.5 and 10.6 respectively. Column 3 is calculated by multiplying columns 1 and 2. The joint probabilities in column 4 are calculated by multiplying the separate probabilities from Tables 10.5 and 10.6. The expected cost in column 5 is calculated by multiplying columns 3 and 4. The expected costs of each outcome are then added to give the total expected cost for the project.

Table 10.7
**Table of combined probabilities**

| *Condition* | *Predicted bins per week for emptying (1)* | *Predicted labour cost (2)* | *Predicted cost (3)* | *Joint probability (4)* | *Expected cost (5)* |
|---|---|---|---|---|---|
| No campaign for recycling, plus higher than expected increase in house completion | 100,000 | £0.50 | **50,000** | .2 × .4 = .08 | **4,000** |
| | | £0.35 | **35,000** | .2 × .4 = .08 | **2,800** |
| | | £0.25 | **25,000** | .2 × .2 = .04 | **1,000** |
| Normal conditions | 80,000 | £0.50 | **40,000** | .7 × .4 = .28 | **11,200** |
| | | £0.35 | **28,000** | .7 × .4 = .28 | **7,840** |
| | | £0.25 | **20,000** | .7 × .2 = .14 | **2,800** |
| Government campaign to encourage recycling | 70,000 | £0.50 | **35,000** | .1 × .4 = .04 | **1,400** |
| | | £0.35 | **24,500** | .1 × .4 = .04 | **980** |
| | | £0.25 | **17,500** | .1 × .2 = .02 | **350** |
| Total expected cost | | | | | **32,370** |

The final line of Table 10.7 gives the weighted average of all possibilities, which is called the 'expected cost'. It is not easy to interpret the weighted average because it is not a cost that will appear as a payment in the cash book. It is a combination of all the costs that might arise. If the manager uses £32,370 as the budgeted cost, it will represent all possible outcomes forecast. Intuitively it is a compromise value between the best and worst outcomes of section 10.4.2, taking account of relative probabilities of occurrence.

## 10.4.3 Decision trees

Suppose now the council says: 'We need to make a decision. Do we continue to operate our own refuse collection service or do we close down this operation and offer it to private tender?' The departmental manager is asked to present a decision analysis involving two choices – continue or close down.

A decision tree is a map of all the possible outcomes. The symbols used in a decision tree are shown in Figure 10.1; Figure 10.2 shows the decision tree.

**Figure 10.1**
**Symbols for a decision tree**

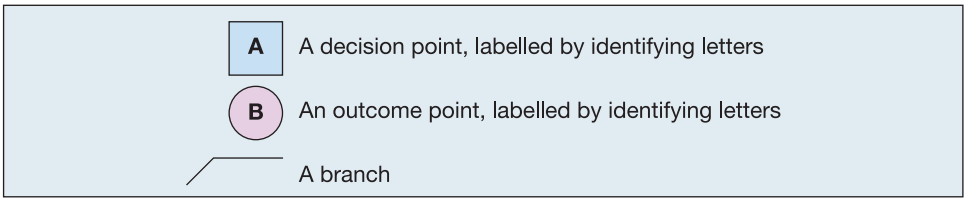
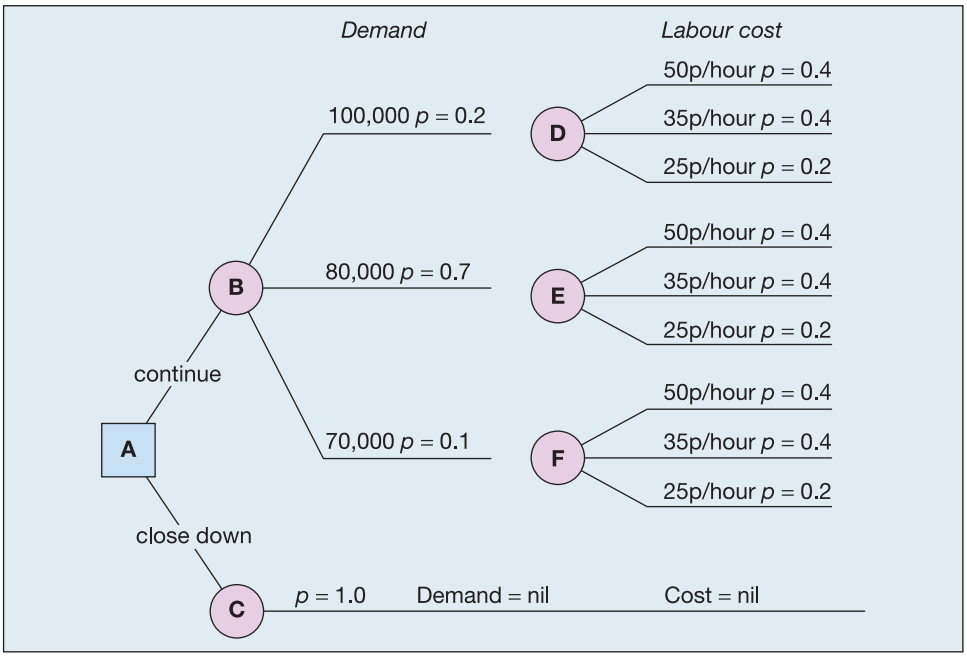
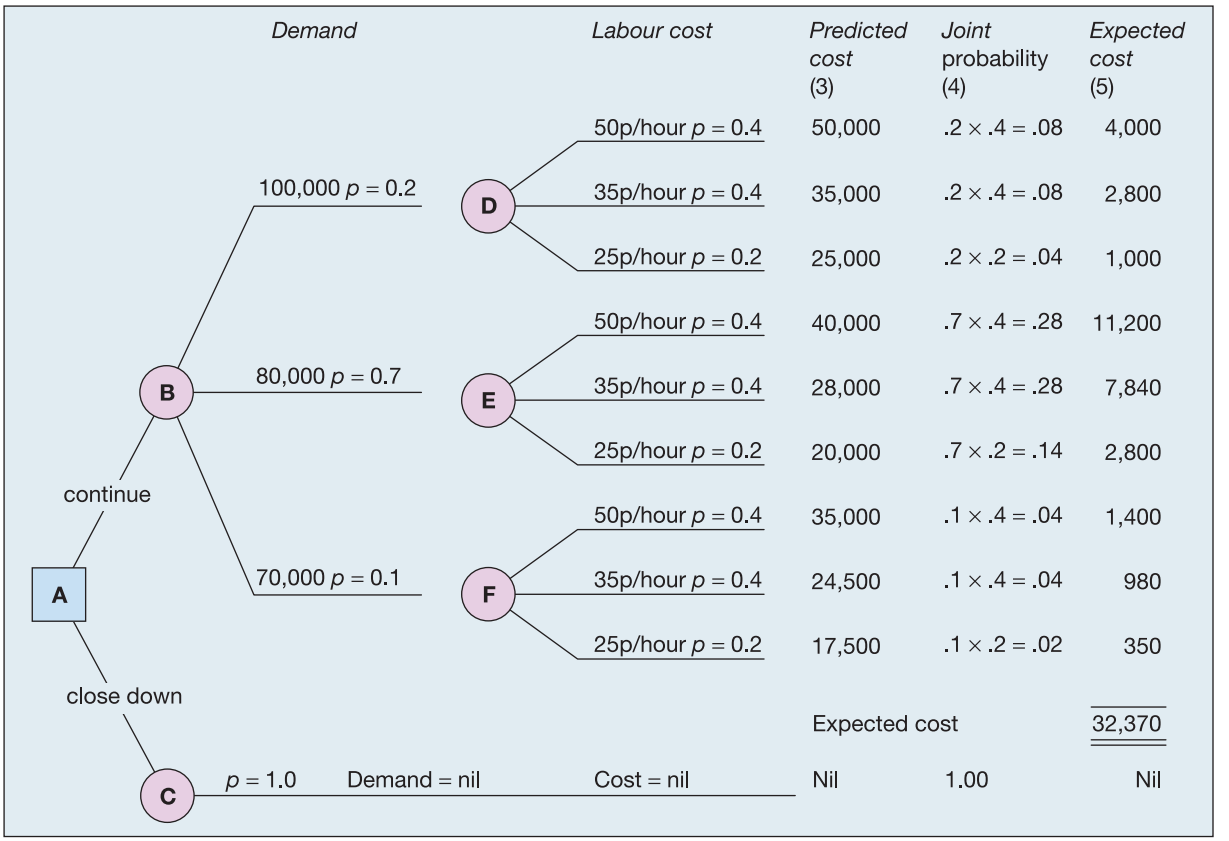



**Figure 10.2**
**Decision tree for refuse collection decision**




The 'close down' option shows a probability of 1 that the cost is zero. The 'continue' option shows three outcomes for demand, each combined with three outcomes for labour costs. There are nine branches coming out of the 'continue' option. For each branch an expected outcome is calculated. The calculations are shown in Figure 10.3. They are the same as the calculations in Table 10.7.

Figure 10.3
Expected outcomes for decision tree




The decision tree does not give any more information than the table in Table 10.7, but it is helpful as a diagrammatic representation of the decisions and their effect. A decision tree is useful where there are two or three decisions to depict but, if there are more than that, there may be practical problems in setting them out on one sheet of paper.

**Activity 10.3**

*Think of a decision you have taken recently where there was some uncertainty at various stages of the process. How did you deal with the uncertainty? Could you represent the decision as a decision tree? What problems would you face in representing the decision as a decision tree?*

## 10.4.4 Sensitivity analysis

The availability of spreadsheets allows us to ask questions such as 'What is the effect on profit of a 1 per cent change in sales?' or 'What is the effect on profit of a 1 per cent change in costs of materials?'

1 What is the change in the cost or revenue being tested?
2 What is the resulting change in profit?
3 What is the resulting profit as a percentage of the profit before change?
4 Sensitivity factor = $\dfrac{\%\text{ change in profit}}{\%\text{ change in element being tested}}$

Questions of this type may be answered by using **sensitivity analysis**. This asks 'what if' questions such as: 'What will be the change in profit if the selling price decreases by 1 per cent?' or 'What will be the change in profit if the cost increases by 1 per cent?'

Assume an initial forecast of sales and costs as shown in Table 10.8. The effect of a 1 per cent increase in a variable cost is shown in Table 10.9. A 1 per cent increase in a fixed cost is shown in Table 10.10. A 1 per cent increase in contribution is shown in Table 10.11.

**Table 10.8**
**Forecast of sales and costs**

| *Transport service business: monthly forecast* | |
|---|---|
| | £ |
| Forecast sales | 40,000 |
| Forecast variable fuel costs | (15,000) |
| Forecast variable labour costs | (10,000) |
| Fixed costs | (5,000) |
| Profit | 10,000 |

**Table 10.9**
**Effect of a 1 per cent increase in variable cost**

| | £ | | £ |
|---|---|---|---|
| Forecast sales | 40,000 | | 40,000 |
| Forecast variable fuel costs | (15,000) | | (15,000) |
| Forecast variable labour costs | (10,000) | +1% | **(10,100)** |
| Fixed costs | (5,000) | | (5,000) |
| Profit | 10,000 | | **9,900** |

Percentage decrease in profit = 100/10,000 = 1%

So a 1% *increase* in a variable cost causes a 1% *decrease* in profit.

The sensitivity factor is –1.

**Table 10.10**
**Effect of a 1 per cent increase in fixed cost**

| | £ | | £ |
|---|---|---|---|
| Forecast sales | 40,000 | | 40,000 |
| Forecast variable fuel costs | (15,000) | | (15,000) |
| Forecast variable labour costs | (10,000) | | (10,000) |
| Fixed costs | (5,000) | +1% | **(5,050)** |
| Profit | 10,000 | | **9,950** |

Percentage decrease in profit = 50/10,000 = 0.5%

So a 1% *increase* in a fixed cost causes a 0.5% *decrease* in profit.

The sensitivity factor is –0.5.

Table 10.11
**Effect of a 1 per cent increase in sales revenue and 1 per cent increases in variable costs (i.e. 1 per cent increase in contribution)**

| | £ | | £ |
|---|---|---|---|
| Forecast sales | 40,000 | +1% | 40,400 |
| Forecast variable fuel costs | (15,000) | +1% | (15,150) |
| Forecast variable labour costs | (10,000) | +1% | (10,100) |
| Fixed costs | (5,000) | | **(5,000)** |
| Profit | 10,000 | | **10,150** |

Percentage increase in profit = 150/10,000 = 1.5 per cent

So a 1 per cent *increase* in forecast sales causes a 1.5 per cent *increase* in profit.

The sensitivity factor is +1.5.

## 10.5 What the researchers have found

### 10.5.1 An economist's view of pricing decisions

Lucas (2003) compares the economist's view, which recommends a decision-relevant cost approach to pricing, with the business practice view, which is dominated by a full cost approach to pricing. He argues that neither the economist's view nor the business practice view is strongly supported because the empirical evidence is conflicting. The evidence he cites is taken from previous papers, dating back to the 1970s and 80s.

He points out that leading management accounting textbooks have discussed the importance of using relevant costs for pricing decisions, but the same books have also referred to surveys showing the widespread use of full cost pricing. Econometric studies have, in some cases, shown support for full cost but, in other cases, support for marginal cost pricing. He reviews other forms of research, such as case studies, from various dates over a long time period, concluding that the empirical case is not clear.

### 10.5.2 Full cost pricing

Guilding *et al.* (2005) reported a mailed survey of UK and Australian companies which asked about the importance of cost-plus pricing (full cost pricing). They found that companies attached importance to the idea of full cost pricing but actually applied it to a relatively small subset of their product and service lines. They found that the intensity of competition was positively related to the importance of full cost pricing. The authors discussed the heightened awareness of costs in a competitive situation and the need to ensure that those setting prices are aware of costs, whether or not this involves covering variable costs or full costs. The manufacturing sector attached relatively low importance to full cost pricing. The authors suggested that in manufacturing business it is relatively difficult to trace costs to products because of joint manufacturing costs and relatively high overheads.

### 10.5.3 Establishing relevant costs

Lowson (2003) explained the problems of determining the true cost of obtaining clothing from countries which have low labour costs. The hidden costs include delays in supply, the use of airfreight, administrative and quality costs. The inflexibility costs involve issues such as longer lead times and a general inflexibility in responding to changes in customer demand. Lowson then modelled the costs, checking the model through interviews with a retailer who was purchasing clothing from overseas suppliers. The fundamental quantities described were the lead time for supply, the inventory in the pipeline at any stage, the customer service level and the supplier performance. Lowson's research was reported as a stage of continuing development in modelling the costs relevant to the situation, but was limited to the one industry of clothing supply.

### 10.5.4 Challenging the predictive ability of accounting techniques

Cooper *et al.* (2001) consider the ways in which accounting is used as a technology for planning and control and the problems involved in using accounting information for planning organisational decision making. They suggest that the use of accounting techniques resembles the use of a ritual to maintain social cohesiveness. Accounting creates an image of the organisation and helps to create a culture for the organisation. When accounting techniques are used to make predictions or look forward in decision making, they are doing so in the face of uncertainties that put limitations on the predictions or decisions. The authors say that the real purpose of using predictive accounting techniques is to bind the organisation as a whole to focusing on the future.

## 10.6 Summary

Key themes in this chapter are:

- **Relevant costs** and **revenues** are those that make a difference in respect of a decision. **Sunk costs** are not relevant because future actions cannot change the fact that such costs have been incurred. **Incremental costs** and **incremental revenues** allow calculation of the additional profit available from a new venture. **Opportunity cost** reflects what might have taken place.
- In decision making it requires those who understand the operations of a business to decide on cost structure.
- Pricing decisions may be related to cost if the market accepts **full cost pricing** (e.g. with a professional business where customers or clients seek out the personal service).
- Pricing decisions may be related to **marginal cost** if there is heavy competition and manufacturers take whatever price they can get in the market.
- Decision making under uncertainty requires the estimation of a range of outcomes each with its own probability. One simple approach is the three-level analysis which asks 'what is the best outcome, what is the worst outcome, and what is the most likely outcome?'
- Probabilities can be attached to predicted outcomes using either **objective probabilities** based on verifiable evidence or **subjective probabilities** based on opinions.
- Where an outcome takes the form 'both . . . and', the probabilities are multiplied.
- Uncertainty and risk can be incorporated in decision making by **sensitivity analysis**.

## References and further reading

Cooper, S., Crowther, D. and Carter, C. (2001) 'Challenging the predictive ability of accounting techniques in modelling organizational futures', *Management Decision*, 39(2): 137–46.

Guilding, C., Drury, C. and Tayles, M. (2005) 'An empirical investigation of the importance of cost-plus pricing', *Managerial Auditing Journal*, 20(2): 125–37.

Lowson, R.H. (2003) 'Apparel sourcing: assessing the true operational cost', *International Journal of Clothing Science and Technology*, 15(5): 335–45.

Lucas, M. (2003) 'Pricing decisions and the neoclassical theory of the firm', *Management Accounting Research*, 14: 201–17.

# QUESTIONS

The Questions section of each chapter has three types of question. '**Test your understanding**' questions to help you review your reading are in the 'A' series of questions. You will find the answer to these by reading and thinking about the material in the textbook. '**Application**' questions to test your ability to apply technical skills are in the 'B' series of questions. Questions requiring you to show skills in '**Problem solving and evaluation**' are in the 'C' series of questions. The symbol **[S]** indicates that a solution is available at the end of the book.

## A Test your understanding

**A10.1** What is a relevant cost? Give an example (section 10.2).

**A10.2** What is a relevant revenue? Give an example (section 10.2).

**A10.3** What is a sunk cost? Give an example (section 10.2).

**A10.4** What is incremental analysis (section 10.2)?

**A10.5** What is an opportunity cost? Give an example (section 10.2).

**A10.6** What is the method used in analysing relevant and non-relevant costs (sections 10.2.2 to 10.2.4)?

**A10.7** What are the limitations of the decision-relevant approach (section 10.2.5)?

**A10.8** Explain how economic factors usually dictate prices of goods and services (section 10.3.1).

**A10.9** Explain the situations where full cost pricing may be appropriate (section 10.3.2).

**A10.10** Show that a sales margin of 10 per cent is equal to 11 per cent on sales (section 10.3.3).

**A10.11** When may mark-up percentages be applied in pricing (section 10.3.4)?

**A10.12** What are the limitations of full cost pricing (section 10.3.5)?

**A10.13** Explain marginal cost pricing (section 10.3.6).

**A10.14** What is the 'three-way analysis' method of decision making under risk and uncertainty (section 10.4.1)?

**A10.15** What is an objective probability (section 10.4.2)?

**A10.16** What is a subjective probability (section 10.4.2)?

**A10.17** What is the rule for joint probabilities 'both . . . and' (section 10.4.2)?

**A10.18** What is a decision tree (section 10.4.3)?

**A10.19** What is sensitivity analysis (section 10.4.4)?

**A10.20** What is a sensitivity factor (section 10.4.4)?

# B Application

**B10.1 [S]**

A hardware store is considering purchasing the shop next door to expand capacity. The shop next door will cost £140,000 to buy. The cost of the existing shop was £80,000 but it would now sell for £120,000. Fittings in the existing shop will be sold for £5,000 and a new refit for both shops together will cost £20,000. The cost of the refit will be depreciated at a rate of £4,000 per annum. The new shop will be depreciated by £7,000 per annum.

The employment cost of the manager of the existing shop is £30,000 per annum. She will spend half her time on the new part of the expanded shop. An additional part-time assistant will be employed at a cost of £12,000 per annum. Heating and lighting for the new shop space will cost £6,000 per annum but there will be a saving of £1,000 on the fixed costs of the heating and lighting contracts for the existing shop.

**Required**

(1) Explain the meaning of 'relevant costs'.
(2) Explain the use of relevant costs in making the decision on whether to expand the hardware shop.

**B10.2 [S]**

An outdoor-pursuits centre is planning for the year ahead. There is a possibility that the government will give additional funds to the education budget under an 'active and healthy' policy. There is also a possibility that this money will be diverted for other use and as a result the local councils will cut back on funds for outside activities. Normal conditions will mean that neither of these extremes occurs.

| | *Condition* | *Predicted demand (pupil days)* | *Probability* |
|---|---|---|---|
| Worst possible | Councils cuts back funds for activities | 5,000 | .4 |
| Most likely | Normal | 6,000 | .3 |
| Best possible | Schools 'active and healthy' programme | 8,000 | .3 |

The outdoor-pursuits centre is facing three possible levels of surplus (fees minus costs) per pupil day. If new safety regulations are implemented from the start of the year, more staff will be required, thus reducing the estimated surplus per day. If the long-term weather forecast is poor, bookings will be lower.

| | *Condition* | *Predicted surplus per pupil day* | *Probability* |
|---|---|---|---|
| Worst possible | New safety regulations and poor weather forecast | £1.00 | .2 |
| Most likely | New safety regulations and reasonable weather | £1.50 | .2 |
| Best possible | Safety regulations delayed and reasonable weather | £2.50 | .6 |

**Required**

(1) Evaluate the cost of all options, based on combining probabilities.
(2) Draw a decision tree for the choice: 'keeping open the outdoor centre versus closing down'.

**B10.3 [S]**
A souvenir shop makes the following forecast for one year's sales and costs.

| Forecast | £ |
|---|---|
| sales | 80,000 |
| variable costs of souvenirs purchased | (26,000) |
| fixed labour costs | (30,000) |
| other fixed costs | (5,000) |
| Profit | 19,000 |

**Required**
Prepare tables showing the sensitivity of the profit forecast to each of the following:

(a) a 1 per cent change in sales and variable costs,
(b) a 1 per cent change only in the materials cost of souvenirs purchased,
(c) a 1 per cent change only the labour costs, and
(d) a 1 per cent change only in the other fixed costs.

**B10.4 [S] [CIMA question]**
A company is considering a short-term pricing decision for a contract that would utilise some material P that it has held in inventory for some time. The company does not foresee any other use for the material. The work would require 1,000 kgs of Material P. There are 800 kgs of Material P in inventory, which were bought some time ago at a cost of $3 per kg. The material held in inventory could currently be sold for $3.50 per kg. The current purchase price of Material P is $4.50 per kg.

The relevant cost of Material P for the company to use when making its pricing decision for the contract is closest to:

**A** $3,300
**B** $3,500
**C** $3,700
**D** $4,500

CIMA Paper P2 – Management Accounting – Decision Management November 2008, Question 1.2

## C Problem solving and evaluation

**C10.1**
The directors of Hightown United Football Club Ltd are preparing for a meeting with their bank manager to discuss the availability of funds to be used to buy new players.

The following information is available:

**1** The Hightown United stadium is divided into three separate spectator areas:

| | *Spectator entry fee per person* (£) | *Attendance norm* |
|---|---|---|
| Ground | 3.00 | 70% of crowd |
| Enclosure | 4.00 | 20% of crowd |
| Stand | 5.00 | 10% of crowd |

**2** Other income:
Sponsorship: £100,000 fixed fee plus 5 per cent of gross takings for each match.
Advertising: £150,000 per year.
Programmes and refreshments: 70 pence per spectator.
**3** Cost of holding a match:
Manning turnstiles: 15 pence per spectator.
Police presence: £200 per 1,000 spectators.
Advertising and crowd entertainment: £1,000 per match.

If a match is cancelled, turnstile manning and police costs are not incurred but the cost of advertising and crowd entertainments will be paid in advance and will not be recoverable.

**4** Other annual running costs:

| | £ |
|---|---|
| Staff salaries | 900,000 |
| Rates and ground costs | 200,000 |
| Travel | 150,000 |
| Other | 300,000 |

**5** Expected attendances:

| | *Home games* | *Spectators per game* |
|---|---|---|
| League | 20 | 16,000 |
| Cup | 4 | 12,000 |
| European trophy | 2 | 25,000 |

The number of games predicted for the Cup and European Trophy matches is based on average past performance. At worst the team might play only one home game in each competition.

The bank manager has asked that the following information be provided for the meeting:

**1** A statement showing the budgeted surplus expected to be generated during the forthcoming season.
**2** A calculation of the percentage fall in average attendances which could be tolerated before reaching a break-even point.
**3** A calculation of the percentage increase which would have to be applied to spectator charges to maintain the budgeted surplus if all expenses were 10% higher than budget but advertising revenue and the fixed sponsorship fee did not increase.

**Required**
Prepare a report for the directors, containing the information requested by the bank manager and identifying any limitations of the analysis carried out.

**C10.2**
Cleancloths Ltd has two production lines. One line produces Supersnake, an absorbent double strength cloth which soaks up spillage of industrial liquids. Supersnake cannot be sold for domestic use. The other production line manufacture rolls of absorbent cloth for domestic use.

The directors recently considered the following budget for the Supersnake production line for the year ending 31 March Year 5:

| | £ | £ |
|---|---|---|
| Sales (600,000 units at £5 per unit) | | 3,000,000 |
| | £ | |
| Material (6,000,000 metres) | 1,800,000 | |
| Labour | 420,000 | |
| Packaging material | 180,000 | |
| Variable overhead | 540,000 | |
| Fixed overhead | 480,000 | |
| | | 3,420,000 |
| Loss | | (420,000) |

The budgeted loss has caused the directors a great deal of concern. They are aware that future demand for Supersnake is uncertain because of new competition in the industrial cleaning market.

The directors have asked you, as the newly appointed management accountant, to investigate two alternative plans:

*Plan A:* Avoid the budgeted loss by closing the Supersnake production line on 31 March Year 4.
*Plan B:* Continue production for a further year and close the Supersnake production line on 31 March Year 5.

You have discovered the following information during your investigation:

1 Each unit of Supersnake contains 10 metres of material. It is estimated that at 31 March Year 4 Cleancloths Ltd will have in stock 1,000,000 metres of Supersnake material which would be unsuitable for domestic use. It could be sold for waste at a price of 5 pence per metre.
2 Packaging material for 200,000 units will be in stock at 31 March Year 4. As it is already printed it would have to be scrapped if production ceased on that date. Disposal costs would be negligible.
3 The machine used on the Supersnake production line is five years old. It originally cost £700,000 and is being depreciated on a straight line basis over a ten-year life with no scrap value expected at the end of that time. Depreciation is included in the variable overhead costs in the budget. It is estimated that the machine could be sold for £200,000 on 31 March Year 4. Continued use during the year to 31 March Year 5 would reduce the selling price by £7,000 for every 200,000 units of Supersnake produced.
4 The production manager of the Supersnake line has given notice of his intention to leave on 31 March Year 4. His salary cost of £35,000 per annum is included in the fixed overhead costs. If production were to continue to 31 March Year 5, a temporary supervisor would have to be hired at an estimated cost of £31,000 per annum.
5 Other fixed overhead costs comprise items which could not be avoided by closure of the Supersnake line.
6 Production and sales volumes will be equal throughout the year.
7 If production is to take place during the year to 31 March Year 5, it must be at one of three levels of output. The marketing manager has estimated the unit selling price which may be obtained for each of these alternative levels of output:

| *Production units to be sold* | *Selling price per unit (price for all units sold)* |
|---|---|
| | £ |
| 200,000 | 5.20 |
| 400,000 | 5.10 |
| 600,000 | 5.00 |

8 Labour costs vary in proportion to output. Employees no longer required for production of Supersnake could be redeployed within the company at no extra cost.

**Required**
Prepare a report to the directors of Cleancloths Ltd on the relative costs and benefits of *Plan A* compared with *Plan B*.

**C10.3 [S] [CIMA question]**
(a) A manufacturing company is considering its pricing policy for next year. It has already carried out some market research into the expected levels of demand for one of its products at different selling prices, with the following results:

| *Selling price per unit* | *Annual demand (units)* |
|---|---|
| $100 | 50,000 |
| $120 | 45,000 |
| $130 | 40,000 |
| $150 | 25,000 |
| $160 | 10,000 |
| $170 | 5,000 |

This product is manufactured in batches of 100 units, and analysis has shown that the total production cost depends on the number of units as well as the number of batches produced each year. This analysis has produced the following formula for total cost:

$$Z = 70x + 80y + \$240{,}000$$

Where Z represents the total production cost
x represents the number of units produced; and
y represents the number of batches of production.

**Required:**

(i) Prepare calculations to identify which of the above six selling prices per unit will result in the highest annual profit from this product.

*(7 marks)*

(ii) Explain why your chosen selling price might not result in the highest possible annual profit from this product.

*(3 marks)*

*(Total for requirement (a) = 10 marks)*

(b) The company is also launching a new product to the market next year and is currently considering its pricing strategy for this new product. The product will be unlike any other product that is currently available and will considerably improve the efficiency with which garages can service motor vehicles. This unique position in the market place is expected to remain for only six months before one of the company's competitors develops a similar product.

The prototype required a substantial amount of time to develop and as a result the company is keen to recover its considerable research and development costs as soon as possible. The company has now developed its manufacturing process for this product and as a result the time taken to produce each unit is much less than was required for the first few units. This time reduction is expected to continue for a short period of time once mass production has started, but from then a constant time requirement per unit is anticipated.

**Required:**

(i) Explain the alternative pricing strategies that may be adopted when launching a new product.

*(6 marks)*

(ii) Recommend a pricing strategy to the company for its new product and explain how the adoption of your chosen strategy would affect the sales revenue, costs and profits of this product over its life cycle.

*(9 marks)*

*(Total for requirement (b) = 15 marks)*

*(Total for Question = 25 marks)*

CIMA Paper P2 – Management Accounting – Decision Management November 2008, Question Six

# Case studies

## Real world cases

Prepare short answers to Case studies **10.1**, **10.2** and **10.3**.

## Case 10.4

Leisure Furniture Ltd produces furniture for hotels and public houses using specific designs prepared by firms of interior design consultants. Business is brisk and the market is highly competitive with a number of rival companies tendering for work. The company's pricing policy, based on marginal costing (variable costing) techniques, is generating high sales.

The main activity of Home Furniture Ltd is the production of a limited range of standard lounge suites for household use. The company also offers a service constructing furniture to customers' designs. This work is undertaken to utilise any spare capacity. The main customers of the company are the major chains of furniture retailers. Due to recession, consumer spending on household durables has decreased recently and, as a result, the company is experiencing a significant reduction in orders for its standard lounge suites. The market is unlikely to improve within the next year. The company's pricing policy is to add a percentage mark-up to total cost.

**Required**

Explain why different pricing policies may be appropriate in different circumstances, illustrating your answer by reference to Leisure Furniture Ltd and Home Furniture Ltd.

### Case 10.5 (group case study)

In groups of three, take the role of finance director, production director and sales director in a company manufacturing pressure die castings, gravity die castings and sand castings. The three types of casting are manufactured in different locations but each is no more than 20 miles from either of the other locations. All castings are brought to central premises for finishing treatment. The costs of materials are around 56 per cent of final sales price and the costs of labour are around 30 per cent of sales price.

The finance director has been asked to explain to the production director and the sales director the effect of measuring profit using variable costing rather than absorption costing. It is important to keep separate the profit on each of the three product types. The finance director should provide a short explanation and the production director and sales director should ask questions about anything which is unclear or omitted from the explanation. After the discussion is completed (say, 30 minutes in all), the group should make a presentation to the class outlining the nature of their discussion and the conclusion reached as to how profit for each product should be measured.

### Case 10.6 (group case study)

Your company manufactures furniture units to customers' specifications. In groups of three, take the role of sales director, production director and finance director. You have met to decide on the price to be charged for each contract. The sales director aims to maximise revenue, the finance director seeks to maximise profit and the production director wishes to continue operating at full capacity. Discuss the approach you will take to deciding the company's pricing policy for the year ahead. Present to the rest of the class the arguments you will present to the entire board of directors.