Management accounting
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Undergraduate study in
Economics, Management,
Finance and the Social Sciences

This is an extract from a subject guide for an undergraduate course offered as part of the University of London International Programmes in Economics, Management, Finance and the Social Sciences. Materials for these programmes are developed by academics at the London School of Economics and Political Science (LSE).

For more information, see: www.londoninternational.ac.uk
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Introduction

About this edition

This edition of the subject guide is a development of my 2013 edition, which in turn built on Thomas Ahrens’ 2009 amended edition. Throughout the various editions, many of the elements that contribute to this subject guide have changed. In particular, the textbook adopted a slightly different approach to management accounting since the 13th edition and provided some significant updates in its 15th edition. The 13th edition emphasised the importance of the role of management accounting for decision making by introducing the ‘five-step decision-making framework’. Also, the strategic relevance of many concepts and techniques is stressed more. The 15th edition contextualises the topics by referring to more contemporary cases and to the emerging managerial thinking of the current global business community. These aspects are highlighted throughout the subject guide.

Another important development from the 2013 edition is that the study guide is now structured in 20 chapters. This enables you to more easily ‘digest’ the topics in smaller chunks and, ideally, whether you are taught by a tutor or studying on your own, to assign a chapter per lesson throughout your learning. As you will notice, Chapter 20 replicates the experience of a final revision class, where scenarios and questions address all the syllabus topics in a systematic way.

My view of managerial accounting is that traditional techniques and concepts are not surpassed or made obsolete by new and more sophisticated ones, but instead are put in different perspectives and relegated to more specific uses. However, the subject of management accounting has acquired more and more strategic relevance in the management of organisations. Hence, the chapters of this edition of the subject guide are organised in a loop: in the first chapters the influence of management accounting on an organisation’s strategy is introduced. in further chapters management accounting concepts and techniques are explained and in the final chapters the same concepts are applied in strategic contexts.

My personal approach is to stimulate you to reflect on the topics and to try to relate them to your own experience, where possible.

Nevertheless, I still owe a debt of gratitude to Thomas Ahrens for his invaluable work on the initial editions of this subject guide and for allowing me to keep or rephrase substantial parts of his material. This is particularly the case in (but not limited to) some of the ‘insights’ and activities I use throughout this edition. Where parts of Thomas Ahrens’ editions have been used, though, in many cases their gist, focus and sometimes their conclusions have been changed, contributing (I would hope) to the theoretical debate on the subject.

Aims

This course is designed to equip you with the knowledge of concepts and the ability to apply techniques of management accounting, in order to be able to contribute to the success of a firm. Management accounting has evolved from being purely concerned with the recording and measurement of costs, to supporting decision makers in their daily and
strategic decisions. For this reason non-financial information is included in management accounting reports, where it is used in combination with financial information to construct a picture that can illuminate the contribution that each division, function, activity, process and procedure makes to the strategic achievements of a firm.

This subject guide begins by putting management accounting in its current context (i.e. as an essential function for the implementation of a firm’s strategy). Chapters 1 and 2 give particular emphasis to the role played by management accounting in the support of strategic decision making. Chapter 3 adds the elements of uncertainty and capacity constraint. Chapters 4 to 11 address various costing techniques, showing their underlying logic and demonstrating their most appropriate use. These techniques enable different analyses which are aimed at tracing the consumption of resources back to units of products or services. The choice between them will be seen in light of the different aims that the decision makers are hoping to achieve.

Chapter 12 explores the link between measurement and management, making the information created by activity-based costing (ABC) an essential tool for strategic management of an organisation. These decisions imply wider and longer commitments for a company, as explained in Chapter 13.

Chapters 14 to 19 close the loop opened at the beginning of the study guide with regards to the role of management accounting in strategic management. Chapters 14 to 16 will demonstrate how the concepts and techniques presented in the previous chapters can be used for advanced management practices, such as budgeting and controlling in a strategic context. Chapters 17 and 18 will explore how management accounting can enable performance evaluation aimed at supporting daily and strategic decision making, by emphasising the use of comprehensive frameworks (such as the balanced scorecard) in strategic decision making.

The subject guide closes with Chapters 19 and 20, where scenarios are proposed to address and discuss all concepts respectively in a systematic way.

## Learning outcomes

At the end of this course, and having completed the Essential reading and activities, you should be able to:

- critically evaluate the uses of managerial accounting information for strategic decision making in various business contexts
- select, devise and apply different types of cost allocation and explain their different roles for supporting strategic managerial decisions
- design and prepare budgets and explain their use in strategic planning and control
- design and use variances to support feedback analysis and strategic control
- discuss various approaches to performance measurement and control in various types of organisations, and devise and evaluate simple indicators of performance
- discuss the changing role of management accounting.
Why study management accounting?

Whether profit is or is not one of the key aims of an organisation, its decision makers will nonetheless be very much interested in using its resources in the most efficient way. Resources are, by definition, scarce and their efficient use enables a fuller achievement of any organisation’s ultimate goals. Management accounting explores techniques and concepts to measure the use of resources and how they are linked to the production of services and products, with the aim of supporting decision making with regards to the allocation of resources, the design of activities, processes and procedures, the evaluation of their effectiveness and the proposals for their improvement. Hence, studying management accounting is relevant in any context where resources are used: in commercial firms and any type of business, as much as in not-for-profit organisations, governments and charities.

Your position may require you to measure others’ performance in terms of results compared to the consumption of resources that they used. In this case you will be faced with the choices of how to allocate costs to one person’s actions or another’s. Your choices will have important effects on how people will behave in the firm, what decisions they will take and what priorities they will assume.

Also, your organisation may wish to measure your performance as well, in which case you will want to be able to discuss the methods of such measurement because it may affect your pay or your promotion.

The questions of how to measure, what to measure, whom to feed this information to and when are what constitute management accounting or managerial accounting. Hence, whether or not you want to be a specialist in this field, you will become involved in discussions of performance and the uses of resources. It is from this perspective that you should aim to acquire management accounting knowledge and skills.

Organising your studies

This course builds on the knowledge and skills acquired in AC1025 Principles of accounting. Hence, before beginning this course, it is recommended that you go back to that learning material and refresh your memory.¹

The subject guide is intended to lead you through your learning of management accounting. Using your textbooks and their companion websites as tools, the subject guide provides you with a framework for your study; it contains aims and learning objectives for each topic which should help you focus more clearly on what is expected of you in the assessment. The subject guide also points to the most important issues in each topic and provides some additional explanations and cross references, so that you can see the links between different topics and appreciate that they are all different sides to similar problems. The worked examples and activities are aimed at making your learning as active as possible.

Your use of the textbook depends very much on whether you receive instruction from a teaching institution or whether you study by yourself. However, it is important to remember that under no circumstances is the subject guide meant to replace the textbook. The reading relevant to each chapter of the subject guide is listed at the beginning of each chapter. When the Essential reading also includes journal articles, they are mostly available through the University of London Online Library.

¹ Please be aware, however, that AC1025 Principles of accounting was revised in 2015, so chapter references may no longer be the same as the edition you originally studied from. The new version is available on the relevant course page of the VLE, and as usual you can find the relevant sections by using the table of contents or by searching for keywords in the PDF.
If you are receiving regular instruction at a teaching institution I recommend that you read through each chapter of the subject guide prior to attending the relevant taught sessions. This will give you the opportunity to participate in and contribute to the classes more effectively. The introduction to each chapter should help you to reflect on what to expect in the remainder of the chapter. Try to read the whole chapter in one go even though this may result in a somewhat superficial overview. After attending the taught session you should read the chapter again, giving more attention to the details. It is paramount that you allow enough time to go through the activities proposed in each chapter. These are designed to elicit your reasoning and check whether you have understood and learned a topic. Where possible, try to explain the topics to others (experts or non-experts alike); you will soon realise that by explaining a topic you gain a fuller grasp of it.

As you receive instruction, the main role of the textbook is to complement your learning during the taught sessions. The textbooks go into greater detail and you should combine what you learn from this subject guide, the taught sessions and the textbook to construct your own critical view of each topic and to obtain a deeper grasp of specific concepts and techniques. As per the subject guide, I would recommend that you read the relevant textbook material prior to and after the respective taught sessions. I also recommend that you use the textbooks’ companion websites.

If you study by yourself, this subject guide, the textbook, the companion websites and the other readings are your main source of knowledge. In the same way as indicated above, I recommend that you read a whole chapter of the subject guide in one go, using the introduction to each chapter to help you reflect on what to expect. After that, go to the textbook(s) and read the relevant chapters alongside the subject guide, which is intended to help you navigate through them. You must aim to construct your own critical view of each topic and to obtain a deeper grasp of specific concepts and techniques. Just as for taught students, it is paramount that you allow enough time to go through the activities proposed in each chapter of the subject guide and that you try to explain the topics to others in order to fully develop your understanding.

Make sure that you understand the logic of the learning objectives at the beginning of each chapter of the subject guide, and those in the textbooks. As you read, try to relate what you are reading to the learning objectives for each chapter. The textbook’s companion websites are an invaluable source of interactive learning material, which I recommend you use immediately upon completing a chapter. Finally, go over the summaries in the margins again and make sure they still make sense! You should immediately attempt a few of the exercises provided at the end of each chapter, because practising is a very effective way of complementing your learning. Leave a few exercises and do them one or two days later to consolidate your learning.

Especially if you study by yourself you should benefit from the fact that both the subject guide and the textbooks take a holistic approach to the subject of management accounting, though in different ways. Although topics must be presented in separate chapters, they are interrelated. In particular, one of the textbooks refers to a five-step decision-making framework, which brings all topics together, as they are all aimed at supporting decision making. An example in the subject guide is activity-based costing (ABC), which has its own chapter (Chapter 11), but is also referred to in Chapters 12 and 14, where the technique is applied in a
more strategic context. The advantage of this holistic approach is that it explains the relevance of certain techniques in relation to different ideas within management accounting. Therefore, if you seek to find out more about a particular topic or technique, first consult the glossary and then the index. Follow up the references from the index to find out about the different ideas in relation to which a topic or technique is explained.

It is helpful to look back regularly to the earlier chapters of the subject guide, in order to refresh and reinforce your understanding of the earlier topics. Also, it is a good idea to follow up some of the references provided in the textbook together with the suggestions for further reading which are given in this subject guide. Once you have started to study you will be able to evaluate how long it should take you to proceed further and to complete your study. Allow enough time to fully cover lecture preparation, organisation of notes after the lecture (if you are on a taught programme), reading in the guide, the Essential reading, Further reading and exercises.

**Essential reading**


This textbook provides plenty of examples. In fact, it is mostly based on case studies. Throughout this subject guide, when you are referred to ‘the textbook’ or ‘your textbook’, this is generally the book in question (unless stated otherwise). I recommend that you have access to this textbook’s contents (including its companion website) at least for the period of time when you are preparing for this course. You can use either the current 15th or the previous 14th and 13th editions. However, the changes introduced in the 13th edition are meaningful and make earlier editions obsolete, whereas the changes introduced in the 15th edition are important updates but not essential.


This text will help you to recall some concepts of financial accounting and the value of accounting information that are fundamental for your understanding of management accounting. The text is downloadable free of charge here:

http://bookboon.com/uk/student/finance/basics-of-international-financial-reporting

Detailed reading references in this subject guide refer to the editions of the set textbooks listed above. New editions of one or more of these textbooks may have been published by the time you study this course. You can use a more recent edition of any of the books; use the detailed chapter and section headings and the index to identify relevant readings. Also check the virtual learning environment (VLE) regularly for updated guidance on readings.

**Further reading**

Please note that as long as you read the Essential reading you are then free to read around the subject area in any text, paper or online resource. You will need to support your learning by reading as widely as possible and by thinking about how the principles you have learnt apply in the real world. To help you read extensively, you have free access to the VLE and University of London Online Library (see below).
The following book stands out as further recommended reading:


This textbook provides comprehensive insights into the theory behind methods and techniques. I recommend that you have access to this textbook at least for the period of time when you are preparing for this course.

Other useful texts for this course include:


Balakrishnan, R. and G.B. Sprinkle 'Integrating profit variance analysis and capacity costing to provide better managerial information', *Issues in Accounting Education* 17(2) 2002, pp.149–61.


Online study resources

In addition to the subject guide and the Essential reading, it is crucial that you take advantage of the study resources that are available online for this course, including the VLE and the Online Library.

You can access the VLE, the Online Library and your University of London email account via the Student Portal at:

http://my.londoninternational.ac.uk

You should have received your login details for the Student Portal with your official offer, which was emailed to the address that you gave on your application form. You have probably already logged in to the Student Portal in order to register! As soon as you registered, you will automatically have been granted access to the VLE, Online Library and your fully functional University of London email account.

If you have forgotten these login details, please click on the ‘Forgotten your password’ link on the login page.

The VLE

The VLE, which complements this subject guide, has been designed to enhance your learning experience, providing additional support and a sense of community. It forms an important part of your study experience with the University of London and you should access it regularly.

The VLE provides a range of resources for EMFSS courses:

• Electronic study materials: All of the printed materials which you receive from the University of London are available to download, to give you flexibility in how and where you study.

• Discussion forums: An open space for you to discuss interests and seek support from your peers, working collaboratively to solve problems and discuss subject material. Some forums are moderated by an LSE academic.

• Videos: Recorded academic introductions to many subjects; interviews and debates with academics who have designed the courses and teach similar ones at LSE.

• Recorded lectures: For a few subjects, where appropriate, various teaching sessions of the course have been recorded and made available online via the VLE.

• Audiovisual tutorials and solutions: For some of the first year and larger later courses such as Introduction to Economics, Statistics, Mathematics and Principles of Banking and Accounting, audio-visual tutorials are available to help you work through key concepts and to show the standard expected in exams.

• Self-testing activities: Allowing you to test your own understanding of subject material.

• Study skills: Expert advice on getting started with your studies, preparing for examinations and developing your digital literacy skills.

Note: Students registered for Laws courses also receive access to the dedicated Laws VLE.

Some of these resources are available for certain courses only, but we are expanding our provision all the time and you should check the VLE regularly for updates.
Making use of the Online Library

The Online Library (http://onlinelibrary.london.ac.uk) contains a huge array of journal articles and other resources to help you read widely and extensively.

To access the majority of resources via the Online Library you will either need to use your University of London Student Portal login details, or you will be required to register and use an Athens login.

The easiest way to locate relevant content and journal articles in the Online Library is to use the Summon search engine.

If you are having trouble finding an article listed in a reading list, try removing any punctuation from the title, such as single quotation marks, question marks and colons.

For further advice, please use the online help pages (http://onlinelibrary.london.ac.uk/resources/summon) or contact the Online Library team: onlinelibrary@shl.london.ac.uk

Examination advice

Important: the information and advice given here are based on the examination structure used at the time this guide was written. Please note that subject guides may be used for several years. Because of this we strongly advise you to always check both the current Programme regulations for relevant information about the examination, and the VLE where you should be advised of any forthcoming changes. You should also carefully check the rubric/instructions on the paper you actually sit and follow those instructions.

This course is examined by a written unseen examination which lasts for three hours 15 minutes (including 15 minutes of reading time). There are two sections. Section A contains four questions which require the use of calculations to answer the questions. Section B has four essay questions. Candidates must answer at least two questions from Section A, one question from Section B and one other from either section. All questions carry equal marks, 25 in total. Where the questions require you to answer different parts, the relative weighting of marks is given. Typically, those questions which ask you to perform calculations also ask you to interpret your results in a later part. Some of the essay questions may give you a further choice of two questions. At the end of each chapter in the subject guide you will be given one or two sample questions. Note that the questions cannot usually be answered with reference to only one chapter in the subject guide, but will require you to integrate the material with other chapters, textbook and journal article readings, and also with other subjects, such as AC1025 Principles of accounting.

The Examiners' commentaries contain valuable information about how to approach the examination and so you are strongly advised to read them carefully. Past examination papers and the associated reports are valuable resources when preparing for the examination.

Past examination papers and commentaries are available online but you should be aware that the syllabus and subject guide were revised for 2012 and bear this in mind as you look at past examination papers. You should also consult the Examination section of your Student handbook.

Remember, it is important to check the VLE for:
• up-to-date information on examination and assessment arrangements for this course
• where available, past examination papers and Examiners’ commentaries for the course which give advice on how each question might best be answered.

Changes to the syllabus

The material contained in this subject guide reflects the syllabus for the year 2016–17. The field of accounting changes regularly, and there may be updates to the syllabus for this course that are not included in this subject guide. Any such updates will be posted on the VLE. It is essential that you check the VLE at the beginning of each academic year (September) for new material and changes to the syllabus. Any additional material posted on the VLE will be examinable.

Abbreviations

Following is a list of abbreviations that you may encounter in this subject guide and in the readings for this course.

- ABC: activity-based costing
- ABM: activity-based management
- AVCO: average cost
- CVP: cost-volume-profit analysis
- EVA®: economic added value
- FIFO: first in, first out
- IRR: internal rate of return
- JIT: just-in-time inventory system
- LIFO: last in, first out
- NPV: net present value
- R&D: research and development
- ROI: return on investment
- TOC: theory of constraints
- WACC: weighted average cost of capital
Chapter 1: Management accounting and its strategic context

Aim

The aim of this chapter is to clarify the importance of the management accounting function in organisations, in light of their business model and strategy. This entails exploring the role of the management accountant in organisational practice.

Learning outcomes

By the end of this chapter, and having completed the Essential readings and activity, you should be able to:

- distinguish between financial accounting, management accounting and cost accounting
- discuss the importance of the management accounting function for the strategic success of an organisation
- use the value chain framework for classifying and analysing dimensions of performance according to its functions
- discuss the challenges and role of management accountants in an organisation's decision-making process.

Essential reading


Further reading


Introduction

The basic concepts and terms of management accounting have been introduced in AC1025 Principles of accounting. In particular, Chapters 13 to 19 of that subject guide should provide you with an initial framework to place management accounting into the context of the modern business environment and the provision of information. I strongly recommend that you go back and revisit this learning material prior to proceeding with this chapter.

This chapter aims at developing the subject of management accounting by explaining in more detail how management accounting supports and contributes to the strategic achievements of an organisation. This chapter should help you to get the best out of Chapter 1 of Horngren et al. (2014) and the related online learning material provided in the textbook's companion website www.myaccountinglab.com. I also recommend that the free ebook International financial reporting is read in conjunction with this guide (see Essential reading). This will provide you with an essential overview of the main concepts and terms of financial accounting and the interpretation of corporate accounts, which you should combine with your learning from AC1025 Principles of accounting.

As a starting point it is worth reflecting on the fact that management accounting builds on financial accounting information, as it requires measurements and records of business transactions from diverse sources, such as creditor and debtor records, the payroll, the fixed asset inventory and other records. In addition, management accountants can create additional ad-hoc and ‘notional’ (or ‘figurative’) accounting information; for example, by calculating opportunity costs for the use of capital. Imagine two companies which belong to the same group and provide similar services to two different geographical areas. Assume that they provide similar output levels, with one company using twice as much working capital (debtors, inventory, cash) as the other. In terms of reported profit, based on financial accounting records, these two companies are very similar. However, the company that produces its results using less working capital is more efficient and most likely more profitable, too. Management accountants may therefore decide to include a notional or figurative interest charge on working capital when calculating the financial contribution of the companies. This incentivises the CEO of each
company to be economic with working capital; for example, by seeking to minimise the cash operating cycle.

**Accounting and organisational strategy**

Management accounting produces information for internal decision makers, as opposed to the aim of financial accounting, which is to satisfy the informational needs of external stakeholders. Hence, management accounting information must mirror the strategic relevance of the decisions it is aimed at supporting. It must reach the decision makers to facilitate the decision-making process, and it must contain adequate detail to allow an informed decision. Therefore, while the production of management accounting information should not cause damaging delays to the decision-making process, the decision makers should also be confident in their ability to evaluate alternative scenarios and all foreseeable consequences of their decisions, before making them.

Management accounting and its importance to the decision-making process is well addressed in Horngren et al. (2014), with reference to the ‘five-step decision-making process’ introduced on p.35 and used throughout the other chapters; the idea is that managerial accounting is aimed at producing and communicating information that is relevant to managerial decision making.

Management accounting is therefore much more detailed and potentially much more varied than financial accounting because it is supposed to respond to specific information requests rather than follow the general reporting standards that are valid for different types of organisations. Refer to Exhibit 1-1 of Horngren et al. (2014) for a summary of these aspects. This is not to say that all management accounting reporting is ad hoc. However, this information is usually tailored around the specific strategic priorities of an organisation. For a better understanding of this concept, refer to the value chain framework and the Coca-Cola supply chain analysis example (Exhibits 1-2 and 1-3, Horngren et al., 2014). In both cases reflect on how the management of each part of the value chain and the supply chain can benefit from ad hoc information. For example, when managing ‘research and development’ it is probably useful to know the amount of resources that have been allocated to each research project, and how these resources should be conveniently split between human resources (e.g. scientists, skilled workers, unskilled workers, consultants, etc.), raw materials and other rights (e.g. licences to use others’ intellectual property).

Look at the ‘design of products, services or processes’ and reflect on how the same categories of costs are likely to change in proportion to each other. For example, at the design stage it is likely that fewer scientists and more skilled workforce will be used than at the stage of ‘research and development’.

What about raw materials? How will this change again to consider the next stage of ‘production’?

You may like to refer to Drury (2015, pp.4–24) to consolidate your knowledge.

**Activity 1.1**

Apply the concept of a value chain to any familiar production process and reflect on what categories of costs would apply to each phase (or ‘part’ in Horngren et al.’s terminology) of the value chain. Repeat the same exercise with another familiar production process and compare the two, phase by phase. It should be possible to draw some conclusions based on the strategic relevance of each phase in different contexts. The exercise is particularly interesting when reflecting on firms that are operating in similar conditions but clearly have different strategic goals, for example, one firm’s main key success factor...
Accounting information and decision making

All the managerial accounting information reviewed by reading these first pages, and by completing Activity 1.1, should be useful for decision making, that is for:

i. identifying problems and uncertainties
ii. obtaining information
iii. making a prediction about the future
iv. making a decision by choosing among alternatives
v. implementing the decision, evaluating the performance and learning.

These steps make the ‘five-step decision-making process’ as introduced in Horngren et al. (2014, Chapter 1). I recommend you refer to other sources, too, for slightly different framework explanations (as, for example, in Drury, 2015, p.7) as this will elicit your critical view of the concept.

Also, the managerial accountant is bound to make decisions with regards to what accounting information to produce and how to do so. During this process three main guidelines should be followed. The first one is

Insight 1.1

A useful digression on strategies

The relevance of managerial accounting information for strategic decisions depends on the firms’ different strategies.

Two ‘generic’ strategies that are frequently distinguished are ‘price leadership’ and ‘differentiation’. ‘Price leadership’ implies low prices combined with a standardised offering. The strategic effort goes into developing a customer proposition that appeals to large numbers of customers and can be provided at low cost. Product variation or even tailoring products to individual customers’ wishes is then not usually part of the product offering. Budget airlines are an extreme example of this strategy.

By contrast, ‘differentiation’ emphasises the satisfaction of individual customers’ wishes as closely as possible, be it with respect to quality of manufacture, ease of use, flexibility of application or delivery, product variety, reliability, pre-sale and after-sale assistance or any combination of these. An example would be luxury motor vehicle manufacturers. Product cost is also a concern for organisations that pursue this strategy, but not to the same extent as for those that pursue price leadership.

Even though the academic literature on strategy often portrays price leadership and differentiation as strategic opposites, in practice there is usually a combination of both; for example, in the various markets for electronic consumer goods. There are different reasons for this. In large organisations some divisions may tend towards one strategy and some towards the other. During their life cycle, certain products may start out as differentiated products that are tailored towards the high price segment (perhaps because they are innovative), and later they may be marketed to compete mainly on price (perhaps because many competitors have entered this market, production volumes have increased and high quality is no longer a differentiating factor).
the **cost-benefit approach**, which requires that the information's added value be compared with the cost of producing that information before deciding to produce it. For example, acquiring and installing certain information management systems, such as SAP, may provide an enormous wealth of information. However, the required amount of data that must be traced, recorded and inputted to feed these systems may be disproportionate in comparison with the benefits of the information returned.

**Behavioural and technical considerations** make the second guideline. Accountants should consider who is going to supply the accounting system and use its information. Consideration must be given to the corporate culture and to the culture of the region where the firm is based and operates. For example, regional attitudes to recording can differ, similarly the concept of how much tolerance should be allowed for approximation may differ. Moreover, different people may present various degrees of technical preparation and reliability; hence, different training efforts and control procedures must be put in place in order to ensure that data are recorded to the required specifications.

Finally, managerial accountants must always be aware that **different costs should be produced for different purposes**. An example of this is how information is aggregated in different categories according to the type of decision that it sought to be supported. Products' revenues and related costs can be segmented geographically, when the decision maker is evaluating the allocation of regional marketing. However, when the decision maker is considering re-engineering the production of a pool of products, then revenues and costs will be segmented according to the production lines or the firm's functions instead. We will address this matter more closely in various chapters of this subject guide: in Chapters 4 and 5 costs will be allocated according to their behaviour; in Chapters 6 and 7 costs will be allocated according to their contribution to the overall life of the products; in Chapters 8 to 11 the cost per unit of product or service will be calculated using different methods; finally in Chapters 12 and 14 those costs per unit will be used for different purposes.

In this subject guide the assumption has been made that managerial accounting is of strategic relevance for the reasons highlighted above, which will also be more widely explored later. However, it is noteworthy that management accounting, as a subject and in practice, has reached this point as the result of many years of development. To this end, Insight 1.2 provides a short compendium of the developments of managerial accounting in the last three decades. For Further reading on this, you may also like to refer to Drury (2015, p.18).

**Insight 1.2**

**Strategic management accounting**

In the 1980s management accounting and accountants were criticised for their failure to recognise organisations' new strategic priorities (Johnson and Kaplan, 1987), and this decade produced many of the initiatives that make management accounting more strategically relevant today. The reproach was that management accounting was in fact dominated by financial reporting requirements and took no account of what decision makers wanted to know. For example, standard costing systems allocated overhead costs to products that were not causing them, and standard costs were updated so infrequently that the changes in the design and manufacture of these products quickly made them obsolete. One of the attempts to correct the shortcomings of traditional standard costing systems (see Chapters 8 and 9) was activity-based costing (ABC), which sought to allocate manufacturing overheads depending on the manufacturing activities that were
caused by a product, and which is the subject of Chapter 11. A more general suggestion to enhance the managerial relevance of management accounting was Simmonds’ (1981) concept of strategic management accounting. It focused on the incorporation of marketing knowledge into management accountants’ roles. A study by Roslender and Hart (2003) suggested that even though the term ‘strategic management accounting’ itself was not common in practice, on the whole, the management accountants whom they studied could be said to hold more strategic roles then, than they had in the past. Studies of the role of the management accountant in organisational management in different countries have found that commercially aware and active management accountants distinguish commercial involvement from the old ‘bean counter’ mentality (e.g. Friedman and Lyne, 1997). By ‘bean counting’ they meant an overriding concern with administration, record keeping and elementary financial reporting work. In terms of the classic distinction between the roles of the management accountant – namely, record keeping, attention directing and problem solving – this implies a shift in emphasis from the first to the last two.

If the calls for greater strategic relevance have been an important criticism that led to conceptual changes within management accounting, an important facilitator of those changes has been the technical advances in information technology. Contemporary accounting and information systems are significantly more powerful and easier to operate than they were only a few years ago.

Generally speaking, it is now easier to extract information from the systems that are used in organisations. Management accountants can offer information that is better tailored to answer the questions of managers. In some cases, managers can now directly access information. As a consequence, less effort is needed on the part of management accountants to administer information systems and serve simply as mediators between an organisation’s management and its information systems. There is now the potential for management accountants to become much more actively involved in management decision making.

**Management accountants in their organisations**

A management accountant may cover a number of different technical or strategic positions. Technical positions span from more basic positions (main responsibilities would include inputting data in order to produce relevant management accounting information) to more advanced positions (main responsibilities would include determining what data to input, how to elaborate upon it and deciding what information is relevant for whom, and for what purpose).

The responsibilities may be wider at a more strategic position, such as finance director (also called chief financial officer – CFO) or controller (also called chief accounting officer – CAO). These are executive positions where management accountants are expected to deploy their technical and strategic skills to the extent that they have a significant input in determining their firms’ major decisions.

Most commonly, management accountants are expected to contribute to planning, controlling and performance evaluation. Senior management accountants, who are involved in any of those three roles, need an extensive knowledge of the operations of the organisation they work for. In this way they will be able to recommend to the top management courses of action that fulfil their strategic goals. Gaining experience in various roles within the organisation or in other organisations will be essential for you to be able to convincingly discuss strategic decisions with the top management.
More specifically, the greater proximity the role has to the CFO, the more responsibility and influence it will have on treasury, risk management, tax planning, investor relations, internal audit and overall control.

The strategic relevance of management accounting is represented by its ability to support the management in taking strategic decisions, which include the definition of the organisational strategy. Management accountants collaborate with the organisation’s managers in preparing alternative scenarios and evaluating different possible courses of actions. For example, the management accountants can calculate the cost implications of design choices and factor in the revenue that can be expected from new product attributes (e.g. style, durability, multi-functionality, etc.). With a similar perspective, using ABC and management, the management accountant can provide valuable information with respect to each activity’s added value. A strategic view will be required to evaluate the activities’ respective added value, provided that an activity can be equally valuable or wasteful according to its contribution to the firm’s fulfilment of its strategic goals. For example, an activity aimed at improving the quality of service above and beyond the minimum necessary may be wasteful in a budget airline and highly valuable in a luxury airline.

Management accountants must reflect on the ethical implications of their job, which implies also addressing the question of to whom they respond with their actions and decisions. Management accountants respond to the owners along with many other organisational stakeholders. The social environment of an organisation is much wider than just its owners, employees and customers. Creditors, competitors, other organisations, neighbours and suppliers may be equally affected by the decisions taken in an organisation. For example, manufacturing firms are accountable to the wider community for their contribution to the external environment pollution and safety. All firms are accountable for spreading good commercial practices and providing sound advice to clients in a way that contributes to the overall economic system’s stability. Universities can be held accountable by students, parents and the wider scientific, business and social communities. Hospitals are subject to the concerns of patients, their relatives, the professional associations of doctors, the government’s drug regulators, etc. Overall, these concerns go under the name of corporate social responsibility and constitute a pillar of contemporary firms’ strategies for survival and success.

Typically, production engineers and marketing managers tend to have different views of where the priorities are and what solutions are most appropriate. Both groups have incentives to depict particular organisational problems in ways that emphasise certain aspects rather than others and will more or less consciously bias the information that they provide to management accountants.

If you reflect on the meaning of the term ‘organisational goals’ you will realise that these are in fact the aggregate of the goals of individual organisational members, which may well be conflicting goals. The implications for the role of management accounting in decision making are profound. When producing management accounting information, should the management accountant factor in that their choices may favour the view of one or another member of the organisation? The management accountant will have to invoke not only their technical abilities but also their ethical principles.
Suggested questions from your textbook


A reminder of your learning outcomes

Having completed this chapter, and the Essential readings and activity, you should be able to:

• distinguish between financial accounting, management accounting and cost accounting
• discuss the importance of the management accounting function for the strategic success of an organisation
• use the value chain framework for classifying and analysing dimensions of performance according to its functions
• discuss the challenges and role of management accountants in an organisation’s decision-making process.

Sample examination questions

1. Explain what differences you would expect to find in the management accounting information of two pharmaceutical firms, of which one (My Drugs Plc) has a strong focus on innovation driven by internal research and the other’s (Their Drugs Plc) business model is to widely distribute drugs invented by other firms. My Drugs Plc invents and produces highly specific drugs for use in hospitals and clinics. Their Drugs Plc searches the market for small producers of generic drugs with high market potential to be distributed to the wide market. Both My Drugs Plc and Their Drugs Plc package the drugs that they sell using their own brands. My Drugs Plc also delivers the drugs to its clients, whereas Their Drugs Plc outsources all deliveries.

2. Explain what makes management accounting strategic.
Chapter 2: Relevant information in decision making

Aim

The aim of this chapter is to lay the foundations of management accounting theory and practice. This chapter will link management accounting concepts and tools to the ‘five-step decision-making process’ presented in Horngren et al. (2014), showing their strategic use in practice. This decision-making process will be used throughout the subject guide. The particular focus of this chapter is on the definition and identification of relevant costs.

Learning outcomes

By the end of this chapter, and having completed the Essential readings and activities, you should be able to:

• apply an effective decision-making process to make decisions
• explain the concept of cost
• identify the categories of sunk and opportunity costs
• distinguish relevant from irrelevant information for decisions.

Essential reading


Further reading


Introduction

Managerial accounting was derived for the purpose of supporting managers in making decisions. Decision-making processes have been introduced in Chapter 1, and in this chapter we will explore the concepts of relevance of both costs and revenues in a decision-making context and how different types of information influence the process.

Managers take decisions at all levels of an organisation. At the highest level, managers define the strategy of their organisation by identifying its ultimate goals and developing long-term plans to achieve them. Implementing such strategies requires managerial control (i.e. the translation of long-term plans into detailed short-term action plans). At an even more detailed level managers must take operational decisions, which entail putting procedures and controls in place. These go under the name of operational control and are aimed at ensuring that the action plans are realised.
Decisions taken at any level may often have strategic relevance. This is more obvious when an organisation is defining strategy, and less obvious when implementing operational procedures. However, the consequences of implementing the wrong procedure may have serious implications for the realisation of an organisation’s strategy. For example, a systematic mistake in the production process may damage the customer’s satisfaction, and may consequently compromise loyalty and damage the entire customer relationship. Alienating customers may well act as an obstruction to the realisation of an organisation’s strategy. As a consequence, a lack of managerial control at an operational level could have a direct impact at a strategic level.

**Activity 2.1**

Reflect on the various roles that you have assumed or you expect to assume when working for an organisation. How do you define the progress in your expected career? Most likely you will refer to the breadth and scope of the decisions that you will be expected to take and how they will affect the organisation.

Now reflect on the amount of information that you will require in order to take informed decisions throughout your career and on the increasing importance for this information to be useable for your decision purposes.

It is important that managers are supported with useable information whether they are defining strategic goals, performing managerial control or setting operational procedures and controls. Management accounting is aimed at providing managers with information that is relevant to their decisions across all these levels. This entails avoiding information deluge (overloading the managers with redundant information) and instead providing meaningful results from the analysis of data. For example, at the highest level of decision making, when managers are considering whether to concentrate the organisation’s presence in a market segment or to abandon it, managerial accounting should provide them with reliable estimates of the current profitability of that segment and a range of its possible variations in the future. More detailed information about every single product, customer or distribution channel may prove redundant.

Furthermore, at the managerial control level, when managers are considering outsourcing the production of a component, management accounting will have to provide them with the actual and opportunity costs, as well as the potential savings which would emerge from such a choice. More details about the variable costs and contribution margin of each product may prove overwhelming and confusing. With another example, managerial control implies checking that each department performs the required activities within their respective budgeted costs and achieving the forecasted revenues; management accounting must provide the managers with the overall costs and revenues per department. The specific cost of each component or the exact number of hours spent in the provision of a service may be redundant.

Finally, at the operational level, information needs to be very specific and match the budget guidelines; for example, when deciding if it is worth purchasing a larger amount of a certain component in order to be entitled to a certain trade discount, or if it is worth making a payment ahead of the negotiated term, in order to be entitled to a cash discount, the manager taking these decisions should be provided with the threshold cost of capital calculated for the organisation. Providing them with a wider wealth of information may render the decision-making process more costly than beneficial.
Decisions that refer to strategic goals and plans are normally taken on an annual basis, but this schedule may be re-considered when relevant internal or external changes occur. Management control is a more frequent and regular process and may follow different cycles (i.e. weekly, monthly, quarterly, annually), according to the type of processes and activities it involves. Operational decisions may occur on a continuous basis as operational control focuses on ensuring that specific tasks are efficiently and effectively performed.

Relevance and value of information

In this context, the question is – how does an organisation identify what information is relevant to the decision making? A useful taxonomy is that of relevant and irrelevant costs and revenues.

Relevant costs and revenues are those future costs and revenues that will be changed by a decision, whereas irrelevant costs and revenues are those that will not be affected by the decision.

(Drury, 2015, p.34)

In this context, ‘changed’ means that costs existing in one option will be (partly or totally) avoidable in the other option and costs that would not exist in one option would emerge in the other. Namely they are: avoidable and emerging costs.

In reality, this straightforward postulation often seems to clash with managerial behaviour. Decision makers are biased by their own past decisions. For example, take the following scenario: a consulting firm has accepted the order of a large consulting project, which requires the use of bespoke software. The firm’s CIO (Chief Information Officer) researches the market and decides to commit substantial resources to the development of the required bespoke software. Add to this scenario that the payment of external developers is done by instalments, which are currently still being paid. Assume, now, that ‘off-the-shelf’ software has become available on the market, its price is substantial and it would require some customisations, but its functionality is much more advanced than the in-house developed software, which enables the consulting firm to be more efficient and reap higher margins from the large consulting project. The CIO is faced with the decision to either keep using the developed bespoke software or scrap it and purchase the ‘off-the-shelf’ alternative. The only relevant information the CIO should consider refers to the future costs and future revenues of either options (i.e. the future margins that the large project can yield by adopting either software). Say that the margins that the firm can obtain from this large consulting project are $1,000,000 if it uses the in-house developed software or $1,300,000 if it adapts and uses the ‘off-the-shelf’ software.

It appears obvious that the CIO should advise the firm to scrap the in-house developed software and purchase and adapt the ‘off-the-shelf’ one.
However, in reality, the CIO is likely to be biased by the fact that such a decision may be perceived in the firm as a failure of the CIO themselves. The fact that instalments for the external developers’ cost are still being paid adds to the difficulty of taking the decision to move on and take the more profitable option. Refer to the following Example 2.1.

Example 2.1 – Relevant costs and revenues

ABC Consulting Plc accepts an order for a market research from DEF New Markets Ltd. This market research requires ABC Consulting Plc to analyse data in a completely novel way, requiring new software. The scenario is as follows:

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price to the client for the results of the research</td>
<td>$1,600,000</td>
</tr>
<tr>
<td>Cost of developing new software in-house</td>
<td>($200,000)</td>
</tr>
<tr>
<td>Costs of employees for analysis of data and producing reports</td>
<td>($400,000)</td>
</tr>
<tr>
<td>Margin</td>
<td>$1,000,000</td>
</tr>
</tbody>
</table>

Upon having developed the new software, but before starting to use it for the analysis of data, ABC Consulting Plc realises that ‘off-the-shelf’ software is available, which enables a more efficient way of analysing data. The scenario changes as follows:

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price to the client for the results of the research</td>
<td>$1,600,000</td>
</tr>
<tr>
<td>Cost of purchasing the new software externally</td>
<td>($250,000)</td>
</tr>
<tr>
<td>Costs of employees for analysis of data and producing reports</td>
<td>($50,000)</td>
</tr>
<tr>
<td>Margin</td>
<td>$1,300,000</td>
</tr>
</tbody>
</table>

The costs that are relevant to this decision are only the costs that refer to the analysis of data, that is $400,000, which is an avoidable cost, and $300,000, which is made of two emerging costs, with a net effect of $100,000 higher margin.

The cost of developing the new software in-house and the revenues are irrelevant to the decision, because they are both committed and will not change whichever option is taken, even though they are not yet respectively paid and received.

The CIO of ABC Consulting Plc will, nevertheless, have to admit that $200,000 have been wasted in the in-house development of software that is not going to be used. In addition they have to ask the firm to commit a further $250,000 to replace that software!

If the switch to the external development is accepted, the new scenario will be as follows:

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price to the client for the results of the research</td>
<td>$1,600,000</td>
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<td>Cost of purchasing the new software externally</td>
<td>($250,000)</td>
</tr>
<tr>
<td>Costs of employees for analysis of data and producing reports</td>
<td>($50,000)</td>
</tr>
<tr>
<td>Margin</td>
<td>$1,100,000</td>
</tr>
</tbody>
</table>

Another dimension must be considered: the volume of production. Relevant costs normally comprise variable costs (i.e. costs that increase when the volume of production increases and decrease when the volume of production decreases) and fixed costs (i.e. costs that do not change in value even though the volume of production changes, within a certain range). The total amount of relevant costs is, therefore, dependent on the predicted volume of production in each of the options considered by the managerial decision.

Look at the next activity to clarify this point.
We have so far referred to outlay costs (i.e. costs which the firm actually incurred or will incur). Of these, only those that can be influenced by a managerial decision are relevant to that decision. Those that cannot be influenced by a managerial decision are irrelevant to that decision. However, there are other costs that will not actually materialise and yet are relevant to the decision-making process. These are opportunity costs.

If we define cost as any decrease in wealth brought about by a decision to use a particular resource or set of resources, by measuring the decrease in wealth by reference to the next best alternative, we are effectively using the economic concept of opportunity cost. Economists define opportunity cost as the benefits foregone by not adopting the next best alternative, where ‘benefits’ can relate to any economic benefit, not only cash. Opportunity costs arise in situations where different scenarios are mutually exclusive and this in turn is determined by certain resources being scarce. If no resources were scarce the decision maker would be able to pursue different courses of action at the same time. Because the courses of action are mutually exclusive and choosing one excludes the possibility of pursuing the other, the benefits forgone by not pursuing that course of action represents an opportunity cost. In this very moment, when you are reading these lines, you could be doing something else. Potentially this something else could give you some other satisfaction or rewards than enhancing your knowledge. The satisfaction or rewards that you are forgoing are an opportunity cost of choosing to read this text and study this course. Hopefully you still believe that the satisfaction and rewards that emerge from studying this course outweigh its opportunity costs!

Activity 2.3
(adapted and expanded from the 2011 subject guide)

A customer offers to buy electrical engines from your company. They are of an old design and a slight modification to its electricity intake is needed to make them work. You have plenty of those old engines in stock and have no prospect of being able to sell them to anyone else. Their scrap value is negligible. Both the workers and the supervisors of your factory are paid fixed monthly salaries. You expect to have some spare production capacity over the coming weeks. The material cost of one old engine was $500. To manufacture the altered design specified in the order, you would have to modify some of your production machinery. An engineer would have to work on it for eight hours and use materials worth $30,000. The customer offers to pay $300 per engine after the alterations have been made.

Is it worth considering this order? What further information do you require to decide whether you should accept the order?

A typical mistake would be to turn the order down because the selling price is lower than the production cost. In fact, the production cost is a sunk cost, hence irrelevant to the decision.

However, $30,000 is an emerging cost, hence relevant to the decision. You should accept the order only if the emerging revenues cover the emerging cost and this happens if the order is in excess of 100 engines. $30,000 / $300 = 100. Before accepting the order you will also have to check that your workers and supervisors have enough spare production capacity available to fulfil the order.
Activity 2.4

Refer to a similar situation as in Activity 2.3. However, this time, the customer offers to buy 100 electrical engines of a current design, again, with a slight modification to its electricity intake. This order would be over and above orders already received so far. Both the workers and the supervisors of your factory are paid fixed monthly salaries. Assume you have just enough spare production capacity over the coming weeks. The material cost of one engine is estimated to be $500. To manufacture the altered design specified in the order, you would have to modify some of your production machinery. An engineer would have to work on it for eight hours and use materials worth $30,000. The customer offers to pay $850 per engine. Your company’s list price for the current design is $880.

Is it worth considering this order? What further information do you require to decide whether you should accept the order?

Feedback on Activity

In this case the emerging costs will be $500 per engine and $30,000 to enable the alterations. Emerging revenues would be the price $850 for the altered engines, times the number of altered engines. But, what about the current price of $880 per current engine? The current price of $880 for a current design engine is irrelevant, if you do not expect to receive further orders. Hence, emerging costs would be ($500 × 100) + $30,000 = $80,000. Emerging revenues would be £850 × 100 = $85,000.

However, if you expect to receive further orders, the current price of $880 for a current design engine becomes relevant. It would be an opportunity cost (i.e. it would measure the lost opportunity to make revenues out of the current design engines, making the offer most certainly not appealing). Why would you forgo $880 for a product that would cost you $500, in order to receive only $850 for a product that would cost you more than $500? The minimum price for accepting this order would be, in this case, $880 + ($30,000 / 100) = $1,180.

Upon completing this and the previous activities, revise the concept of ‘One-Time-Only Special Orders’ in your textbook.

It should be clearer at this point that opportunity costs are relevant to managerial decisions in that they measure the value of forgone margins.

Activity 2.5

Think about the opportunity costs that you incurred by enrolling on the University of London’s International Programmes.

Bases and implications of outsourcing (or ‘build-or-buy’)

A typical situation when relevant costs and revenues are invoked for supporting managerial decisions is when managers consider producing in-house components or services that are currently purchased from suppliers. Managers will have to consider:

- emerging costs of producing in-house (e.g. materials, direct labour hours, consultants, extended capacity, etc.)
- opportunity costs (i.e. forgone margins of any production displaced by the choice of producing in-house those components or services).

On the other hand, if the production is currently made in-house and the managerial decision under consideration is whether to outsource it, managers will have to consider:

- Emerging costs (i.e. costs that will be incurred only if the firm outsources part of the production). These will be variable
(i.e. the price per unit of components that will be paid to the external contractor) and fixed (i.e. the fixed fee required by the contractor to enter in this deal).

- emerging margins (i.e. the difference between emerging revenues and emerging costs caused by the use of the capacity freed by outsourcing part of the production).

A practical guide to identifying relevant costs is given below, with reference to a resource needed if the firm accepts a contract with a customer for a specific project.

### Identifying relevant costs

#### Not yet controlled resource

If the resource is not already controlled by the organisation, then it must be purchased, and the measure of the cost to the organisation is the current purchase price of the resource. For many resources, this current price provides a suitable measure with no need to make adjustments. Problems arise when it is considered appropriate to acquire some resource to undertake a particular action, and the resource in question will provide services over and above those needed for the action under consideration.

For example, in order to accept a contract to manufacture a particular product, it might be necessary to acquire the services of a special machine. The organisation could simply hire the machine for the contract, in which case the cost of the machine is the hire charge. But what if it is decided that the machine should be bought outright, and the organisation intends to use the machine on other contracts, as well as the one under consideration?

In these circumstances, to assign the whole cost of the machine to the particular contract currently under consideration would be misleading, as we would effectively be ‘overcharging’ this contract for the machine and ‘undercharging’ other contracts.

It is necessary in such circumstances to somehow allocate the cost of the machine to the contracts that will benefit from its use. Various techniques for performing such an allocation have been developed, but the methods that are considered to come closest to a rational economic allocation of cost are too advanced to address in this subject guide. A simpler, but still acceptable, method is to calculate the future economic benefits that the machine is still likely to provide to the firm after it has been used for the contract under consideration. This value is very difficult to estimate precisely, however, its residual value (i.e. book value after depreciation) represents the best estimate that accountants can make. This value should be treated as emerging revenue at the end of the contract.

For example, customer Wonder Plc instructs KnowAll Plc to carry out a piece of scientific research, which is likely to last three years. KnowAll Plc needs to purchase a new machine to perform this research. The machine costs $50,000 and is likely to have a useful life of five years. The allocation of cost to the contract with Wonder Plc can be calculated as $30,000, under the assumption that at the end of the research, the machine may be sold for $20,000 or may be used and still provide future economic benefits for approximately at least $20,000.

This technique is based on assumptions, though, which must be tested for strength under each specific circumstance. For example, you may be aware that there is no market for that machine, or that your firm may well still
use it after the contract is fulfilled, but not for its full set of functionalities. The latter circumstance would imply estimating the market price of another less sophisticated machine that would provide your firm with those less sophisticated functionalities for the remaining two years and use that value as the residual value in the contract under consideration. In essence you are trying to address the following question: how much money would my firm have to spend if it will not inherit this machine from the contract under consideration?

**Already controlled resource**

What if the organisation already controls the resource? In this case, we must consider how the resource would be used if the organisation were to reject the action under consideration and were to adopt the next best use for the resource. By undertaking the action, the next best use cannot be undertaken with that particular resource. If there is in fact no next best use for the resource, then the organisation bears no economic cost in using the resource for the action under consideration. This might be the case where the action under consideration makes use of the labour services of employees who would otherwise be paid for doing nothing. However, for most resources, there will be an alternative use. Bear in mind that the next best use for the resource could be to sell it immediately. If the resource is used for the action under consideration, the sales revenue that would otherwise be received will have to be sacrificed. In these circumstances, the opportunity cost of the resource is the net realisable value forgone of the resource.

If there is an alternative use for the resource, then it will be necessary, if the resource is assigned to the action under consideration, to replace the resource to enable the next best alternative to be carried out. Materials that would otherwise be used elsewhere will have to be replaced, and the opportunity cost is therefore the replacement cost of the materials. If labour is transferred from other jobs, it will be necessary to employ replacement labour, so the opportunity cost is the pay due to the replacement workers. So for resources that would have to be replaced, the measure of opportunity cost is current replacement cost.

Further to the above analysis, other more qualitative factors must be considered in an outsourcing decision. These are equally, if not more, important than the quantitative analysis. It is strongly recommended that these qualitative factors are read carefully and reflected upon, which include contractor's reliability, quality of the outsourced production and likely changes in the balance of negotiation power with the contractor in the long run.

**A reminder of your learning outcomes**

Having completed this chapter, and the Essential reading and activities, you should be able to:

- apply an effective decision-making process to make decisions
- explain the concept of cost
- identify the categories of sunk and opportunity costs
- distinguish relevant from irrelevant information for decisions
Sample examination questions

1. Economists advocate that lost opportunities should be factored into the managerial decision process as much as actual costs. Explain, with an example, the concept that lost opportunities should be factored into decision making, with reference to a build-or-buy situation. Please, refer also to the sample examination question of Chapter 3, where the topics of both chapters are embedded in one scenario question.

2. Explain whether each of the following costs is relevant or irrelevant to a build-or-buy decision, assuming that a company is currently producing a product and is considering buying it instead:
   - depreciation of the machine that is currently used for producing the product, assuming that the machine cannot be used in any other way and that, once the production stops, the machine must be scrapped
   - electricity consumption required to use the same machine.
Chapter 3: Decision making with constraints and uncertainty

Aim

The aim of this chapter is to build on the foundations of management accounting theory and practice. In particular, this chapter will focus on analysing and solving situations where a production resource is limited and it must be allocated to different jobs in a way that maximises the benefits of its use.

Learning outcomes

By the end of this chapter, and having completed the Essential reading and activities, you should be able to:

• solve resource allocation problems in situations of capacity constraint and choices between products
• discuss the effects of performance evaluation for managerial control purposes.

Essential reading


Further reading


Introduction

Most managers, most of the time, face situations where a production resource is scarce (i.e. it limits the firm’s capacity to produce enough products or services to satisfy the entire predicted demand for those products or services).

In these situations managers must identify the most effective allocation of that scarce resource. There are two aspects to this managerial decision: the first is maximising the total margin under the current assumptions; the second is adjusting the decision based on consideration of the uncertainty of the initial assumptions and further strategic considerations.

This chapter focuses on techniques aimed at the strategic optimisation of resource allocation, under conditions of uncertainty, and performance evaluation.
Resource allocation, constraint factors

Firms operate using resources that are scarce by definition. If they were not limited and the firm did not have exclusive access to them, they would not be considered assets in the first place from the accounting perspective. In fact, the strategic competitive advantage of a firm is based on having exclusive access to scarce resources.

As a result of this, the amount of resources available for a firm, or to which the firm can have access, dictates its maximum capacity of production. However, the rich variety of resources needed for a firm to operate means that when one is used to its maximum capacity, others will be left with some degree of idle capacity. If the resource that is fully employed is increased, to allow the production to use more of the other resources, chances are that one of the newly increased levels of production will hit a ceiling imposed by the scarcity of another resource. Hence, in a competitive environment (i.e. under the assumption that no one single firm can fulfil the entire market demand of a product or service) it is safe to assume that there is always a scarce factor that caps a firm’s volume of production.

Managers are faced with the decision of how to optimise the use of all available resources in order to maximise the margins. Once again, there are further dimensions to this analysis than its purely quantitative aspects. Typically, these include strategic marketing considerations which indicate that a certain mix of products should be offered to the market, to allow completeness of range or to keep competitors at bay by preventing them from finding a space to enter that market. In other words, the choice of a second best mix of products may be considered as the cost of preserving a firm’s competitive advantage, by reinforcing the barriers to entry of the market where it operates.

Notwithstanding the strategic importance of such considerations, this subject guide focuses on the quantitative side of the analysis.

The logic of quantitative analysis aims at maximising the margins of a product mix under the assumption of a scarce factor so that, if the scarce factor is used at its best, then the overall margins will be maximised. This is known as the theory of constraints (TOC).

An example of this concept is: assume that your firm sells tables and chairs. Also assume that the margin it makes from each table sold is $100 and the margin from each chair sold is $50. Say that there is a capacity constraint that creates a trade-off between the respective amounts of tables and chairs that can be sold. If it were possible to choose freely, anyone would choose to sell tables rather than chairs. However, if the constraint is such that for each table sold the firm must sacrifice the sale of three chairs, the choice would be to prefer chairs. Let us make the example more specific:

- The constraint factor is the container by which tables and chairs are transported to the distribution channels.
- The container can fit 100 tables or 300 chairs, or any combination of the two products where the space freed by removing a table allows three chairs to be stacked in.
- The maximum demand for these products is 70 tables and 240 chairs.

You may feel it appropriate to stack as many tables as possible to fulfil the demand of the higher profitable product, hence yielding 70 × $100 = $7,000 and use the remaining space in the container for chairs. This is the
space of 30 tables (i.e. 90 chairs) bringing your total margin to $7,000 + (90 \times 50) = $11,500.

However, you will soon realise that if you removed one table and added three chairs, you would increase the total margin by $50, as follows: 
\((3 \times 50) – (1 \times 100) = 50\). So, you should repeat this replacing exercise as much as possible (i.e. to the point where you will have fulfilled the demand of chairs).

In more formal terms, you will calculate each product's margin per unit of scarce factor and prefer the product that brings in the highest margin per scarce factor.

<table>
<thead>
<tr>
<th></th>
<th>Margin per unit of product</th>
<th>Use of scarce factor per product*</th>
<th>Margin per unit of scarce factor</th>
<th>Maximum demand**</th>
<th>Optimal mix**</th>
<th>Optimal mix margin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tables</td>
<td>$100</td>
<td>3</td>
<td>$33</td>
<td>70</td>
<td>20</td>
<td>$2,000</td>
</tr>
<tr>
<td>Chairs</td>
<td>$50</td>
<td>1</td>
<td>$50</td>
<td>240</td>
<td>240</td>
<td>$12,000</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$14,000</td>
</tr>
</tbody>
</table>

*measured in units of space (e.g. cubic metres)

**measured in units of products

The strategic marketing considerations mentioned above may, in this case, comprise your customers' purchasing behaviour, whereby they buy chairs and tables in bundles, hence they expect your firm to sell them in packages of, for example, four chairs and one table; or else you are aware that leaving the demand for tables unsatisfied would allow a competitor to enter this market and cause a price competition, which will significantly hinder your position and margins. If the latter is true and a strategic choice is taken to fulfil the demand for tables to keep the barrier to entry, this analysis provides you with the information that the cost of the choice is $14,000 – $11,500 = $2,500. So, the question will be: is it worth forgoing $2,500 for each shipped container to protect the barrier to entry?

Real scenarios may present more than one scarce resource. In this case there are two possible approaches to solving the problem: (i) linear programming and (ii) graphic solution. The only challenge of both approaches is the application of quantitative methods. Refer to the appendix of Chapter 11 of Horngren et al. (2014) for an example. Give particular attention to the fact that these methods are meant to be used to support managerial decisions; hence the results must be considered in the context of the firm's remaining operations and strategy. Some of these considerations can be included in the linear programming by measuring opportunity costs with purposely chosen shadow prices. A shadow price is a purely figurative value attached to an opportunity that is lost when taking a certain decision: the higher the strategic value of such opportunity, the higher the shadow price.

**Uncertainty of information**

All the examples given above assume that the outcomes of decisions are identifiable and defined. In reality we know that decisions may lead to different possible outcomes to each of which we can attach a probability.

There are different ways of dealing with uncertainty. The most straightforward is to calculate expected values. An expected value is the weighted average of the possible outcomes where the weights are their respective probabilities of happening. This method is useful because it
reduces multiple outcomes to one value only and enables you to apply the models of cost analysis mentioned above. On the other hand sometimes this method is counterintuitive. For example, assume that you are in the process of deciding what equipment to take with you in a boat fishing trip according to the expected weather. Assume that you can only take equipment that is suitable for very hot weather or very cold weather. You cannot take both. Finally, assume that you are told that there is a 40 per cent probability that it will be very hot and a 60 per cent probability that it will be very cold. The expected value of this is an average temperature that is not expected to actually be experienced! It would be necessary to consider the (positive or negative) utility attached to each possible outcome (i.e. how bad it would be to be out on the boat with the wrong equipment).

Another technique is referred to as the ‘decision tree analysis’, which is particularly useful when there is a sequence of possible uncertain events, rather than one only.

Read the appendix to Chapter 3 of Horngren et al. (2014). You should reflect on the use of these techniques and the consequences of applying them when evaluating business decisions. For example, ask yourself: ‘what if the negative scenario occurs?’

Performance evaluation

It should now be clearer that these models may have far-reaching implications if applied without due consideration to other consequences of managerial decisions. The likely bias they may create is determined by their rigorous nature, which is often misinterpreted as an all-encompassing characteristic. In other words, because the results of these quantitative models are rationally logical, it is assumed that they are more relevant than a less compelling strategic analysis. This bias is augmented by the indicators of performance applied to evaluate managerial behaviour, when such indicators link managerial incentives to the achievement of quantifiable results.

Put the outsourcing example presented above in the context of a cost-cutting firm, where managers are praised and rewarded for cutting costs. This is likely to be a powerful signal for a manager who spots an opportunity for making substantial saving by outsourcing the production of a certain component or service. On the other hand, there is no hard evidence for the long-term effects of outsourcing.

Similarly, put the scarce resource example presented above in the context of a firm where the top management has clearly signalled that profitable fast expansion is the current main goal. A manager will be inclined to propose the optimal mix of products that delivers the highest margin, for which they will have hard quantitative evidence, rather than considering the long-term effects of allowing a competitor to penetrate that market.

Activity 3.1

In many countries, consulting firms that provide auditing and other consulting services are banned from providing both auditing and other consulting services to the same clients. Reflect on the considerations that a top manager of such a firm should make when faced with the choice of discontinuing a portfolio of consulting services with a client in order to be able to be its auditor. What would be the arguments of the two subordinate managers respectively responsible for audit and non-audit services? How would this social dynamic change if, instead of being organised in audit and non-audit services managers, the firm was organised with account managers, that is to say managers responsible for clients?
Suggested questions from your textbook


A reminder of your learning outcomes

Having completed this chapter, and the Essential readings and activities, you should be able to:

- solve resource allocation problems in situations of capacity constraint and choices between products
- discuss the effects of performance evaluation for managerial control purposes.

Sample examination question

Lillian is an interior designer. Over the last five years she has accepted an ever increasing number of projects and had to reject many good offers because she does not have time to serve all potential clients. Lillian has an assistant, Johanna, who helps with the designing. Her projects are of three types:

Type one – Interior style advice:
- Lillian visits clients at their properties and evaluates with them how to improve their choices of interiors.
- Johanna designs the furnishing and leaves it to the clients to do the orders and supervise installation.

Type two – Full renovation of properties:
- Lillian agrees with the client on the new style of their property.
- Johanna redesigns the internal layout of properties and Lillian supervises the demolition and building work of renovation.
- Johanna designs the furnishing, orders all furniture and supervises its installation.

Type three – Finding suitable properties for development:
- Lillian explores the market for properties that are suitable to be redeveloped.
- Lillian assists the clients on the negotiation and purchasing process.
- Lillian agrees with the client on the new style of their property.
- Johanna redesigns the internal layout of properties and Lillian supervises the demolishing and building work of renovation.
- Johanna designs the furnishing, orders all furniture and supervises its installation.

Type one projects are charged an average of $2,500 to the client and normally take:
- one day of Lillian’s time
- three days of Johanna’s time
- expenses of £500.

Type two projects are charged an average of £22,000 to the client and normally take:
- eight days of Lillian’s time
- six days of Johanna’s time.
• expenses of £2,000.

Type three projects are charged an average of £43,000 to the client and normally take:
• 25 days of Lillian’s time
• five days of Johanna’s time
• expenses of £3,000.

Next year’s market demand for projects is expected to be as follows:
• Type one: 20
• Type two: 20
• Type three: 10.

Assume that the total number of working days in a year are 230 per person and that Lillian does not calculate any salary for herself but Johanna’s cost is included in the expenses mentioned above.

a. Devise the most profitable portfolio of projects, showing calculations and the total margin that your proposed portfolio is expected to achieve.

b. Abigail has similar skills to Lillian and would be happy to join Lillian’s business. She would require a salary of £150,000 (this is the all-inclusive cost for Lillian). Is it worth it for Lillian to hire Abigail?