

***Management Accounting 4th edition Eldenburg
Solutions Manual***

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Solutions manual

to accompany

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by

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Chapter 1: The role of accounting information in management decision making

Questions

1.1 Explain the value chain and list ways that value chain analysis benefits organisations. (LO4)

A value chain can be described as the key activities engaged in by the organisation or industry. We can view the value chain on two levels: at the industry level, and at the (more common) organisational level. Refer to figure 1.5 for a sample industry value chain and to figure 1.6 for a sample internal value chain. Value chain analysis may benefit an organisation in a number of ways including:

- **Focuses on activities.** The central feature of the value chain is its focus on *activities and processes* rather than functions or departments. This makes identification of improvements across segments more likely.
- **Encourages a broader organisational view.** This is particularly so for management accounting staff and business unit managers. Management accounting staff are more likely to take a broader perspective if using a value chain framework when considering the consequences of decisions.
- **Breaks down more traditional representations of organisational activity.** A value chain framework encourages higher levels of cross-fertilisation and communication between business segments, so that decisions are not confined by the traditional boundaries of functional areas.
- **Externalises thinking by incorporating suppliers and customers.** An organisation's value chain encompasses not only customers and suppliers, but in some cases extends to the customers' customers and the suppliers' suppliers. Analysis of the value chain leads to improved relationships between the organisation and others in the value chain, creating an extended organisation that can respond flexibly to dynamic and competitive environments. In other words, value chains explicitly recognise that no organisation operates in isolation from suppliers and customers.
- **Reinforces other initiatives such as activity-based costing (ABC).** With the focus on activities, a value chain framework provides a sound foundation for exploring activity-based costing (which is covered in chapter 4). ABC uses activities as the foundation of product and service costing. Moreover, a value chain framework complements other recent initiatives like strategic cost management, which refers to the simultaneous focus on reducing costs and strengthening an organisation's strategic position. This commonly involves taking a longer-term view of cost management and decision-making.
- **Provides a foundation for outsourcing and strategic alliance decisions.** A value chain framework serves as the foundation for considering decisions such as outsourcing of particular parts of the value chain and for considering the formation

of strategic alliances with say a distributor. In this way, the value chain serves as a strategic tool.

- **Supports initiatives like supply chain analysis.** As organisations work to increase profitability, improving their relationships with suppliers becomes a priority. Improvements can be identified through supply chain analysis. The **supply chain** is the flow of resources from the initial suppliers through the delivery of goods and services to customers and clients. The initial suppliers may be inside or outside the organisation. Negotiating lower costs with suppliers is a straightforward way to reduce costs. Suppliers may be willing to reduce prices, particularly for organisations willing to sign long-term purchase commitments. Occasionally, organisations work with suppliers to help them reduce their costs so that the savings can be passed along.
- **Categorises activities as value-added and non-value-added.** Value chain analysis involves studying each step in the business process to determine whether some activities can be eliminated because they do not add value. This analysis extends to suppliers and customers, and includes shared planning, inventory, human resources, information technology systems, and even corporate cultures. Eventually, the analysis leads to business decisions for improving value.

1.2 Why do managers need to measure, monitor, and motivate performance? (LO1, 2 and 3)

Once operating plans are in place, organisations need to know whether the plans are being met or need to be changed to take advantage of new opportunities. To do this, actual performance needs to be measured and compared to the plans (monitored). To help managers move toward the organisational goals, incentives such as performance-based bonuses are offered (motivating).

1.3 List three types of internal reports and explain how each is used. List three types of external reports and explain how each is used. (LO2)

See figure 1.2 for a list of possible internal and external reports. Students may have thought of other reports as well. Following are examples of internal reports. Capital budgets support organisational strategies, the master budget supports operating plans, and variance reports (actual versus planned performance) help organisations monitor and motivate performance if they are tied to compensation contracts.

Financial statements are external reports that provide creditors and shareholders information about current and past operations. Tax returns are reports prepared for the government that also determine the amount of taxes due. Suppliers need reports about inventory levels to keep an organisation's inventory levels up to date.

1.4 What types of information in addition to cost accounting are needed for management decisions?
(LO1)

The type of information needed depends on the type of decision. For product-related decisions, managers may need information about the market, including the size of the market, their potential share, competitors' prices and quality of products. For employee-related decisions, they may need to know the amount of experience employees have had or estimate costs to lay them off using information about length of service from human resources. If managers are developing a new good or service, they need information from suppliers about the cost of resources. Students may have thought of other types of decisions and information needed for them.

1.5 Explain relevant information in a decision-making context.
(LO 1 and 3)

Relevant information is information that varies with the available alternatives for a decision; these are relevant because they relate directly to each separate decision that could be made.

1.6 What is a cost object?
(LO2)

A cost object is a thing or activity for which we measure costs. Cost objects might include products, services, customer, processes, departments, of the entire organisation.

1.7 In your own words, explain the path to higher-quality decisions.
(LO3)

Higher quality decisions are made by using higher quality information, that is, information that has few uncertainties and is relevant, complete, as certain as possible, and timely. This information needs to be prepared in reports that are easy to understand, readily available, and timely. Then a high quality decision-making process is used. This is a process that is thorough, as unbiased as possible, focused, creative, and visionary as it relates to strategies.

1.8 Outline the meaning of structural cost drivers.
(LO4)

Structural cost drivers are those that relate to the underlying economic structure of the organisation and include such concepts as scale, scope, experience, technology and complexity.

**1.9 Identify two key influences on the nature of a management accounting system.
(LO2)**

The nature of the management accounting system might be influenced by a number of influences including:

- organisational structure
- availability of information technology
- organisational strategies
- how the management accounting role is viewed within the organisation, and
- types of decisions managers are confronted with

Exercises

1.10 Value-added and non-value-added activities

Some activities add value to an organisation, while others do not.

Required

Determine whether each of the following activities is likely to be value-added or non-value-added and explain your choice.

- (a) Inspection activities
- (b) Moving materials to work stations
- (c) Manufacturing extra inventory to keep employees busy
- (d) Packing to fill a customer order
- (e) Product design initiatives

(LO4)

- (a) Inspection activities are non-value-added. Some organisations have very low defect rates, making it unnecessary to inspect; that is, the product design and manufacturing process insures high quality production. The concept of high quality is to 'do it right the first time'. Some firms may inspect incoming materials to guarantee high quality during their manufacturing processes, but these costs could be eliminated through contractual arrangements with suppliers that include high penalties for low quality material deliveries.
- (b) Moving materials to work stations could also be either value-added or non-value-added, depending on the circumstance. In organisations that use JIT systems, the amount of materials handling is reduced to the minimum level necessary, which reduces costs.
- (c) Manufacturing extra inventory to keep employees busy is non-value added if there are no sales for the inventory.
- (d) Packing to fill a customer order is more likely to be value adding as it is specifically related to a customer order
- (e) Product design initiatives are likely to be value adding as they relate to better product outcomes for customers.

1.11 Internal and external reports

Classify the following reports as internal or external.

- (a) Operating budget**
 - (b) Credit reports**
 - (c) Financial statements**
 - (d) Capital budget**
 - (e) Tax returns**
 - (f) Analysis of product mix**
- (LO1 and 2)**

- (a) internal
- (b) external
- (c) external
- (d) internal
- (e) external
- (f) internal

1.12 Management accounting function

Differentiate between the management accounting function and the management accountant.

(LO2)

Most organisations will have a management accounting function in one form or another. In some organisations, this function might be performed by a variety of differently qualified and trained staff such as accountants (financial or management), costing clerks, engineers, and other staff with management training or experience. In some cases, the label *management accountant* might not even be used, but the management accounting work is still performed as a function. More often, though, the label *management accountant*, or some similar label such as *resource analyst* or *internal management consultant*, would be used

1.13 Types of manager decisions

Suppose that the following are activities conducted by Microsoft Corporation.

- A. Comparing the timeliness of development steps of a new release of Windows with the timeline that was laid out to guide development.
- B. Developing a timeline for the release of new Windows and Microsoft Office products over the next year.
- C. Debugging the next version of Windows.
- D. Providing technical support to customers who are having problems with Microsoft Office.
- E. Estimating cash expenditures for the next year.
- F. Comparing budgeted costs to actual costs and discussing major differences with department managers.
- G. Deciding whether to construct a new building on the Microsoft site.

Required

Identify whether each activity is most likely part of:

- (a) organisational strategies
- (b) operating plans
- (c) actual operations
- (d) measuring, monitoring, and motivating.

For each item, explain why.

(LO1)

- A. (d) Measuring, monitoring & motivating (specifically monitoring) because it is **comparing** actual versus expectations
- B. (b) Operating plans because it involves looking at **short-term plans**
- C. (c) Actual operations because this is part of normal operations (developing new products)
- D. (c) Actual operations because this is part of normal operations (customer support for existing products)
- E. (b) Operating plans because it involves developing **short-term plans**
- F. (d) Measuring, monitoring & motivating because it involves **comparing** actual to expectations and discussing variances from budget with managers (and measuring their performance as managers). Presumably the managers know in advance that their performance is measured based (or at least partially based) on these variances from budget, which should **motivate** their performance.
- G. (a) Organisational strategies because it involves a **long-term** decision to expand facilities

Problems

1. 14 Industry and organisational value chain

With reference to Marino Designs in Self-study problem 2, at the start of this chapter, differentiate between an industry value chain and an organisational value chain.

(LO4)

An industry value chain relates to the broader industry in which an entity chooses to compete. A company may participate in parts of the industry or the entire industry. For example, Marino Designs is described as a “fully integrated company” which means it operates across the entire industry value chain. They farm the Marino sheep for the raw material, wool, which is then converted into yarn then machine-knitted fabric for garment manufacture. Marino Designs market and distribute their products. They more than likely retail garments through the internet as well as own their own retail shops.

The internal value-chain focuses on the key internal value-creating activities, which an entity engages in. Marino Designs focus on research and development, design, manufacture, distribution and sales, and marketing as key functions.

1.15 Structural cost drivers

(a) With reference to Marino Designs in Self-study problem 2, demonstrate the meaning of the structural cost drivers: scope, technology and experience.

(b) Classify Marino Designs' likely strategy as low cost or product differentiation. Explain.

(LO4)

(a) *Scale* refers to the levels of investment in such activities as research and development, manufacturing, marketing and customer support. Marino Designs would appear to devote significant resources to research and development with new product design for garments made of Marino wool. They would spend considerable time and resources to maximise the quality of the raw material, Marino wool, as well as have farms and production capabilities that facilitate flexibility and shorter lead times. The self-study problem also indicates that Marino Designs have their own global fashion outlets, also contributing to the scale of the retail segment.

Scope refers to the degree of vertical integration (horizontal integration is more closely related to scale). Marino Designs holds a strong value-chain position by being vertically integrating. Nevertheless, they have the opportunity to outsource parts of the value chain. For example, they could outsource the retail segment. They may not outsource the Marino sheep farming, knitting-mills or clothing manufacture as these activities might be considered core to the Marino Designs strategy.

Experience refers to the times in the past that Marino Designs has already done what it is doing again. We are not given explicit details, but it could be argued that they have a high quality product that is in demand around the world and given the scale of the operations, have probably been operating for quite some time and would have built up a strong area of expertise around sheep farming for high quality Marino garment manufacture.

Technology refers to the process technologies in each step of the value chain. It is not easy to evaluate the internal mechanisms of an organisation without access to the company. At one end of the value chain, one would assume that Design would have strong reliance on the latest fashion industry research and wool garment manufacturing design technologies – which can impact quite rapidly on production (for example, a change in demand for certain jacket design, or weave can be made instantly with computer design technology which instigates changes directly from computer to manufacturing (knitting mills). Marino Design would also place a strong emphasis on technological excellence in their outbound logistics, marketing, retail and customer service value chain activities (as reflected in use of the internet).

Complexity relates to the extent of the product/service line. Marino Design remains fairly focused on their Marino jacket, but it would be expected that they have seasonable fashion lines, given their global presence with stores around the world. In this sense the number of product offerings would add to the complexity.

(b) Marino Designs would more than likely follow a product differentiation strategy for the following reasons:

- they are aiming to create and market a 'unique' product (evident in their focus on their Marino wool jacket – this wool is very expensive and a high quality);

- Their aim would be to provide a product which offers superior features and innovative ideas to their garment designs that would not be provided by other competitors (value of the Marino wool fabric over others);
- customers seek out Marino Design products (as evidenced in the illustration).
- customer loyalty to the brand 'Marino Design' means the price elasticity of demand is very much reduced and a premium pricing strategy can be followed; and
- any associated costs with differentiation can be passed on to customers
- they would maintain this strategy by continually focusing on strong marketing skills and ways to remain creative.

1.16 Relevant information

Suppose you are responsible for ordering a replacement for your office photocopy machine. Part of your job is to decide whether to buy it or lease it.

Required

- (a) Describe something that could be considered relevant information in this decision and explain why it is relevant.**
- (b) Describe something that could be considered irrelevant information in this decision and explain why it is irrelevant.**
- (c) Explain why it was important to distinguish between relevant and irrelevant information in this problem.**

(LO1, 2 and 3)

- (a) The annual lease payment is relevant since it will not be incurred if the photocopy machine is purchased. Similarly, the purchase price is relevant because it will not be incurred if the machine is leased. There are many other possible answers to this question.
- (b) Any cost that would be incurred under both options would be irrelevant. Examples include the cost of supplies such as copier paper and toner. There are many other possible answers to this question.
- (c) To choose between options, it is necessary to investigate how the two options would differ. By definition, relevant costs differ across options and help the decision maker choose between options. If irrelevant information is included, costs would be over-estimated for one or both options, which could lead to a poor quality decision.

1.17 Uncertainties, degree of uncertainty

Community Children's Hospital can invest in one of two different projects. The first project is to purchase and operate a hotel that is located two blocks from the hospital. The CEO of the hospital has no experience operating a hotel, but the hospital does provide rooms for in-patients, and so she is familiar with cleaning requirements and managing housekeeping staff. However, the hospital does little advertising and does not have a large public relations staff. In addition, the hospital and hotel are located in a part of town that is deteriorating.

The other investment opportunity is to replace the heart monitors in the neonatal intensive care unit (critical care for newborns and infants). The new monitors would provide a range of functions, including monitoring the body temperature and blood pressure of infants, as well as monitoring heart functions. Each monitor can be used for up to four infants with information about each infant forwarded to one computer that is monitored by a special technician. The current monitors are bedside monitors that need to be read every 10 minutes by nursing staff.

Required

- (a) Prepare a list of uncertainties that the CEO faces if she buys the hotel.**
- (b) Prepare a list of uncertainties the CEO faces if she replaces the heart monitors.**
- (c) Which scenario appears to have a greater degree of uncertainty? Why?**

(LO3)

- (a) There are more possibilities than are listed, but here are some of the uncertainties the CEO faces in the 'buy hotel' alternative:
 - Vacancy rates (i.e. demand for rooms)
 - Optimal pricing structure for the rooms
 - Hotel operating costs
 - Tax consequences of running a for-profit business as a sideline to a not-for-profit business (uncertainty alleviated if she purchases tax advice)
 - Ways that hotel maintenance may differ from hospital maintenance
 - Security in this neighbourhood in the future
 - Long-term future of a hotel in a declining neighbourhood
- (b) There are more possibilities than are listed, but here are some of the uncertainties for the 'heart monitor' decision:
 - Future demand for neo-natal equipment at the hospital
 - Expected wages for the special technician (although she can easily find this out)
 - Maintenance or operating costs for the monitors that are not disclosed by the medical supply vendor
 - Expected useful life of the monitors
 - Hospital's ability to charge patients for the new equipment
 - Effect of the new equipment on how nurses spend their time
- (c) The 'buy hotel' alternative probably has a greater degree of uncertainty because it is outside the core competencies of the hospital and CEO.

1.18 Cost reduction; value chain analysis

Budget Cupboards produces kitchen and bathroom cupboards that incorporate unusual functions, such as specialty drawers for knives and kitchen tools, and kitchen appliance holders that pop up from under the counter top. Competition in this industry has recently increased. Budget's management wants to cut costs for its basic cupboard models and then cut prices using the structure of the table as shown.

Required

- (a) The following table lists potential areas for cost reduction. Two potential cost reductions are provided for the first area listed (design phase). For each of the remaining areas, identify two potential ways that Budget Cupboard's management could reduce costs.

Potential area for cost reduction	Potential cost reductions	
Design phase	Work with suppliers to reduce direct materials costs	Redesign cupboards to use fewer parts
Manufacturing process		
Administration		
Changes in quality or functionality		

- (b) Budget does not currently use value chain analysis. Describe several advantages of using value chain analysis.
(LO2 and 4)

- (a) Here are possible answers to this question; students may think of others.

Potential Area for Cost Reduction	Potential Cost Reduction	
	(1)	(2)
Manufacturing process	Reduce inventory by using a JIT system	Reduce inspection by using cellular manufacturing (also increases flexibility so that specialty items can be manufactured to order more easily)
Administration	Outsource functions such as payroll if it is cheaper to do so	Explore software that would increase efficiency and reduce number of employees needed
Changes in quality or functionality	Identify specialty functions with low volume sales and consider discontinuing them	Identify lower cost materials that would not reduce current quality

- (b) To price more competitively, overall costs need to be reduced without affecting product quality or functionality. Value chain analysis and JIT are methods that are used to reduce costs. JIT manufacturing reduces inventory storage and insurance costs, and frees up extra space in the manufacturing plant. If there are alternative uses for the space, the overall contribution margin should increase. Value chain analysis enables managers to categorise activities into value-added and non-value added. Then the non-value added activities are eliminated or minimised to save costs. The supply chain can be analysed to determine whether vendors can reduce their costs or provide higher quality goods and services at the same price.

1.19 Quality of decisions

Maria and Tracey became good friends while working at the same entity. Two years ago, they both decided to increase their savings so that they could eventually purchase homes. Each began by putting a portion of each month's salary into a savings account. At the end of the first year, they had each accumulated \$4000. Because their savings accounts paid a very small interest rate, they decided to invest the savings to earn a higher rate of return. Maria and Tracey both hoped to save enough money to buy homes within five years.

Maria decided to take an investment course offered through the entity. The course taught her about different types of investments and strategies for investing. She then purchased and read an investment book to learn more. Maria learned that some investments are riskier than others, and that investors must balance risk against desired return. Higher risk leads to higher returns on average; but, higher risk could also lead to low returns or even loss. She also learned that investment advisers recommend diversifying risky investments. One way to diversify is to invest in mutual funds, which invest in many different organisations. Maria decided that she was willing to assume some risk, but was not comfortable with a high level. She decided to invest her \$4,000 in a share market mutual fund. She read consumer reports to learn about different mutual funds, and selected a fund that invests conservatively in fairly stable companies. However, the share market did not do well in the first year. The value of her mutual fund at the end of a year was \$4050.

Tracey talked with her boyfriend and other friends about how they invest. Her boyfriend's cousin recommended investing in a start-up company that sells video games. He told her that the games were very popular with teenagers and that the company would probably be acquired, resulting in big gains for investors. This opportunity sounded good to Tracey, so she decided to invest her entire \$4000 in the company's shares. After 10 months, she was excited to learn that the company was being acquired. She received shares in the acquiring company in exchange for her original shares. At the end of the year, the market value of her shares was \$8200.

Required

Evaluate the quality of the investment decisions made by Maria and Tracey. *Hint:* Refer to figure 1.3 (on page 18).

- (a) List the information used by Maria in making her investment decision.**
- (b) List the information used by Tracey in making her investment decision.**
- (c) Did Maria appear to use high-quality information? Explain.**
- (d) Did Tracey appear to use high-quality information? Explain.**
- (e) Describe Maria's decision-making process. What did she do to explore her options? Did she appear to be biased? What were her priorities? How did she reach a conclusion?**

- (f) **Describe Tracey's decision-making process. What did she do to explore her options? Did she appear to be biased? What were her priorities? How did she reach a conclusion?**
 - (g) **Did Maria appear to use a high-quality decision-making process? Explain.**
 - (h) **Did Tracey appear to use a high-quality decision-making process? Explain.**
 - (i) **Given your analyses of the information and decision-making processes used by Maria and Tracey, which investor made a higher-quality decision? Explain.**
- (LO1 and 3)**

- (a) Maria appeared to use the following information in making her investment decision:
 - Information learned during investment course, including different types of investments and strategies for investing
 - Information learned from an investment book
 - Risk/return trade-off for different types of investments
 - Need to balance risk against desired return
 - Higher risk leads to higher returns on average, but can also lead to low returns or even loss
 - Investment advisors recommend diversifying risky investments
 - One way to diversify is to invest in mutual funds
 - Maria's willingness to assume some risk, but not a high level
 - Information about different mutual funds obtained from reading *Consumer Reports*
- (b) Tracey appeared to use the following information in making her investment decision:
 - Investment strategies used by her boyfriend and other friends
 - Her boyfriend's cousin's recommendation about a start-up video game company
 - The opinion that the video games were very popular with teenagers and that the company would probably be acquired, resulting in big gains for investors
 - Her desire for a big gain
- (c) Maria appeared to use reasonably high-quality information (see figure 1.3). The information was obtained from various relatively objective and knowledgeable sources. She made use of a fairly large amount of relevant information to select an investment strategy, and then she used an understandable and objective source of information to help her select a mutual fund.
- (d) Tracey appeared to use fairly low-quality information (see figure 1.3). Most of the information consisted of personal opinions from people who most likely were not knowledgeable about investing and might have been biased.
- (e) Maria appeared to use a logical decision-making process. She began by learning about investment strategies in a course, and then expanded her knowledge by reading a book. She then made an intermediate decision to invest in a mutual fund. That decision seemed to be based primarily on her willingness to assume some risk, the recommendation that she diversify her investment risk, and the fact that she did not have a large amount of money to spread across multiple investment

opportunities. She then conducted additional research to identify a mutual fund that matched her personal willingness to assume risk.

- (f) Tracey appeared to base her decision on what ‘sounded good’ based on personal opinions from her boyfriend’s cousin. She appeared to be biased toward an opportunity that might earn a large gain.
- (g) Maria’s decision-making process was fairly high quality (see figure 1.3). She did not appear to be biased in her approach, and she used multiple sources of information to help her explore options. She identified some key factors that were important for her decision, identified her own values/priorities, and chose an investment option that was consistent with the information she had collected and with her values.
- (h) Tracey’s decision-making process was fairly low quality (see figure 1.3). She explored alternatives only by talking with her boyfriend and friends. As soon as she heard about an opportunity that might result in a big gain, she stopped exploring options and made her decision. In short, she ‘jumped to a conclusion’ without careful thought.
- (i) Maria’s decision-making approach was much higher in quality than Tracey’s, as demonstrated in the answers to Parts A-H above. Notice, however, that in this case Tracey earned a higher return than Maria. When people hear that someone like Tracey earned a big gain, they often use it as evidence to argue that a higher quality decision-making process is not needed. ‘If we can earn a big gain by finding a start-up company with a great product,’ they ask, ‘then why should we invest in something like a mutual fund, which has a lower average return?’ In this investment decision, there is also a risk and return trade-off. Maria intentionally chose a lower level of risk, so she would not expect to earn an exceptionally high return. Tracey, on the other hand, was apparently willing to assume a higher level of risk (even though she might not have realised it), which on average might lead to a higher rate of return. However, Tracey did not carefully investigate her investment. If the company had not been acquired, she might have lost all or most of her investment. She now owns shares in only one company; her risk is not diversified. If the company does poorly in the future, then she may not be able to realise a large gain. Over time, people who use better decision-making processes are more likely to obtain good results.

1.20 Relevant information; uncertainties; information for decision-making

Janet Baker is deciding where to live during her second year of university. During her first year, she lived in the university residence college. Recently her friend Rachel asked her to share an off-campus flat for the upcoming school year. Janet likes the idea of living in a flat, but she is concerned about how much it will cost.

To help her decide what to do, Janet collected information about costs. She would pay \$400 per month in rent. The minimum lease term on the apartment is six months. Janet estimates that her share of the utility bills will be \$75 per month. She also estimates that groceries will cost \$200 per month. Janet spent \$350 on a new couch over the summer. If she lives in the university residence college, she will put the couch in storage at a cost of \$35 per month. Janet expects to spend \$7500 on university fees and \$450 on books each semester. Room and board on campus would cost Janet \$2,900 per semester (four months). This amount includes a food plan of 20 meals per week. This cost is non-refundable if the meals are not eaten.

Required

- (a) Use *only* the cost information collected by Janet for the following tasks.
 - (i) List all of the costs for each option. *Note:* Some costs may be listed under both options.
 - (ii) Review your lists and cross out the costs that are irrelevant to Janet's decision. Explain why these costs are irrelevant.
 - (iii) Calculate and compare the total relevant costs of each option.
 - (iv) Given the cost comparison, which living arrangement is the better choice for Janet? Explain.
- (b) Identify uncertainties in the cost information collected by Janet.
 - (i) Determine whether each cost is likely to be (1) known for sure, (2) estimated with little uncertainty, or (3) estimated with moderate or high uncertainty.
 - (ii) For each cost that is known for sure, explain where Janet would obtain the information.
 - (iii) For each cost that must be estimated, explain why the cost cannot be known.
- (c) List additional information that might be relevant to Janet's decision (list as many items as you can).
 - (i) Costs not identified by Janet
 - (ii) Factors other than costs
- (d) Explain why conducting a cost comparison is useful to Janet, even if factors other than costs are important to her decision.
- (e) Consider your own preferences for this problem. Do you expect Janet's preferences to be the same as yours? How can you control for your biases as you give Janet advice?
- (f) Think about what Janet's priorities might be for choosing a housing arrangement. How might different priorities lead to different choices?
- (g) Describe how information that Janet gains over this next year might affect her future housing arrangements.

Suppose Janet asks for your advice.

- (h) Use the information you learned from the preceding analyses to write a memo to Janet with your recommendation and a discussion of its risks. Refer in your memo to the information that would be useful to Janet.

(LO1, 2 and 3)

- (a) (i) and (ii) The costs of each option are listed below:

'Residence college' Alternative		
Couch	\$350	Not relevant because the cost occurred in the past
Couch storage	\$35/mo (4 mos)	Relevant
University fees	\$7500 (4 mos)	Not relevant because it is the same across the alternatives
Books	\$450 (4 mos)	Not relevant because it is the same across the alternatives
Room & board	\$2900 (4 mos)	Relevant

'Flat' Alternative		
Rent	\$400/mo (6 mos)	Relevant
Utilities	\$75/mo (6 mos)	Relevant
Groceries	\$200/mo (6 mos)	Relevant
Couch	\$350	Not relevant because the cost occurred in the past
University fees	\$7500 (4 mos)	Not relevant because it is the same across the alternatives
Books	\$450 (4 mos)	Not relevant because it is the same across the alternatives

- (iii) Some assumptions need to be made here because of the different time spans for the data. The apartment is to be leased for a minimum of 6 months, but the residence hall alternative is only good for 4 months. What does Janet do for the 2-month period after she cannot live in the residence college any longer? Are the semesters contiguous so that she can choose two 6-month leases in an apartment versus three 4-month periods in the residence college? If the semesters are contiguous, then the cost per month can be computed after annualising the information.

Relevant monthly costs for the 'residence college' alternative:

Room & board (\$2,900/4)	\$725
Couch storage	<u>35</u>
\$760	

Relevant monthly costs for the 'flat' alternative:

Apartment rent	\$400
Utilities	75
Groceries	<u>200</u>
\$675	

Given the assumption that semesters are contiguous (and that costs can be annualised), the apartment seems to be less expensive for Janet than the residence hall by \$85 per month.

(b) Costs Janet would know for sure:

	Source of Information
Residence college	Information published by the university
University fees	Information published by the university
Couch	Already purchased; know purchase price

Costs Janet would estimate with little uncertainty:

	Why Not Known for Sure
Couch storage (Assume Janet investigated prices of storage units)	Until a rental agreement is signed, the cost could vary because the rental rate could change or the storage unit could be rented to someone else
Rent (Assume Janet has identified a potential apartment and was given a rent quote)	Until a rental agreement is signed, the cost could vary because the rental rate could change or the apartment could be rented to someone else. Also, the rent could change after the initial six months unless an agreement is signed for a longer period.

Costs Janet would estimate with moderate or high uncertainty:

	Why Not Known for Sure
Utilities (Assume friends or the apartment manager have given Janet an estimate)	Janet cannot be sure how much the utilities will cost. For example, suppose Janet and her roommate need to heat their apartment during the winter. Janet does not know how warm she and her roommate will keep the apartment, and she does not know how cold the winter will be. Also, she cannot know whether the utility rates will change during the year.
Groceries (Assume Janet estimated her own grocery costs)	Unless Janet has purchased her own groceries in the past, she might not know how much food costs or how much and what types of food she would eat. In addition, she might share costs with her roommate, making it more difficult for Janet to anticipate the food costs. Also, there can be unanticipated changes in food prices.

- (c) Additional information that might be relevant to Janet's decision
- (i) Costs not identified by Janet:
- Janet might need to purchase more furniture if she lives in an apartment. She might need a bed, dresser, desk, chair, dining room set, lamps, etc.
 - Janet might need to purchase a range of household equipment and supplies under the apartment alternative, such as a vacuum cleaner, microwave oven, dishes, cookware, etc.
 - If Janet purchases furniture and other household items, she will need to consider what to do with them at the end of the semester. Will she sell them? Will she move them to another living situation? Will she put them into storage? There may be additional costs after the end of the semester, especially if her lease is for a time period longer than the semester.
 - If Janet chooses the residence college alternative, she might incur living costs during the break between semesters.
 - If the apartment is not within walking distance of the university, she might incur additional transportation costs.
 - Janet needs to consider the possibility that her roommate might not pay for her full share of costs. Janet could be held responsible for more than one-half of the rent, utilities, and other apartment costs.
 - There are a number of other additional costs that would differ under the two alternatives that students may list.
- (ii) Factors other than costs:
- Janet has uncertainties under both options about how she will get along with her roommate; however, there might be more opportunities for disagreement and conflict under the apartment alternative. Janet needs to consider the pros and cons of each roommate situation.
 - Janet's personal preferences for living in an apartment versus living in the residence college are likely to be a major factor. Personal preferences might include a desire for greater personal freedom, security, physical space, ability to cook, and so on.
 - Janet needs to consider the difference in flexibility in the two options. For example, if she chooses the apartment, she is committed for a minimum of six months' rent and possibly a wide range of other costs such as furniture purchases, etc. These commitments might make it difficult for her to change her mind.
- (d) The cost comparison will help Janet plan her finances and decide whether she can afford each alternative.
- (e) Students need to recognise their own preferences, which are a function of their own previous experiences and tastes. For example, they might not want to spend time commuting to and from school. However, Janet might consider this to be less important than living in an apartment in a part of town she enjoys more. Students might have had good or bad experiences with roommates in a residence college, which causes them to be biased toward or against that option. One way for students to control biases is to first recognise their own preferences. Then they can look for ways in which their preferences affect what they consider to be relevant or important. Another way is to talk about this problem with other people who are likely to have preferences different than theirs.

- (f) This question was partially answered in Part E. Some people weigh some factors more than others and these weights affect the choices they make. It is possible to come up with many different ways for Janet to prioritise the various factors from Parts A and C in deciding which option is best for her.
- (g) Janet might learn something about her ability to manage her funds. She might learn more about whether she likes or dislikes various aspects of living in an apartment such as:
- Cooking her own meals
 - Commuting from an apartment off campus
 - Her roommate
- Janet also might learn more about her ability to manage costs in a less structured situation.
- (h) There is no one answer to these parts. Instructors might also like to guide students on the format the memo should take.

1.21 Relevant information; recommendation

Frank owns a caravan and loves to visit national parks with his family. However, the family only takes two one-week trips in the caravan each year. Frank's wife would rather stay in motels than the caravan. She presented him with the following itemisation of the cost per trip, hoping that he will sell the caravan and use motels instead.

	Cost per trip
Caravan:	
Cost: \$20 000	
Usable for 10 seasons, two camping trips per season	\$1000
Transportation expense:	
1000 km @ \$0.37 per km	370
Includes:	
\$0.15 per km for petrol, oil, tyres and maintenance	
\$0.22 per km for depreciation and insurance	
Groceries	250
Beverages	100
Cost per trip	\$1720
Cost per person (\$1720/5 family members)	\$ 344

Required

- What are the relevant costs for deciding whether the family should go on one more camping trip this year?
- What are the relevant costs for deciding whether Frank should sell the caravan? Assume the family will take the same vacations but stay in motels if the caravan is sold.
- What factors other than costs might influence the decision to sell the caravan? List as many as you can.
- Consider your own preferences for this problem. Do you expect Frank's preferences to be the same as yours? How can you control for your biases and consider this problem from Frank's point of view?
- Frank asks you to help him decide what to do. Do you think he should sell the caravan? Why?

(LO1, 2 and 3)

- Relevant costs for deciding whether to go camping or stay home this year:
 - \$1000: this is not relevant because it represents the *past* cost of the caravan
 - \$150 (1000 km × \$0.15): the petrol and oil portion of this is relevant because it is incremental
 - \$220: depreciation is not relevant because it is related to the *past* cost of the caravan and insurance is not relevant because Francisco will insure the caravan whether they take the trip or not.
 - \$250: the cost of groceries is relevant only to the extent that it exceeds the cost of groceries while at home.

- \$100: the cost of beverages is relevant only if it exceeds the cost of beverages while at home.
 - Entertainment costs (movies, etc.) that the family might incur if they stay at home during their vacation time that they would not incur if they go camping instead
- (b) The relevant costs for deciding whether to continue to use the caravan or to sell it and stay in motels in the future:
- \$1000: this is not relevant (but the estimated cash inflow from selling the caravan will be relevant)
 - \$150: this is now relevant because it is an estimate for the future costs of using the caravan. The family will probably drive their car if they sell the caravan, so that option will incur some level of petrol, oil, tyres and maintenance cost.
 - \$220: depreciation is not relevant, but insurance is now relevant because it differs across the alternatives
 - \$250: the cost of groceries is relevant only to the extent that it exceeds the cost of groceries while at home, also may need to consider differences in patterns of eating in restaurants.
 - \$100: the cost of beverages is relevant only if it exceeds the cost of beverages while at home.
 - Motel costs: If they sell the caravan, the family will incur costs to stay in motels.
 - Storage costs of the caravan (if any) would no longer be required if the caravan is sold.
- (c) Other factors that Francisco might consider include:
- The enjoyment that his children receive from camping (if they do in fact enjoy it) and whether their preferences will change as they grow older
 - The enjoyment that Francisco receives from camping
 - Francisco's wife's displeasure with camping and enjoyment of the alternatives
 - Expected selling price of the caravan
- (d) Some students might recommend that Frank keep the caravan because they view it as better than staying in motels. Others might suggest that Frank should experience more things than just state and national parks. Still others might think that a caravan must be too small for a 5-person family, so Frank should sell it. Personal biases often sway the way that people look at information for a problem. They often ignore information that contradicts their preferences. Frank and his family do not necessarily have the same experiences and preferences as students when responding to this question. One way for students to control biases is to first recognise their own preferences. Then they can look for ways in which their preferences affect what they consider to be relevant or important. Another way is to talk about this problem with other people who are likely to have preferences different from theirs.
- (e) As outsiders, it is difficult for students to give advice because they cannot know which priorities should be used to solve this problem. Accordingly, the best

advice students could give Frank might be to discuss it with the family and come up with the best solution/compromise for the family. They could also recommend that Frank remain open to his own biases.

1.22 Cost drivers; value chain; strategy; organisational structure

Australian fashion designer Sean Ashby commenced his men's swimwear and clothing business aussieBum in 2001. A keen swimmer and surfer, he was unable to find a good pair of men's cossies and used his life savings of \$20 000 to make a series of prototypes, buy materials and commence manufacturing in Australia. Despite rejection from local retailers who did not see the potential for aussieBum to compete with international brands, Ashby has proven critics wrong. He had no choice but to take his business online, with instant exposure to the international market. It now takes thousands of orders a day.

Since the company's inception, Ashby says that aussieBum has 'taken on its own little cult revolution', with celebrities such as Ewan McGregor, Billy Connolly and David Beckham fans of the aussieBum brand. Even Kylie Minogue's male dancers wore aussieBum cossies in the film clip for her song 'Slow'. The marketing thrust behind Ashby's aussieBum is to live the dream — 'the dream to be independent and present our gear in a way that gets noticed. We don't apologise for pushing the boundaries . . . We have a saying at aussieBum — If you doubt yourself, wear something else'.

The company doubled in size every year in its first five years and continued to grow by 20 per cent every quarter. By 2005, aussieBum earned more than \$5 million in sales and carried no debt. The aussieBum brand now takes pride of place in stores such as Selfridges in the UK; Brown Thomas in Ireland; La Maison Stores in Canada; Alpha Male in Melrose Drive, Los Angeles; KaDeWa in Germany; as well as others in Spain, The Netherlands, Sweden, Poland and Russia. As well as direct department store sales, aussieBum's internet retail orders are booming, with aussieBum being distributed to more than 70 countries. It now has over 200 000 consumers ordering direct via its custom built e-commerce site.

Most of the raw materials are sourced from Italy and China. By manufacturing in Australia, aussieBum hopes to promote Australia's culture and relaxed lifestyle as well as eliminate restrictions that might come with outsourcing production to other countries. Moreover, producing locally (through independent manufacturers) provides flexibility and a reduced timeframe in getting new products to market. With a heavy emphasis on innovative product design, aussieBum pays close attention to the design phase of the product process.

Two recent examples of aussieBum's flexibility and innovative approach to product development and marketing are worthy of note. First, it was able to capitalise on the consumer backlash against competitor Bonds when that company transferred more of its manufacturing offshore. Ashby estimates that aussieBum's sales grew by at least 40 per cent as a result. Second, aussieBum was able to achieve continued growth during the global financial crisis. The company continues to avoid debt and own all its assets outright.

Required

- (a) With reference to the information provided, distinguish between structural and executional cost drivers.**
 - (b) Illustrate and describe the industry and organisational value chain in which aussieBum operates.**
 - (c) Classify aussieBum's likely strategy as low cost or product differentiation. Explain.**
 - (d) Classify aussieBum's organisational structure as centralised or decentralised. Explain.**
 - (e) With reference to disruptive innovation, do you consider aussieBum to be a disruptor to the traditional garment industry value chain? Discuss why or why not.**
- (LO2 and 4)**

- (a) Structural cost drivers relate to those factors that cause costs insofar as the underlying structure of the organisation is concerned. Commonly we talk of five structural cost drivers: scale, scope, experience, technology and complexity. For example, complexity is determined by the number of different product categories. aussieBum has a product range that includes underwear, swimwear and leisurewear. The differences between each of the product ranges appear relatively small, suggesting that complexity at least might be relatively low.
- (b) *Scale* refers to the levels of investment in such activities as research and development, manufacturing, marketing and customer support. From a scale perspective, aussieBum spends significant resources in the research/development and design phases of their value chain. By devoting significant resources to research and development with new product design and innovative materials, this allows the organisation to bring new products to market regularly. They also manufacture in Australia through contracting arrangements, presumably to facilitate flexibility and shorter lead times. The scene setter also makes it clear that aussieBum uses a targeted marketing campaign.

Scope refers to the degree of vertical integration (horizontal integration is more closely related to scale). aussieBum does not appear to be altering its value-chain position by vertically integrating. It appears to continue to outsource (for example raw material production, fabric manufacture and clothing manufacture) the activities that they consider are not core to the aussieBum strategy.

Experience refers to the times in the past that aussieBum has already done what it is doing again. Although aussieBum is relatively new to the industry, the experience being developed by aussieBum is one based on constant innovation and differentiation. It may be argued that for aussieBum experience is not as important, or may to a certain extent, stifle innovation and creativity in a focused men's clothing market.

Technology refers to the process technologies in each step of the value chain. It is not easy to evaluate the internal mechanisms of an organisation without access to the company. At one end of the value chain, one would assume that aussieBum would have strong reliance on the latest textile industry research and design technologies – which can impact quite rapidly on production (for example, a change in fabric or weave can be made instantly with online technology linking changes directly to manufacturing (weaving machines) in any country). aussieBum would also place a strong emphasis on technological excellence in their outbound logistics,

marketing and customer service value chain activities (as reflected in use of the internet).

Complexity relates to the extent of the product/service line. aussieBum remains fairly focused on men's swimwear, underwear, leisure and sportswear. In this sense the product offerings remain fairly tight, although the options available, particularly within swimwear and underwear, are many.

Executional cost drivers are those that influence organisational cost in terms of how the business does what it does. They include: workforce involvement, total quality management, capacity utilisation, plant/process layout and efficiency, product configuration, and linkages with suppliers and customers. So, for example, the stronger the links with suppliers and customers, the more likely that advantages of cost and waste elimination can occur within each entity. aussieBum appears to have established strong links with retail customers, particularly those overseas, and enjoys strong, loyal support from its many internet customers.

- (c) An industry value chain relates to the broader industry in which an entity chooses to compete. Often the entity may participate in parts of the industry and the entire industry. For example, aussieBum does not manufacture the raw material components (materials) but chooses to source the materials from outside entities. aussieBum does manufacture, market and distribute its products. It does operate in part, as a retailer through its internet service but does not own retail shops.

The internal value-chain focuses on the key internal value-creating activities, that an entity engages in. aussieBum focuses on research and development, design, manufacture, distribution and sales, and marketing as key functions.

- (d) aussieBum's organisation would be relatively centralised. Sean Ashby, as CEO, would have oversight of all the functions from research and design to customer service. Given the product range is relatively focused on men's leisure and underwear, there is not a great need to decentralise because of diverse product offerings. Similarly, many of the functions, such as manufacturing and retail are outsourced, so there is no need to decentralise based on geographic location. The support functions would serve all core functions such as R&D, marketing, and logistics.
- (e) aussieBum would be classified as a disruptor to the traditional garment industry by relying on the internet and social media for leverage in the market place. Many companies are now following similar strategies, where they are designing and selling a brand, rather than operating in other parts of the value chain and direct manufacturing. This is occurring in the food as well as fashion industry, with many value chain activities, such as manufacturing outsourced to contract manufacturers who have the scale (and other structural cost drivers) to work in a low cost and high quality environment. These companies are the early movers in disrupting traditional value chains, especially where manufacturing was seen a core activity. Airbnb and Uber, similarly are leveraging their brand through social media by the use of globally recognised computer applications (Apps) and the operational activities are performed by contractors committed to upholding the brand image and reputation. Disruptive innovation is about redesigning value chains and Sean Ashby would have reviewed every activity to see how the digital

world could help with access to organisations with the necessary structural and executional cost drivers, rather than requiring the funds to invest himself. Airbnb and Uber have gone one step further by enabling a global crowd to emerge to provide the necessary structural and executional cost drivers for relatively short-run success.

**1.23 Using Figure 1.5 as an example, develop an internal value chain for an airline such as Virgin Australia.
(LO4)**

Student responses may vary, and might include the following:

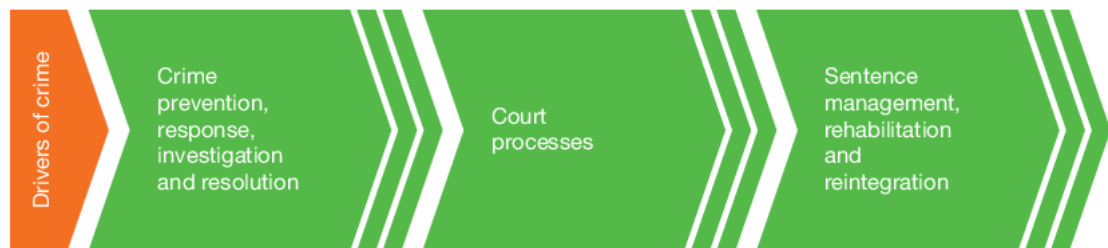
- Research & Development and Design activities discussion including cost leadership processes undertaken to deliver a low cost, but highly value service to customers. For example, students may discuss the online ticketing and check-in processes; the use of low cost paper boarding passes; the streamlined in-flight catering. Discussion can also include the technology required for support processes where cost leadership strategies might be reflected in accounting and administration practices.
- Inbound logistics relates to the provision of supplies necessary for an airline industry. This is varied and covers a broad range from airline service, fuel to catering services. To maintain cost leadership, an airline such as virgin Blue might outsource certain activities (such as airplane service to contractors). Supplier relationships, such as airline fuel suppliers and rental arrangements for allied airport staff and services (i.e. baggage handlers, flight controllers, terminal facilities) are important for an airline's reputation.
- The activity relating to production or service supply is the delivery of a low cost flight service to customers. For example, a low cost strategy airline such as Virgin Blue might focus on production processes that reduce idle capacity (ticketing strategies to operate flights at full capacity). Virgin Blue would also include defining activities and designated roles and activities to their permanent staff (the ground staff, cabin crew and pilots). In a low cost strategy environment a focus on activities can crate savings on additional costs relating to identifying activities that their own staff could do whilst 'on the job' instead of paying for additional contracted cleaning or maintenance personnel.
- Marketing and distribution activities for Virgin Blue are aimed at operating their airlines at full capacity. That is, filling seats on planes in order to cover costs and achieving the lowest cost per air kilometre travelled. Strategies here include the online ticketing sales or 'happy hour' where customers can purchase last minute seats at a reduced cost. As part of this value chain function, Virgin Blue also reward their regular travellers with points for future travel.
- A customer focus is important for an airline such as Virgin Blue. Whilst they aim at achieving a low cost strategy, they also aim to provide a quality experience for customers. Students may refer to the website for other activities that Virgin Blue perform such as carbon credits for promotion of their suitability activities and environmental awareness and other activities to encourage return travellers.

1.24 Value chain in the public sector

Traditionally, government organisations have tended to operate in silos, focusing on their own objectives and managing and protecting their own budgets. Recently, however, faced with seemingly intractable economic, social and environmental problems, many government organisations have sought to develop new ways of working. In particular, they have sought to explore how their objectives overlap and depend on other organisations and how they might share information and resources. One example is provided by attempts to reduce crime and enhance public safety in the criminal justice sector.

In New Zealand the Ministry of Justice is the lead agency in the justice sector. The sector includes the New Zealand Police, the Serious Fraud Office, Child Youth and Family, the Department of Corrections and the Crown Law Office.

The organisations in the criminal justice system can be thought of as being involved in a ‘pipeline’ that begins with crime prevention and the investigation of crime and proceeds all the way through to rehabilitation (see the figure below). Looking at the sector as a pipeline, we can see that policies and actions in any part of the system will affect other parts of the system. By working as a coordinated ‘justice sector’, changes can be made that result in the best outcomes for the sector as a whole.



Within this pipeline, the operations within one agency, Public Prisons, can be further analysed to show the links between its key activities and between the department and other organisations in the sector.

Key activities follow this path:

- offenders are convicted in the courts
- offenders are sentenced and sent to prison
- prisoners undergo an initial assessment
- the serving of the sentence is planned
- the offender’s sentence is managed, including provision of relevant rehabilitation programs
- the offender’s release is planned and managed.

Required

(a) With reference to the information provided, distinguish between the structural and executional cost drivers in this value chain.

(b) Is there an ability for governments to outsource any of these value chain activities?

(LO1, 2 and 4)

- (a) and (b) In this example, the government has worked to combine disparate operations into one value chain industry, which impacts both structural and executional cost drivers. In analysing structural cost drivers, the government have brought together the key parts of the business to generate scale across each segment indicated in the justice system pipeline. This allows for standardised procedures to be followed for each activity, which can be performance measured and audited. The activity of creating a justice pipeline is actually creating the scope, or the vertical integration of a previously fragmented activity. The experience was already there but operating in silos. This new value chain design has created a single system, which encourages greater communication between the key expert areas. This of course, would require technology to help drive improved communication across the value chain activities. A technology platform will ensure the pipeline functions. Without this, the system could easily become fragmented and siloed again as each component part is highly complex.

Because of the structural cost drivers that have emerged through the consolidation of the justice system activities, it is necessary for the executional cost drivers to play a role in maintaining the pipeline. For example, there must be workforce involvement in all activities to commit to maintaining this environment where communication is essential. This will ensure TQM of the single pipeline processes, optimisation of capacity utilisation, efficiency of the layout of the pipeline activities, how a single person is processed through the new pipeline, along with linkages to key support functions. Executional cost drivers are essential for transparency and ease of navigating through this new justice system pipeline.

1.25 Management decision making LO1, 2

The Woolworths Group has a goal of having customers put the company first across all their brands. To achieve this the Group has identified five priorities.⁹

1. Building a customer and store-led culture and team.
2. Generating sustainable sales momentum in food.
3. Evolving the drinks business to provide even more value and convenience to customers.
4. Empowering the portfolio businesses to pursue strategies to deliver shareholder value.
5. Becoming a lean retailer through end-to-end process and systems excellence.

Required

- (a) Given the strategic priorities, what decisions could management take to influence the structural cost drivers and executional cost drivers?
- (b) What type of information would management need in making decisions you have identified in (a)?

(a) In order to meet their goals associated with “having customers put the company first”, improved customer orientation and experience, improving processes and delivering shareholder value, it is critical that management understand the firm’s structural and executional costs drivers (see Figure 1.7). Management decisions directly influence the firm’s structural cost drivers given decisions, for instance, about the scale (i.e. how much is invested in marketing and customer support), scope (i.e. degree of vertical integration), and complexity (i.e. extent of the firm’s food and drinks lines). An understanding of executional cost drivers (i.e. the benefits of workforce involvement and TQM, how capacity can be better utilised, how the relationship with customers can be improved) can further inform management decisions regarding different options to better manage costs and improve customer value.

(b) As the following table illustrates, various sources of information can be relevant in enabling management to understand the impact of their decisions on the firm’s structural and cost drivers.

Cost Driver	Example sources of relevant information
Structural cost drivers	
Scale	Annual investment in R&D, marketing and customer support.
Scope	Degree of vertical integration.
Experience	Average employee qualification levels. Number of employees participating in professional development activities.

Technology	Annual investment in IT systems. Online store reliability/functionality.
Complexity	Number of product lines. Number of stores.
<i>Executional cost drivers</i>	
Workforce involvement	Employee feedback on their commitment to the organisation and senior management.
TQM	Annual investment in service quality improvement. Average weekly product returns.
Capacity utilisation	Average revenue per square metre of floor space. Average revenue per store.
Process efficiency	Average delivery times. Average customer check-out times.
Product configuration	Customer feedback on product options.
Linkages with suppliers and customers	Average supplier delivery times. Customer satisfaction.