CENGAGE

COLIN DRURY

7TH EDITION

MANAGEMENT ACCOUNTING FOR BUSINESS

COLIN DRURY

7TH EDITION

MANAGEMENT ACCOUNTING FOR BUSINESS

CENGAGE

Australia • Brazil • Mexico • Singapore • United Kingdom • United States

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s). Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

This is an electronic version of the print textbook. Due to electronic rights restrictions, some third party content may be suppressed. Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. The publisher reserves the right to remove content from this title at any time if subsequent rights restrictions require it. For valuable information on pricing, previous editions, changes to current editions, and alternate formats, please visit www.cengage.com/highered to search by ISBN#, author, title, or keyword for materials in your areas of interest.

Important Notice: Media content referenced within the product description or the product text may not be available in the eBook version.

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s). Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

CENGAGE

Management Accounting for Business,
Seventh Edition
Colin Drury

Publisher: Annabel Ainscow

List Manager: Jenny Grene

Marketing Manager: Sophie Clarke

Content Project Manager: Melissa Beavis

Manufacturing Manager: Eyvett Davis

Typesetter: Lumina Datamatics, Inc.

Text Design: Lumina Datamatics, Inc.

Cover Design: Simon Levy Associates

Cover Image(s): © Kalisson/Thinkstock Photos

© 2019, Colin Drury

ALL RIGHTS RESERVED. No part of this work covered by the copyright herein may be reproduced or distributed in any form or by any means, except as permitted by U.S. copyright law, without the prior written permission of the copyright owner.

For product information and technology assistance, contact us at
emea.info@cengage.com

For permission to use material from this text or product and for permission queries, email **emea.permissions@cengage.com**

British Library Cataloguing-in-Publication Data

A catalogue record for this book is available from the British Library.

ISBN: 978-1-4737-4911-5

Cengage Learning EMEA
Cheriton House, North Way
Andover, Hampshire, SP10 5BE
United Kingdom

Cengage Learning is a leading provider of customized learning solutions with employees residing in nearly 40 different countries and sales in more than 125 countries around the world. Find your local representative at: **www.cengage.co.uk.**

Cengage Learning products are represented in Canada by
Nelson Education, Ltd.

For your course and learning solutions, visit **www.cengage.co.uk.**

Purchase any of our products at your local college store or at our preferred online store **www.cengagebrain.com.**

Printed in China by RR Donnelley
Print Number: 01 Print Year: 2018

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

BRIEF CONTENTS

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

CONTENTS

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

PART TWO INFORMATION FOR DECISION-MAKING 46

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

PREFACE

The aim of this book is to provide an introduction to the theory and practice of management accounting and to emphasize its role in making business decisions. It is intended primarily for students who are not specializing in accounting and are pursuing a one- or two-semester basic management accounting course. The more advanced technical aspects that are required by specialist accounting students are not covered. These topics are examined in the author's successful *Management and Cost Accounting*, the tenth edition of which is also published by Cengage EMEA.

Feedback from lecturers in a large number of universities indicated that they had found the content, structure and presentation of *Management and Cost Accounting* extremely satisfactory and most appropriate for accounting students pursuing a 2-year management accounting course. They also indicated that there was a need for a book (based on *Management and Cost Accounting*) for students on shorter courses. This book is particularly suitable for students not specializing in accounting, studying management accounting on the following courses:

- a first-level management accounting course for undergraduate students
- higher national diploma in business and finance
- postgraduate introductory management accounting courses.

An introductory course in financial accounting is not a prerequisite, although many students will have undertaken such a course.

STRUCTURE AND PLAN OF THE BOOK

In writing this book I have adopted the same structure and included much of the introductory content of *Management and Cost Accounting*. The major theme is that different information is required for different purposes. The framework is based on the principle that there are three ways of constructing accounting information. One is conventional cost accounting with its emphasis on producing product costs for allocating costs between cost of goods sold and inventories to meet external and internal financial accounting inventory valuation and profit measurement requirements. The second is the notion of decision-relevant costs with the emphasis on providing information to help managers make good decisions. The third is responsibility accounting, cost control and performance management, which focuses on both financial and non-financial information, in particular the assignment of cost and revenues to responsibility centres. This book focuses mainly on the second and third of the above purposes. Less emphasis is given to conventional cost accounting because an in-depth understanding of this topic is not essential for those students who are not specializing in accounting.

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

This book consists of 16 chapters divided into five parts. Part One consists of two chapters and provides an introduction to management and cost accounting and a framework for studying the remaining chapters. Part Two consists of four chapters and is entitled 'Information for decision-making'. Here the focus is on measuring and identifying those costs that are relevant for different types of decisions. The title of Part Three is 'Cost assignment'. It consists of two chapters that provide an explanation of how costs are accumulated and assigned to cost objects, such as products or services. In particular, alternative approaches that can be used for measuring resources consumed by cost objects and the factors that should be considered in determining the sophistication of the cost accumulation system are described.

Part Four consists of five chapters and is entitled 'Information for planning, control and performance measurement'. This part concentrates on the process of translating organizational goals and objectives into specific activities and the resources that are required, via the short-term (budgeting) and long-term panning processes, to achieve the goals and objectives. In addition, the management control systems that organizations use are described and the role that management accounting control systems play within the overall control process is examined. The emphasis here is on the accounting process as a means of providing information to help managers control the activities for which they are responsible. Performance measurement and evaluation within different segments of the organization are also examined. The title of Part Five is 'Strategic performance and cost management and challenges for the future'. It consists of three chapters. The first chapter focuses on strategic performance management, the second on strategic cost management and value creation. The third chapter concentrates on the emerging issues that are likely to have an impact on management accounting and considers some potential future developments in management accounting.

MAJOR CHANGES IN THE CONTENT OF THE SEVENTH EDITION

The feedback relating to the structure and content of the previous editions has been extremely favourable and therefore no major changes have been made to the existing structure. The major objective in writing the seventh edition has been to produce a less complex and more accessible text and to incorporate recent development in the management accounting literature. This objective created the need to thoroughly review the entire content of the sixth edition and to rewrite, simplify and improve the presentation of much of the existing material. Many of the chapters have been rewritten and some new material has been added (e.g. environmental and sustainability issues, ethical considerations and the impact of the emergence of the knowledge base economy). In addition a new chapter (Challenges for the future) has been added that focuses on the emerging issues that are likely to have an impact on management accounting and considers some potential future developments in management accounting. The end result has been an extensive rewrite of the text.

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

Learning notes

In order to meet the different requirements of readers and different course curriculum, various topics are included as learning notes that can be accessed by students and lecturers on the digital support resources accompanying this book.

The learning notes relate to either specific topics that may be only applicable to the curriculum for a minority of the readers, or a discussion of topics where more complex issues are involved that not all readers may wish to pursue. All learning notes are appropriately cross-referenced within the text to the digital support resources. For example, at appropriate points within specific chapters the reader's attention is drawn to the fact that, for a particular topic, more complex issues exist and that a discussion of these issues can be found by referring to a specific learning note on the digital support resources accompanying this book.

Case studies

Case studies are available on the dedicated digital support resources for this book. Both lecturers and students can download these case studies from the digital support resources. Teaching notes for the case studies are only available for lecturers to download. The cases generally cover the content of several chapters and contain questions to which there is no ideal answer. They are intended to encourage independent thought and initiative and to relate and apply your understanding of the content of this book in more uncertain situations. They are also intended to develop your critical thinking and analytical skills.

International focus

The book has now become an established text in many different countries throughout the world. Because of this a more international focus has been adopted. A major feature is the presentation of boxed exhibits of surveys and practical applications of management accounting in companies in many different countries. To simplify the presentation, however, the UK pound monetary unit has been mostly used throughout the book, although examples of the euro, dollar and rand can be found in the assessment material at the end of each chapter. Most of the assessment material incorporates questions set within a UK context. These questions, however, are appropriate for worldwide use and contain the beneficial features described above for case study assignments.

Assessment material

Throughout this book I have kept the illustrations simple. You can check your understanding of each chapter by answering the review questions. Each review question is followed by page numbers within parentheses that indicate where in the text the answers to specific review questions can be found. More complex review problems are also set at the end of each chapter and within the digital online resources to enable students to pursue certain topics in more depth. Fully worked solutions to the review problems within the text are provided in a separate section at the end of the book.

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

SUPPLEMENTARY MATERIAL

The seventh edition of Colin Drury's *Management Accounting for Business* text is accompanied by the following dedicated digital support resources:

- Dedicated instructor resources only available to lecturers, who can register for access either at login.cengage.com or by speaking to their local Cengage representative.
- Cengage's MindTap helps students master the material. Dedicated content creates a learning path designed by the instructor to guide students through the course and focus on what's important. Instructors can find out more about accessing MindTap by speaking to their local Cengage representative.
- Cengage's Aplia, an online homework solution dedicated to improving learning by increasing student effort and engagement is embedded in the MindTap.

DEDICATED INSTRUCTOR RESOURCES

This includes the following resources for lecturers:

- Instructor's Manual with instructor's additional review problems
- Testbank provides approximately 500 extra questions and answers
- PowerPoint slides to use in your teaching
- Case Studies (internationally focused)
- Teaching Notes to accompany the Case Studies
- Downloadable figures and tables from the book to use in your teaching
- Quizzes
- Extra Real World Views
- Outline Solutions to all Real World View Questions
- Learning Notes (relating either to specific topics that may only be applicable to the curriculum for a minority of readers, or a discussion of topics where more complex issues are involved)
- Glossary
- Accounting and Finance definitions (handy introductions to Accounting and Finance techniques, disciplines and concepts)
- Guide to Excel
- Useful weblinks (links to the main accounting firms, magazines, journals, careers and job search pages)

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

MINDTAP

MindTap is a fully online digital learning platform of Cengage content, assignments and services that engages students with interactivity while also offering the lecturer choice in the configuration of coursework and enhancement of the curriculum via complimentary Web apps known as MindApps.

MindApps range from ReadSpeaker (which reads the text out loud to students), to ConnectYard (allowing the lecturer to create digital "yards" through social media).

APLIA

Cengage's Aplia is a fully tailored online homework solution embedded in the MindTap and dedicated to improving learning by increasing student effort and engagement. Aplia has been used by more than 1 million students at over 1300 institutions worldwide, and offers automatically graded assignments and detailed explanations for every question, to help students stay focused, alert and thinking critically.

ACKNOWLEDGEMENTS

I am indebted to many individuals for their ideas and assistance in preparing this and previous editions of the book. In particular, I would like to thank the following who have provided material for inclusion in the text and the book's accompanying digital support resources or who have commented on this and earlier editions of the book:

Magdy Abdel-Kader, University of Essex
Tony Abdoush, Bournemouth University
John Ahwere-Bafo, Royal Holloway, University of London
Karen Boyd, Newcastle University
Alison Broughton, Middlesex University
Anthony Atkinson, University of Waterloo
Stan Brignall, Aston Business School
Jose Manuel de Matos Carvalho, ISCA de Coimbra
Gin Chong, Southampton Institute
Peter Clarke, University College Dublin
Wayne Fiddler, University of Huddersfield
Ian G Fisher, John Moores University
Lin Fitzgerald, Loughborough University Business School
John Ford, Gordon Institute of Business Science, University of Pretoria
Keith Gainsley, Sheffield Hallam University
Olive Gardiner, Fife College
Alicia Gazely, Nottingham Trent University
Richard Grey, University of Strathclyde
David Grinton, University of Brighton
Antony Head, Sheffield Hallam University
Yu-Lin Hsu, University of Strathclyde
Lise Hunter, University of Plymouth

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

Mike Johnson, University of Dundee
Mohammed Sulaiman Hassan Kasbar, Queen Mary University of London
Michel Lebas, Groupe HEC
Pik Liew, London School of Economics
Kevan Lyons, University of New York in Prague
Phillip McCosker, University College, Worcester
Bhagwan Moorjani, University of Westminster
Ellertone Ndalama, University of Warwick
Lorenzo Neri, Queen Mary University of London
Peter Nordgaard Hansen, Copenhagen Business School
Deryl Northcott, Auckland University of Technology
Rona O'Brien, Sheffield Hallam University
Dan Otzen, Copenhagen Business School
Graham Parker, Kingston University
Breggie Van Der Poll, UNISA
Tony Rayman, University of Bradford
Jayne Rastrick, Sheffield Hallam University
Carsten Rohde, Copenhagen Business School
Robin Roslender, University of Stirling
George Sarpong, Nelson Mandela University
John Shank, The Amos Tuck School of Business, Dartmouth College
Helen Smith, Abertay University
Torkel Strömsten, Stockholm School of Economics
Mike Tayles, University of Hull
Chandres Tejura, University of North London
Ed Tew, University of Winchester
René Thamm, Technische Universität Dresden
Eric Tonner, Glasgow Caledonian Univeristy
Ben Ukaegbu, London Metropolitan University
Franco Visani, University of Bologna
John Williams, Rhodes University
Richard Wilson, M.S. Loughborough University Business School
Laura Zoni, Bocconi University
Nasiru Zubairu, University of Plymouth

I am also indebted to Martin Quinn for providing the new real world views that have been added to the seventh edition as well as Jenny Grene, Hannah Close, Sue Povey and Sophie Clarke at Cengage for their valuable publishing advice, support and assistance. My appreciation goes also to the Chartered Institute of Management Accountants, the Chartered Association of Certified Accountants, the Institute of Chartered Accountants in England and Wales, and the Association of Accounting Technicians for permission to reproduce examination questions. The answers in the text and accompanying website are my own and are in no way the approved solutions of the above professional bodies.

Finally, and most importantly I would like to thank my wife, Bronwen, for converting the original manuscript of the earlier editions into final typewritten form and for her continued help and support throughout the seven editions of this book.

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

ABOUT THE AUTHOR

Colin Drury was employed at Huddersfield University from 1970 until his retirement in 2004. He was awarded the title of professor in 1988 and emeritus professor in 2004. Colin is the author of three books published by Cengage: *Management and Cost Accounting*, which is Europe's bestselling management accounting textbook, *Management Accounting for Business* and *Cost and Management Accounting*. Colin has also been an active researcher and has published approximately 100 articles in professional and academic journals. In recognition for his contribution to accounting education and research, Colin was given a lifetime achievement award by the British Accounting Association in 2009.

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s). Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

LIST OF FIGURES

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

REAL WORLD VIEWS

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

CENGAGE

Teaching & Learning Support Resources

Cengage's peer reviewed content for higher and further education courses is accompanied by a range of digital teaching and learning support resources. The resources are carefully tailored to the specific needs of the instructor, student and the course. Examples of the kind of resources provided include:

- A password protected area for instructors with, for example, a testbank, PowerPoint slides and an instructor's manual.
- An open-access area for students including, for example, useful weblinks and glossary terms.

Lecturers: to discover the dedicated lecturer digital support resources accompanying this textbook please register here for access: login.cengage.com.

Students: to discover the dedicated student digital support resources accompanying this textbook, please search for **Management Accounting for Business** on: cengagebrain.com.

BE UNSTOPPABLE

Learn more at cengage.co.uk/education

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s). Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

MINDTAP
From Cengage

Fit your coursework into your hectic life.

Make the most of your time by learning your way. Access the resources you need to succeed wherever, whenever.

Study with interactive tools and resources designed to help you master key concepts and prepare you for class.

Review your current course grade and compare your progress with your peers.

Get the free MindTap Mobile App and learn wherever you are.

Break Limitations. Create your own potential, and be unstoppable with MindTap.

MINDTAP. POWERED BY YOU.

cengage.co.uk/education/Mindtap

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s). Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

PART ONE

INTRODUCTION TO MANAGEMENT AND COST ACCOUNTING

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

1 Introduction to management accounting

2 An introduction to cost terms and concepts

The objective of this section is to provide an introduction to management and cost accounting. In Chapter 1 we define accounting and distinguish between financial, management and cost accounting. This is followed by an examination of the role of management accounting in providing information to managers for decision-making, planning, control and performance measurement. We also consider the important changes that have taken place in the business environment. As you progress through the book you will learn how these changes have influenced management accounting systems. In Chapter 2 the basic cost terms and concepts that are used in the cost and management accounting literature are described.

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

1 INTRODUCTION TO MANAGEMENT ACCOUNTING

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

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

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

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

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

During the past two decades many organizations in both the manufacturing and service sectors have faced dramatic changes in their business environment. Deregulation and extensive competition from overseas companies in domestic markets has resulted in a situation where most companies now operate in a highly competitive global market. At the same time there has been a significant reduction in product life cycles arising from technological innovations and the need to meet increasingly discriminating customer demands. To succeed in today's highly competitive environment, companies have made

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s). Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

customer satisfaction an overriding priority. They have also adopted new management approaches and manufacturing companies have changed their manufacturing systems and invested in new technologies. These changes have had a significant influence on management accounting systems.

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

THE USERS OF ACCOUNTING INFORMATION

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

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

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

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

of undertaking specific activities so that decisions can be made as to which activities will be undertaken and the resources that must be raised to finance them.

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

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

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

It is possible to distinguish between two branches of accounting, which reflect the internal and external users of accounting information. **Management accounting** is concerned with the provision of information to people within the organization to help them make better decisions and improve the efficiency and effectiveness of existing operations, whereas **financial accounting** is concerned with the provision of information to external parties outside the organization. Thus, management accounting could be called internal reporting and financial accounting could be called external reporting. This book concentrates on management accounting.

DIFFERENCES BETWEEN MANAGEMENT ACCOUNTING AND FINANCIAL ACCOUNTING

The major differences between these two branches of accounting are:

- *Legal requirements.* There is a statutory requirement for limited companies to produce annual financial accounts, regardless of whether or not management regards this information as useful. Management accounting, by contrast, is entirely optional and information should be produced only if it is considered that the benefits it offers management exceed the cost of collecting it.
- *Focus on individual parts or segments of the business.* Financial accounting reports describe the whole of the business, whereas management accounting focuses on small parts of the organization; for example, the cost and profitability of products, services, departments, customers and activities.
- *Generally accepted accounting principles.* Financial accounting statements must be prepared to conform with the legal requirements and the generally accepted accounting principles established by the regulatory bodies such as the International Financial Reporting Standards Board. These requirements are essential to ensure uniformity and consistency, which make intercompany and historical comparisons possible. Financial accounting data should be verifiable and objective. In contrast, management accountants are not required to adhere to generally accepted accounting principles when providing managerial information for internal purposes. Instead, the focus is on serving the management's needs and providing information that is useful to managers when they are carrying out their decision-making, planning and control functions.

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s). Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

- *Time dimension.* Financial accounting reports what has happened in the past in an organization, whereas management accounting is concerned with *future* information as well as past information. Decisions are concerned with *future* events and management, therefore require details of expected *future* costs and revenues.
- *Report frequency and less emphasis on precision.* A detailed set of financial accounts is published annually and less detailed accounts are published semi-annually. Management usually requires information more quickly than this if it is to act on it. Managers are often more concerned with timeliness than precision. They prefer a good estimate now rather than a precise answer much later. Consequently, management accounting reports on various activities may be prepared at daily, weekly or monthly intervals.

THE DECISION-MAKING, PLANNING AND CONTROL PROCESS

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

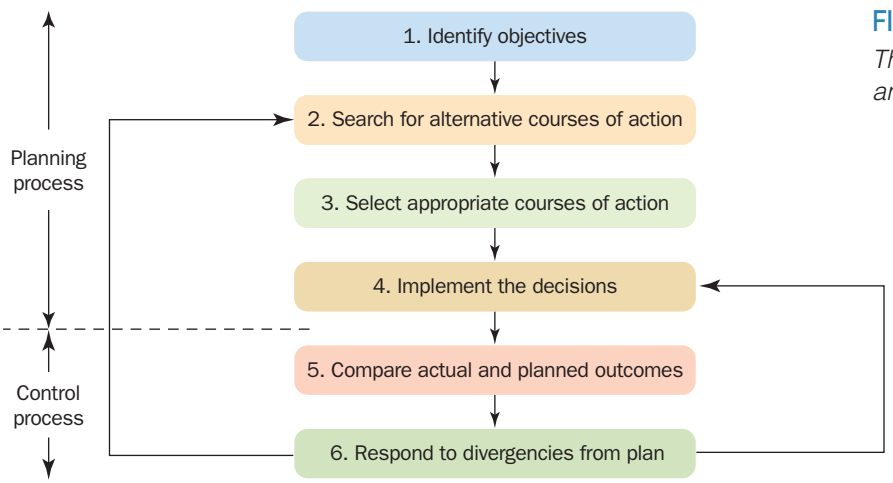


FIGURE 1.1
The decision-making, planning and control process

Identifying objectives

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

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s). Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

This is an area where there is considerable controversy. Economic theory normally assumes that firms seek to maximize profits for the owners of the firm or, more precisely, the maximization of shareholders' wealth. Some writers (e.g. Simon, 1959) believe that many managers are content to find a plan that provides satisfactory profits rather than to maximize profits. Clearly it is too simplistic to say that the only objective of a business firm is to maximize profits. Some managers seek to establish a power base and build an empire. Another common goal is security, and the removal of uncertainty regarding the future may override the pure profit motive. Organizations may also pursue more specific objectives, such as producing high quality products or being the market leader within a particular market segment. Nevertheless, the view adopted in this book is that, *broadly*, firms seek to maximize future profits. There are two reasons for us to concentrate on this objective:

1. It is unlikely that any other objective is as widely applicable in measuring the ability of the organization to survive in the future.
2. It is unlikely that maximizing future profits can be realized in practice, but by establishing the principles necessary to achieve this objective you will learn how accounting information can highlight how profits can be increased.

The search for alternative courses of action

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

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

The search for alternative courses of action involves the acquisition of information concerning future opportunities and environments; it is the most difficult and important stage of the decision-making process. We shall examine this search process in more detail in Chapter 9.

Select appropriate alternative courses of action

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

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

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s). Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

The alternatives should be evaluated to identify which course of action best satisfies the objectives of an organization. The selection of the most advantageous alternative is central to the whole decision-making process and the provision of information that facilitates this choice is one of the major functions of management accounting. These aspects of management accounting are examined in Chapters 3–6.

Implement the decisions

Once the course of action has been selected, it should be implemented as part of the budgeting and long-term planning process. The **budget** is a financial plan for implementing the decisions that management has made. The budgets for all of the various decisions a company takes are expressed in terms of cash inflows and outflows, and sales revenues and expenses. These budgets are initially prepared at the departmental/responsibility centre level (i.e. a unit or department within an organization for whose performance a manager is held responsible) and merged together into a single unifying statement for the organization as a whole that specifies the organization's expectations for future periods. This statement is known as a **master budget** and consists of budgeted profit and cash flow statements. The budgeting process communicates to everyone in the organization the part that they are expected to play in implementing management's decisions. We shall examine the budgeting process in Chapter 9.

Comparing actual and planned outcomes and responding to divergencies from plan

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

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

The process of taking corrective action or modifying the plans if the comparisons indicate that actual outcomes do not conform to planned outcomes, is indicated by the arrowed lines in Figure 1.1 linking stages 6 and 4 and 6 and 2. These arrowed lines represent 'feedback loops'. They signify that the process is dynamic and stress the interdependencies between the various stages in the process. The feedback loop between stages 6 and 2 indicates that the plans should be regularly reviewed, and if they are no longer attainable then alternative courses of action must be considered for achieving the organization's objectives. The second loop stresses the corrective action taken so that actual outcomes conform to planned outcomes. Chapters 9–11 focus on the planning and control process.

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

REAL WORLD VIEWS 1.1

What is management accounting?

Management accounting is the sourcing, analysis, communication and use of decision-relevant financial and non-financial information to generate and preserve value for organizations.

Management accounting combines accounting, finance and management with the business skills and techniques you'll need to add real value to any organization. Management accountants are qualified to work across the business, not just in finance, advising managers on the financial implications of big decisions, formulating business strategy and monitoring risk – much more than just crunching numbers.

Management accountants use information of all kinds, not just financial, to lead and inform business strategy and drive sustainable success. As a Chartered Global Management Accountant (CGMA), you will use this information to develop dynamic solutions to improve business.

CGMAs work in all areas of business, in all types of organizations in both the public and private sectors, all over the world. They work in finance, IT, marketing, HR, operations and senior management positions. They could be project managers, management consultants, finance directors or chief executives, and many go on to run their own business.

Question

1 How can management accounting be of assistance in an organization in which you are familiar?

Source

Extracted from the website of Chartered Institute of Management Accountants (www.cimaglobal.com/Starting-CIMA/Why-CIMA/what-is-management-accounting)

THE IMPACT OF THE CHANGING BUSINESS ENVIRONMENT ON MANAGEMENT ACCOUNTING

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

Global competition

During the last few decades reductions in tariffs and duties on imports and exports, and dramatic improvements in transportation and communication systems, have resulted in many firms operating in a global market. Prior to this, many organizations operated in a protected competitive environment. Barriers of communication and geographical distance, and sometimes protected markets, limited the ability of overseas companies to compete in domestic markets. There was little incentive for firms to maximize efficiency and improve management practices, or to minimize costs, as cost increases could often be passed on to customers. During the 1990s, however, organizations began to encounter severe competition from overseas competitors that offered high quality products at low prices. Manufacturing companies can now establish global networks for acquiring raw materials and distributing goods overseas, and service organizations can communicate with overseas offices instantaneously using internet and digital technologies. These changes

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s). Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

have enabled competitors to gain access to domestic markets throughout the world. Nowadays, organizations have to compete against the best companies in the world. This new competitive environment has increased the demand for information relating to quality and customer satisfaction, and cost information relating to cost management and profitability analysis by product/service lines and geographical locations.

Changing product life cycles

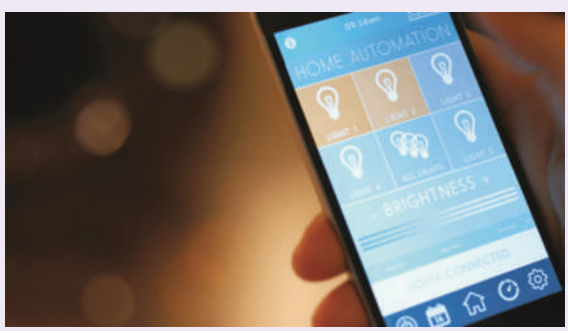
A **product's life cycle** is the period of time from initial expenditure on research and development to the time at which support to customers is withdrawn. Intensive global competition and technological innovation, combined with increasingly discriminating and sophisticated customer demands, have resulted in a dramatic decline in product life cycles. To be successful, companies must now speed up the rate at which they introduce new products to the market, and constantly develop new products and services. Being later to the market than the competitors with the introduction of new products can have a dramatic effect on product profitability.

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

REAL WORLD VIEWS 1.2

The Internet of things – new products and services

The Internet of things (IoT) refers to an ever-growing network of physical objects which are connected to the Internet. This includes household devices and many business and industrial applications. Take the example of lighting. For domestic use, companies such as TP Link offer smart bulbs which can be switched on and off via an app. A set on and off time is also possible and the user can monitor their power consumption. On an industrial scale, companies like Phillips offer smart lighting solutions to cities. These systems use analysis software, and through dashboards provide an overview of connected lighting systems which can be monitored, dimmed or switched on/off as required. In Buenos Aires, Argentina, such a system provided by Phillips reduced energy costs by 50% saving almost 24 000 tons of CO_2.



Question

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

Source

For more detail on smart lighting in Buenos Aires, see www.lighting.philips.com/main/inspiration/smart-cities/smart-cities-initiative/buenos-aires-smart-street-lighting and www.tp-link.com/uk for more detail on smart bulbs and plugs for the home.

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s). Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

Advances in manufacturing technologies

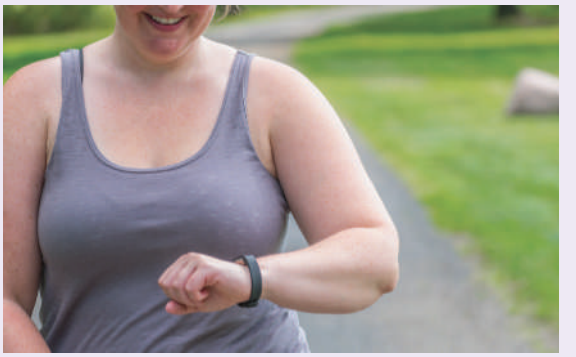
Excellence in manufacturing can provide a competitive weapon to compete in sophisticated worldwide markets. In order to compete effectively, companies must be capable of manufacturing innovative products of high quality at a low cost, and also provide a first-class customer service. At the same time,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

REAL WORLD VIEWS 1.3

Medical devices in your hand, and at a low price

Devices such as heart monitors and blood pressure monitors have been traditionally the realm of hospitals and medical practices. In recent years however an increasing array of devices and apps have become available to end consumers. Such devices are quite effective and relatively low cost.

The availability of such devices, while possibly having health benefits for the end-consumer, is a challenge for medical device manufacturers. The price of medical equipment for hospital use is difficult to obtain publically, but to give an example a Phillips Intellivue portable heart monitor sells for about $2000–4000 second-hand on eBay. This would suggest a much higher price for a brand new device. Contrast this with an app called 'Instant Heart Rate' by Azumio Inc. which can be installed and used on a smartphone for free. The app uses the phone camera lens to detect minute changes in skin colour as the blood flows through the fingertip. Another example is a Fitbit (see fitbit.com) or similar wearable device. A Fitbit costing €120–150 can measure heart rate and cardio-fitness levels for example, to a reasonable level of accuracy. Or to give yet another example, a portable and accurate ECG machine by manufacturer OMRON can be purchased for a little over £200. Added to this, apps like 'Instant Heart Rate' and the Fitbit type devices also come with various analytical tools which provide the user with trends over time. This is something which is arguably an advantage over devices used only in hospitals, and can contribute vastly to preventative medicine.



Questions

1 Do you think the costs of manufacturing a smart phone or wearable item which can be used as a consumer medical device are more or less than the costs of a specialized medical device?
2 How do you think the type of technologies mentioned above affect the manufacturers of specialized medical devices?

Source

Price of OMRON ECG at www.mistrymedical.com/item/3119/omron-heartscan-ecg-machine-without-software--hcg-801-e-

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s). Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

The impact of information technology

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

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

Environmental and sustainability issues

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

Customers are no longer satisfied if companies simply comply with the legal requirements of undertaking their activities. They expect company managers to be more proactive in terms of their social responsibility, safety and environmental issues. Environmental management accounting is becoming increasingly important in many organizations. There are several reasons for this. First, environmental costs can be large for some industrial sectors. Second, regulatory requirements involving huge fines for non-compliance have increased significantly over the past decade. Therefore, selecting the least costly method of compliance has become a major objective. Third, society is demanding that companies focus on being more environmentally friendly. Companies are finding that becoming a good social citizen and being environmentally responsible improves their image and enhances their ability to sell their products and services.

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

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

Pressures to adopt higher standards of ethical behaviour

Earlier in this chapter it was suggested that management accounting practices were developed to provide information that assists managers to maximize future profits. It was, however, pointed out that it is too simplistic to assume that the only objective of a business firm is to maximize profits. The profit maximization objective should be constrained by the need for firms to also give high priority to their social responsibilities and ensure that their employees adopt high standards of **ethical behaviour**. A code of ethics has now become an essential part of corporate culture.

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

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

Deregulation and privatization

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

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

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

Focus on value creation

There is now an increasing recognition that management accounting needs to place greater emphasis on creating value rather than an overemphasis on managing and recording costs. Reducing cost is still important because it enables a company to remain competitive by reducing or maintaining selling prices and thus increasing customer value. You will see in Chapter 15 that recent developments have resulted in management accounting distinguishing between value-added and non-value-added activities with the former representing those activities that the customers perceive as adding value to the product or service and the latter adding costs but no value. Cost management seeks to eliminate or reduce non-value-added activities and to identify ways of performing the value-added activities in such a way that they enhance the value to the product or service.

Recently increasing attention has been given to the importance of **intellectual capital** (also known as intangible assets) arising from the observed dramatic differences between the book and market values of many companies, particularly the dotcom companies in the late 1990s. Examples of items that represent intellectual capital include resources such as the organization's reputation, the morale of its staff, customer satisfaction, knowledge and skills of employees, established relationships with suppliers, etc. It is important that intangible assets are taken into account in order to assess the value of future business opportunities. This presents a challenge to management accountants as to how to identify, measure and report on the value of intellectual capital.

Customer orientation

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

FOCUS ON CUSTOMER SATISFACTION AND NEW MANAGEMENT APPROACHES

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

Cost efficiency

Keeping costs low and being cost-efficient provide an organization with a strong competitive advantage. Increased competition has also made decision errors due to poor cost information more potentially hazardous to an organization. Many companies have become aware of the need to improve their cost systems so that they can produce more

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

accurate cost information to determine the cost of their products and services, monitor trends in costs over time, pinpoint loss-making activities and analyse profits by products, sales outlets, customers and markets.

Quality

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

Time as a competitive weapon

Organizations are also seeking to increase customer satisfaction by providing a speedier response to customer requests, ensuring 100 per cent on-time delivery and reducing the time taken to develop and bring new products to market. For these reasons management accounting systems now place more emphasis on time-based measures, such as **cycle time**. This is the length of time from start to completion of a product or service. It consists of the sum of processing time, move time, wait time and inspection time. Only processing time adds value to the product, and the remaining activities are **non-value added activities** in the sense that they can be reduced or eliminated without altering the product's service potential to the customer. Organizations are therefore focusing on minimizing cycle time by reducing the time spent on such activities. The management accounting system has an important role to play in this process by identifying and reporting on the time devoted to value added and non-value added activities. Cycle time measures have also become important for service organizations. For example, the time taken to process mortgage loan applications by financial organizations can be considerable, involving substantial non-value added waiting time. Reducing the time to process applications enhances customer satisfaction and creates the potential for increasing sales revenue.

Innovation and continuous improvement

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

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

Organizations are also attempting to enhance customer satisfaction by adopting a philosophy of **continuous improvement**. Traditionally, organizations have sought to study activities and establish standard operating procedures. Management accountants developed systems and measurements that compared actual results with

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

predetermined standards. This process created a climate whereby the predetermined standards represented a target to be achieved and maintained. In today's competitive environment, companies must adopt a philosophy of continuous improvement, an ongoing process that involves a continuous search to reduce costs, eliminate waste and improve the quality and performance of activities that increase customer value or satisfaction. Management accounting supports continuous improvement by identifying opportunities for change and then reporting on the progress of the methods that have been implemented.

Benchmarking is a technique that is increasingly being adopted as a mechanism for achieving continuous improvement. It is a continuous process of measuring a firm's products, services or activities against the other best performing organizations, either

REAL WORLD VIEWS 1.4

Key features of companies pursuing a low cost strategy

The following are examples of companies that pursue a low cost strategy:

- Southwest Airlines
  The airline industry has typically been an industry where profits are hard to come by without charging high ticket prices. Southwest Airlines challenged this concept by marketing itself as a cost leader. Southwest attempts to offer the lowest prices possible by being more efficient than traditional airlines. They minimize the time that their planes spend on the tarmac in order to keep them flying and to keep profits up. They also offer little in the way of additional frills to customers, but pass the cost savings on to them.
- Ikea
  The Swedish furniture retailer Ikea revolutionized the furniture industry by offering cheap but stylish furniture. Ikea is able to keep its prices low by sourcing its products in low-wage countries and by offering a very basic level of service. Ikea does not assemble furniture; customers must collect the furniture in the warehouse and assemble at home themselves, although they can pay extra for delivery. While this is less convenient than traditional retailers, it allows Ikea to offer lower prices that attract customers.

- McDonald's
  The restaurant industry is known for yielding low margins that can make it difficult to compete with a cost leadership marketing strategy. McDonald's has been extremely successful with this strategy by offering basic fast-food meals at low prices. They are able to keep prices low through a division of labour that allows it to hire and train inexperienced employees rather than trained cooks. It also relies on few managers, who typically earn higher wages. These staff savings allow the company to offer its foods for bargain prices

Question

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

Reference

K. Leonard, Examples of Cost Leadership & Strategy Marketing, smallbusiness.chron.com/examples-cost-leadership-strategy-marketing-12259.html

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s). Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

internal or external to the firm. The objective is to ascertain how the processes and activities can be improved. Ideally, benchmarking should involve an external focus on the latest developments, best practice and model examples that can be incorporated within various operations of business organizations. It therefore represents the ideal way of moving forward and achieving high competitive standards.

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

FUNCTIONS OF MANAGEMENT ACCOUNTING

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

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

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

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

The second requirement of a cost and management accounting system is to provide relevant financial information to managers to help them make better decisions. Information is required relating to the profitability of various segments of the business such as products, services, customers and distribution channels, in order to ensure that only profitable activities are undertaken. Information is also required for making resource allocation and product/service mix and discontinuation decisions. In some situations information extracted from the costing system also plays a crucial role in determining selling prices, particularly in markets where customized products and services that do not have readily available market prices are provided.

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

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

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

SUMMARY OF THE CONTENTS OF THIS BOOK

This book is divided into five parts. Part One contains two chapters and provides an introduction to management and cost accounting and a framework for studying the remaining chapters. Part Two consists of four chapters and is titled 'Information for decision-making'. Here the focus is on measuring and identifying those costs that are relevant for different types of decisions. The title of Part Three is 'Cost assignment'. It consists of two chapters that seek to provide an understanding of how costs are accumulated and assigned to cost objects, such

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

as different products or services. In particular, this part describes the alternative approaches that can be used for measuring resources consumed by cost objects and the factors that should be considered in determining the sophistication of the cost accumulation system.

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

Part Five contains three chapters and is titled 'Strategic Performance and Cost Management and Challenges for the Future.' The first chapter focuses on strategic performance management, the second on strategic cost management and value creation and the third chapter discusses the challenges for the future facing management accounting.

SUMMARY

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

- **Distinguish between management accounting and financial accounting**. Management accounting differs from financial accounting in several ways. Management accounting is concerned with the provision of information to internal users to help them make better decisions and improve the efficiency and effectiveness of operations. Financial accounting is concerned with the provision of information to external parties outside the organization. Unlike financial accounting there is no statutory requirement for management accounting to produce financial statements or follow externally imposed rules. Furthermore, management accounting provides information relating to different parts of the business whereas financial accounting reports focus on the whole business. Management accounting also tends to be more future oriented and reports are often published on a daily basis, whereas financial accounting reports are published semi-annually.
- **Identify and describe the elements involved in the decision-making, planning and control process**. The following elements are involved in the decision-making, planning and control process: (a) identify the objectives that will guide the business; (b) search for a range of possible courses of action that might enable the objectives to be achieved; (c) select appropriate alternative courses of action that will enable the objectives to be achieved;

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s). Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

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

- **Justify the view that a major objective of commercial organizations is to broadly seek to maximize future profits**. The reasons for identifying maximizing future profits as a major objective are: (a) it is unlikely that any other objective is as widely applicable in measuring the ability of the organization to survive in the future; (b) although it is unlikely that maximizing future profits can be realized in practice it is still important to establish the principles necessary to achieve this objective; and (c) it enables shareholders as a group in the bargaining coalition to know how much the pursuit of other goals is costing them by indicating the amount of cash distributed among the members of the coalition.
- **Explain the important changes that have taken place in the business environment that have influenced management accounting practice**. The important changes are: (a) globalization of world trade; (b) deregulation in various industries; (c) changing product life cycles; (d) advances in manufacturing and information technologies; (e) focus on environmental and ethical issues: (f) a greater emphasis on value creation, and (g) the need to become more customer driven.
- **Outline and describe the key success factors that directly affect customer satisfaction**. The key success factors are: cost-efficiency, quality, time and innovation and continuous improvement. Keeping costs low and being cost-efficient provides an organization with a strong competitive advantage. Customers also demand high quality products and services and this has resulted in companies making quality a key competitive variable. Organizations are also seeking to increase customer satisfaction by providing a speedier response to customer requests, ensuring 100 per cent on-time delivery and reducing the time taken to bring new products to the market. To be successful companies must be innovative and develop a steady stream of new products and services and have the capability to rapidly adapt to changing customer requirements.
- **Identify and describe the functions of a cost and management accounting system**. A cost and management accounting system should generate information to meet the following requirements: (a) allocate costs between cost of goods sold and inventories for internal and external profit reporting and inventory valuation; (b) provide relevant information to help managers make better decisions; and (c) provide information for planning, control and performance measurement.

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s). Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

KEY TERMS AND CONCEPTS

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

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

Budget A financial plan for implementing management decisions.

Continuous improvement An ongoing search to reduce costs, eliminate waste and improve the quality and performance of activities that increase customer value or satisfaction.

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

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

Cost accounting Accounting concerned with cost accumulation for inventory valuation to meet the requirements of external reporting and internal profit measurement.

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

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

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

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

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

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

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

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

Lean manufacturing systems Systems that seek to reduce waste in manufacturing by implementing just-in-time production systems, focusing on quality, simplifying processes and investing in advanced technologies.

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

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

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

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

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

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

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

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

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

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s). Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

ASSESSMENT MATERIAL

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

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

The dedicated online digital support resources for this book includes over 30 case study problems.

REVIEW QUESTIONS

1.1 Identify and describe the different users of accounting information. *(pp. 5–6)*

1.2 Describe the differences between management accounting and financial accounting. *(pp. 6–7)*

1.3 Explain each of the elements of the decision-making, planning and control process. *(pp. 7–9)*

1.4 Describe what is meant by management by exception. *(p. 9)*

1.5 Explain how the business environment that businesses face has changed over the past decades and discuss how this has had an impact on management accounting. *(pp. 10–15)*

1.6 Describe each of the key success factors that companies should concentrate on to achieve customer satisfaction. *(pp. 15–18)*

1.7 Explain why firms are beginning to concentrate on social responsibility and corporate ethics. *(pp. 13–14)*

1.8 Describe the different functions of management accounting. *(pp. 18–19)*

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s). Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

2
AN INTRODUCTION TO COST TERMS AND CONCEPTS

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

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

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

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

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

COST OBJECTS

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

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

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

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

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

MANUFACTURING, MERCHANDISING AND SERVICE ORGANIZATIONS

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

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

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s). Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

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

DIRECT AND INDIRECT COSTS

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

Direct materials

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

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

Direct labour

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

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

Indirect costs

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

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

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

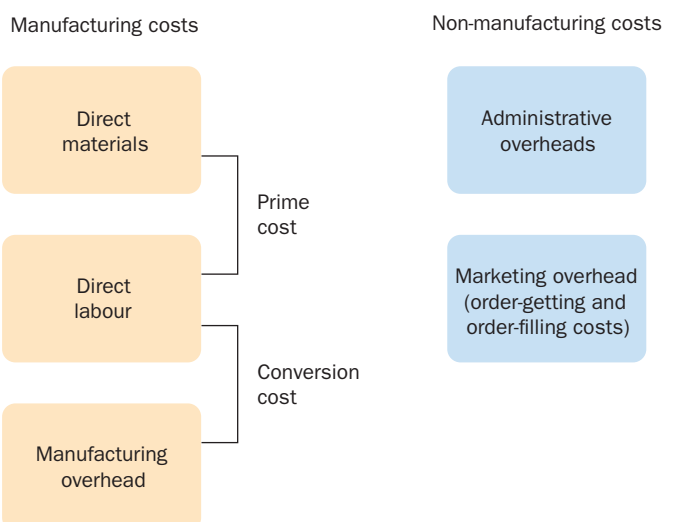


FIGURE 2.1
Manufacturing and non-manufacturing costs

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s). Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

Distinguishing between direct and indirect costs

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

The distinction between direct and indirect costs also depends on the cost object. A cost can be treated as direct for one cost object but indirect in respect of another. If the cost object is the cost of using different distribution channels, then the rental of warehouses and the salaries of storekeepers will be regarded as direct for each distribution channel. Also, consider a supervisor's salary in a maintenance department of a manufacturing company. If the cost object is the maintenance department, then the salary is a direct cost. However, if the cost object is the product, both the warehouse

REAL WORLD VIEWS 2.1

Industry cost structures

Allan Stratton is a cost management consultant with over 35 years of experience, who shares the benefit of his experience providing tools and resources via the Internet. The following information has been extracted from his website relating to one of his updates.

> *Some industries are labour intensive. Others are material or capital intensive. In distribution, regardless of industry, most of the costs are the acquisition of products purchased from manufacturers. The same is true for retail operations like a grocery store, where 70% or more of expenditures go towards the food and merchandise displayed in the stores. In a typical manufacturing organization, half the costs are raw materials or component parts purchased from suppliers. In the capital intensive semiconductor industry half the cost structure is depreciation of the capital investment. Once the investment is made, the depreciation cost is fixed and sunk for the foreseeable future. In a service organization, like a consulting firm or software developer, as much as 75% of the costs can be people and people related (offices, telephones and computers). For a company like Nike that invests heavily in its brand, the largest expenditures are related to marketing, advertising and promotion.*

He concludes that performance management and measurement should differ between industries and reflect the cost structures of those businesses.

Questions

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

References

Stratton, A. (2012) Industry cost structures, *Cost Matters*, 8 February. Available at www.costmatters.com/180-perspective/industry-cost-structures/

Stratton, A. (2013) Beware unit cost traps, *Cost Matters*, 31 January. Available at www.CostMatters.com

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s). Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

rental and the salaries of the storekeepers and the supervisor will be an indirect cost because these costs cannot be specifically identified with the product.

Assigning direct and indirect costs to cost objects

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

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

In this example the surrogate allocation measure is assumed to be a significant determinant of the cost of receiving incoming materials. The process of assigning indirect costs (overheads) and the accuracy of such assignments will be discussed in Chapters 7 and 8 but at this stage you should note that only direct costs can be accurately assigned to cost objects. Therefore, the more direct costs that can be traced to a cost object, the more accurate the cost assignment is.

PERIOD AND PRODUCT COSTS

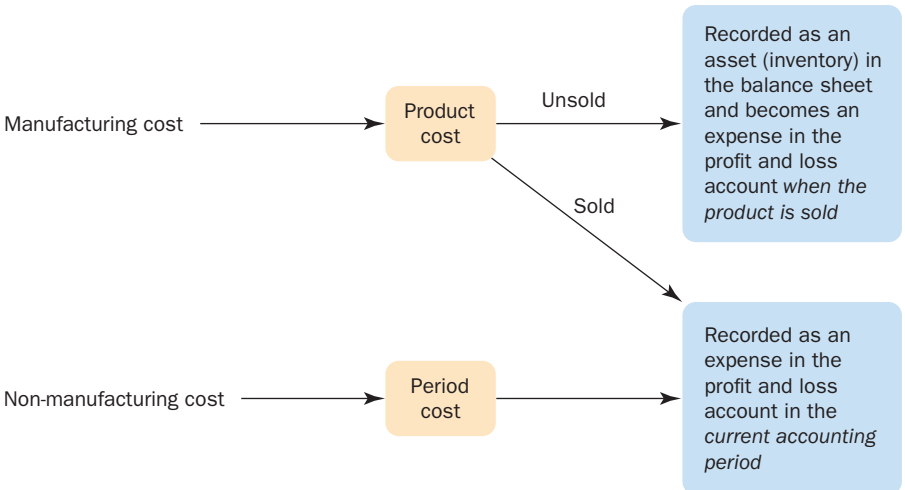
For profit measurement and inventory/stock valuation (i.e. the valuation of completed unsold products and partly completed products or services) purposes it is necessary to classify costs as either product costs or period costs. **Product costs** are those costs that are identified with goods purchased or produced for resale. In a manufacturing organization they are costs that are attached to the product and that are included in the inventory valuation for finished goods, or for partly completed goods (work in progress), until they are sold; they are then recorded as expenses and matched against sales for calculating profit. **Period costs** are those costs that are not specifically related to manufacturing or purchasing a product or providing a service that generates revenues. Therefore they are not included in the inventory valuation and as a result are treated as expenses in the period in which they are incurred. *Hence no attempt is made to attach period costs to products for inventory valuation purposes.*

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

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

FIGURE 2.2

Treatment of period and product costs



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

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

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

EXAMPLE 2.1

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

	(£)	(£)
Manufacturing costs:		
Direct labour	400 000	
Direct materials	200 000	
Manufacturing overheads	200 000	800 000
Non-manufacturing costs		300 000

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

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

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

COST BEHAVIOUR

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

1. How will costs and revenues change if activity is increased (or decreased) by 15 per cent?
2. What will be the impact on profits if we reduce selling price by 10 per cent based on the estimate that this will increase sales volume by 15 per cent?

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s). Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

3 How do the cost and revenues change for a university if the number of students is increased by 5 per cent?

4 How do costs and revenues of a hotel change if a room and meals are provided for two guests for a 3-day stay?

5 How many tickets must be sold for a concert in order to break even?

REAL WORLD VIEWS 2.2

Cost structures in the airline sector

Low-cost carriers such as easyJet and Ryanair offer flights to customers at low prices. Despite this both continued to make good profits. For the year to September 2017, easyJet posted pre-tax profits of £408m and Ryanair €1470m for the year to March 2017. More traditional carriers like British Airways and Air France/KLM, who charge higher fares, reported a profit of £1566m (2016 calendar year) and a loss of €517m ((2017 calendar year) respectively. Why do low-cost carriers continue to do well even though they offer much lower fares? One reason is their cost structures.

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

Traditional carriers like Air France-KLM and British Airways have similar costs to the low-cost carriers – fuel, fleet purchase, maintenance and salaries, etc. – and these too are likely to be fixed. The difference is that these costs are probably at a higher level than low-cost carriers. For example, low-cost carriers typically use one model of aircraft, which reduces maintenance costs and adds buying leverage. Traditional airlines may have some variable costs, e.g. passenger meals. Thus, with overall higher costs, it is more difficult to reduce prices. Of course, even for low-cost carriers, if sales volume is not attainable they cannot match their costs. The demise of Air Berlin in 2016 is a good example. Its sales growth was curtailed by the ongoing postponement of the opening of a new larger airport at Berlin.

Questions

1 Do you agree that the variable cost associated with a passenger can be zero? Can this be said for both low-cost and traditional carriers?

2 What options do more traditional carriers have to improve their fixed cost base?

References

Air France/KLM 2017 Annual Report. Available at www.airfranceklm.com/sites/default/files/124_afklm_consolidated_financial_statement_2017.pdf

British Airway 2016 Annual Report. Available at phx.corporate-ir.net/External.File?item=UGFyZW50SUQ9NjYzMTY0fENoaWxkSUQ9MzcwNDUzfFR5cGU9MQ==&t=1

Easyjet 2017 Annual Report. Available at corporate.easyjet.com/~/media/Files/E/Easyjet/pdf/investors/results-centre/2017/2017-annualreport-and-accounts-v1.pdf

Ryanair 2017 Annual Report. Available at investor.ryanair.com/wp-content/uploads/2017/07/Ryanair-FY2017-Annual-Report.pdf

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s). Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

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

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

Fixed costs remain constant over wide ranges of activity for a specified time period. They are not affected by changes in activity. Examples of fixed costs include depreciation

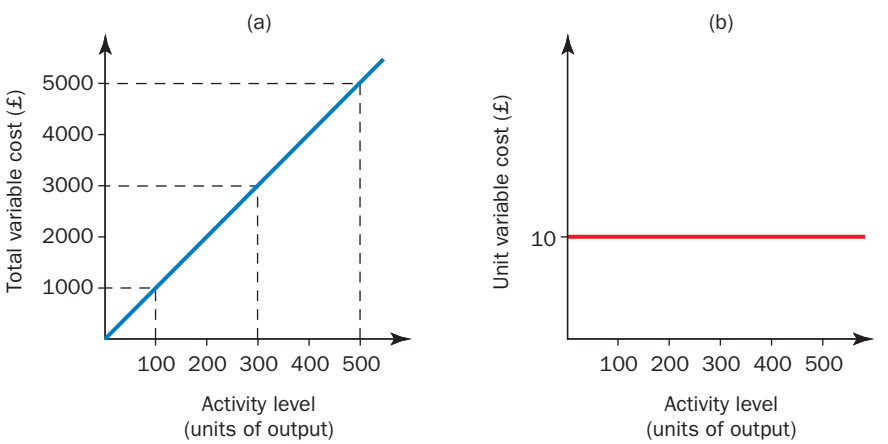


FIGURE 2.3
Variable costs: (a) total; (b) unit

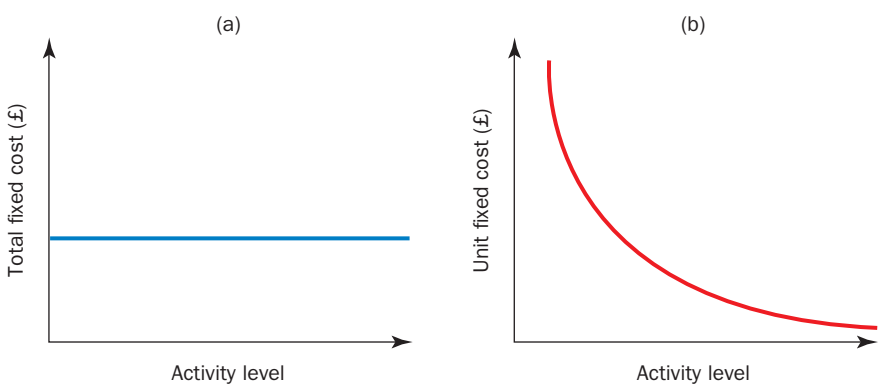


FIGURE 2.4
Fixed costs: (a) total; (b) unit

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

of equipment, property taxes, insurance costs, supervisory salaries and leasing charges for cars used by the sales force. Figure 2.4 illustrates how *total* fixed costs and fixed cost per unit of activity react with changes in activity.

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

Units produced	Fixed cost per unit (£)
1	50 000
10	5 000
100	500
1 000	50

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

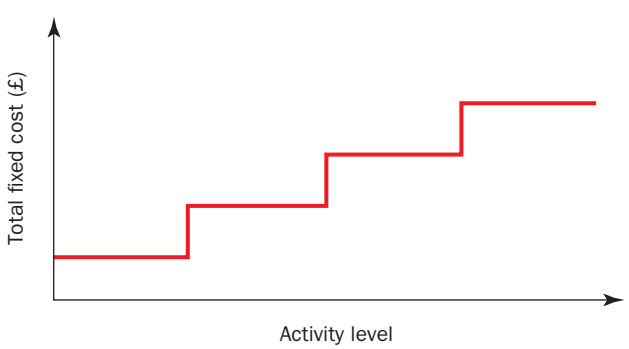
The distinction between fixed and variable costs must be made relative to the time period under consideration. Over a sufficiently long time period of several years, virtually all costs are variable. During such a long period of time, contraction in demand will be accompanied by reductions in virtually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

Spending on some fixed costs, such as direct labour and supervisory salaries, can be adjusted in the short term to reflect changes in activity. For example, if production activity declines significantly then direct workers and supervisors might continue to be employed in the hope that the decline in demand will be temporary; however, if there is no upsurge in demand then staff might eventually be made redundant. If, on the other hand, production capacity expands to some critical level, additional workers might be employed, but the process of recruiting such workers may take several months. Thus within a short-term period, such as 1 year, labour costs can change in response to changes in demand in a manner similar to that depicted in Figure 2.5. Costs that behave in this manner are described as **semi-fixed costs** or **step-fixed costs**. The distinguishing feature of step fixed costs is that within a given time period they are fixed within specified activity levels, but they eventually increase or decrease by a constant amount at various critical activity levels.

Our discussion so far has assumed a 1-year time period. If we consider a shorter time period such as 1 month the step-fixed costs described in the previous paragraph will

FIGURE 2.5

Step-fixed costs



Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s). Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

not occur because it takes several months to respond to changes in activity and alter spending levels. Over very short-term periods, such as 1 month, spending on direct labour and supervisory salaries will be fixed in relation to changes in activity.

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

Before concluding our discussion of cost behaviour in relation to volume of activity, we must consider **semi-variable costs** (also known as **mixed costs**). These include both a fixed and a variable component. If you refer to your telephone account for your landline you will probably find that it consists of a fixed component (the line rental) plus a variable component (the number of telephone calls made multiplied by the cost per call). Similarly, the office photocopying costs may consist of a fixed rental charge for the photocopiers plus a variable cost (the cost of the paper multiplied by the number of photocopies). The cost of maintenance of equipment in a hospital may also be a semi-variable cost consisting of planned maintenance that is undertaken whatever the level of activity, and a variable element that is directly related to the level of usage of the equipment. We shall discuss how mixed costs can be separated into their fixed and variable elements in the next chapter.

RELEVANT AND IRRELEVANT COSTS AND REVENUES

For decision-making, costs and revenues can be classified according to whether they are relevant to a particular decision. **Relevant costs and revenues** are those *future* costs and revenues that will be changed by a decision, whereas **irrelevant costs and revenues** are those that will not be affected by the decision. For example, if you are faced with a choice of making a journey using your own car or by public transport, the car tax and insurance costs are irrelevant, since they will remain the same whatever alternative is chosen. However, fuel costs for the car will differ depending on which alternative is chosen, being zero if you use public transport but necessitating payment for extra fuel if you use the car. Therefore, fuel costs will be relevant for decision-making.

Let us now consider a further illustration of the classification of relevant and irrelevant costs. Assume that in the past a company purchased raw materials for £1000 per unit and then found that it was impossible to use them in future production or to sell them in their current state. A former customer is prepared to purchase a product that will require the use of all these materials, but is not prepared to pay more than £2500 for the product. The additional costs of converting these materials into the required product are £2000. Should the company accept the order for £2500? It appears that the cost of the order is £3000, consisting of £1000 material cost and £2000 conversion cost, but this is incorrect because the £1000 material cost will remain the same whether the order is accepted or rejected. The material cost is therefore irrelevant for the decision. If the order is accepted the conversion costs will change by £2000, and this conversion cost is a relevant cost. If we compare the revenue of £2500 with the relevant cost for the order of £2000, it means that the order

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

should be accepted, assuming of course that no higher-priced orders can be obtained elsewhere. The following calculation shows that this is the correct decision:

	Do not accept order (£)	Accept order (£)
Materials	1 000	1 000
Conversion costs	—	2 000
Revenue	—	(2 500)
Net costs	1 000	500

The net costs of the company are £500 less, or alternatively the company is £500 better off as a result of accepting the order. This agrees with the £500 advantage that was suggested by the relevant cost method.

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

AVOIDABLE AND UNAVOIDABLE COSTS

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

SUNK COSTS

These costs are the costs of resources already acquired where the total will be unaffected by the choice between various alternatives. They are costs that have been created by a decision made in the past and that cannot be changed by any decision that will be made now or in the future. The expenditure of £1000 on materials that were no longer required, referred to in the preceding section, is an example of a **sunk cost**. Similarly, the written down values of assets previously purchased are sunk costs. For example, if equipment was purchased 4 years ago for £100 000 with an expected life of 5 years and nil scrap value then the written down value will be £20 000 if straight line depreciation is used. This written down value will have to be written off, no matter what possible alternative future action might be chosen. If the equipment was scrapped, the £20 000 would be written off; if the equipment was used for productive purposes, the £20 000 would still have to be

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s). Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

REAL WORLD VIEWS 2.3

We must stop falling into the 'sunk costs' fallacy

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

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

Managers are often unable to make the decisions to scrap projects that are already up and running in order to cut their losses. For example, the sunk costs fallacy draws attention to how Sadiq Khan, the Mayor of London, originally opposed the construction of a new £175m Garden Bridge across the Thames but later changed his mind because 'the money [spent on the design] is spent. Cancelling would mean we lose that money and have nothing.'

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

Questions

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

Reference

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

written off. This cost cannot be changed by any future decision and is therefore classified as a sunk cost.

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

OPPORTUNITY COSTS

An **opportunity cost** is a cost that measures the opportunity that is lost or sacrificed when the choice of one course of action requires that an alternative course of action is given up. Consider the situation where a student is contemplating taking a gap year overseas after completing his or her studies. Assume that the student has an offer of a job upon completion of his or her studies. The lost salary is an opportunity cost of choosing the gap year that must be taken into account when considering the financial implications of the decision. For a further illustration of an opportunity cost you should now look at Example 2.2.

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s). Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

EXAMPLE 2.2

A company has an opportunity to obtain a contract for the production of a special component. This component will require 100 hours of processing on machine X. Machine X is working at full capacity on the production of product A, and the only way in which the contract can be fulfilled is by reducing the output of product A. This will result in a lost profit contribution of £200. The contract will also result in *additional* variable costs of £1000. If the company takes on the contract, it will sacrifice a profit contribution of £200 from the lost output of product A. This represents an opportunity cost, and should be included as part of the cost when negotiating for the contract. The contract price should at least cover the additional costs of £1000 plus the £200 opportunity cost to ensure that the company will be better off in the short term by accepting the contract.

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

REAL WORLD VIEWS 2.4

Opportunity costs and auto bail-outs

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

Questions

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

Reference

Andrew Coyne: On opportunity costs, $14B auto bail-outs and assuming a baseline level of competence. Available at nationalpost.com/opinion/andrew-coyne-on-opportunity-costs-14b-auto-bailouts-and-assuming-a-baseline-level-of-competence

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s). Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

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

INCREMENTAL AND MARGINAL COSTS

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

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

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

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

REAL WORLD VIEWS 2.5

Marginal costs of downloadable products

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

Questions

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

References

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

Ekeekwe, N (2017), Mechanics of start-up product pricing. Available at www.tekedia.com/mechanics-of-startup-product-pricing/

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s). Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

If you have studied economics you will have noticed that incremental costs and revenues are similar in principle to the economist's concept of **marginal cost** and **marginal revenue**. The main difference is that marginal cost/revenue represents the additional cost/revenue of one extra unit of output whereas incremental cost/revenue represents the additional cost/revenue resulting from a group of additional units of output. Because decisions normally entail identifying the change in costs and revenues arising from comparing two alternative courses of action, and where this involves a change in activity, it is likely that this will involve multiple, rather than single units of activity.

THE COST AND MANAGEMENT ACCOUNTING INFORMATION SYSTEM

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

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

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

For *inventory valuation* in a manufacturing organization, the costs of all partly completed products (i.e. WIP) and unsold finished products can be extracted from the database to ascertain the total cost assigned to inventories. The cost of goods sold that is deducted from sales revenues to compute the profit for the period can also be extracted by summing the manufacturing costs of all those products that have been sold during the period. We shall consider this process in more detail in Chapter 7.

Future costs, rather than past costs, are required for *decision-making*. Therefore costs extracted from the database should be adjusted for anticipated price changes. Where a company sells many products or services their profitability should be monitored at regular intervals so that potentially unprofitable products can be highlighted for a more detailed study of their future viability. This information is extracted from the database with costs reported by categories of expenses and divided into their fixed and variable elements. In Chapter 5 we shall focus in more detail on product/segmented profitability analysis.

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

For *cost control and performance measurement*, costs and revenues must be traced to the individuals who are responsible for incurring them. This system is known as responsibility accounting. **Responsibility accounting** involves the creation of responsibility centres. A **responsibility centre** is an organization unit or part of a business for whose performance a manager is held accountable. At this stage it may be easier to consider responsibility centres as being equivalent to separate departments within an organization. Responsibility accounting enables accountability for financial results and outcomes to be allocated to individuals (typically heads of departments) throughout the organization. Performance reports are produced at regular intervals for each responsibility centre. The reports are generated by extracting from the database costs analysed by responsibility centres and cost category, divided into controllable costs that can be influenced by the manager of the responsibility centre and those uncontrollable costs that cannot be influenced by the manager. Actual costs for each cost item listed on the performance report should be compared with budgeted costs so that those costs that do not conform to plan can be pinpointed and investigated. We shall examine responsibility accounting in more detail in Chapter 10.

SUMMARY

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

- **Explain why it is necessary to understand the meaning of different cost terms**. The term 'cost' has multiple meanings and different types of costs are used in different situations. Therefore, a preceding term must be added to clarify the assumptions that underlie a measurement. A knowledge of cost and management accounting depends on a clear understanding of the terminology it uses.
- **Define and illustrate a cost object**. A cost object is any activity for which a separate measurement of cost is required. In other words managers often want to know the cost of something and the 'thing' that they want to know the cost of is a cost object. Examples of cost objects include the cost of a new product, the cost of operating a sales outlet and the cost of operating a specific machine.
- **Explain the meaning of each of the key terms highlighted in bold coloured type**. You should check your understanding of each of the terms or concepts highlighted in bold coloured type by referring to the Key Terms and Concepts section.
- **Explain why in the short term some costs and revenues are not relevant for decision-making**. In the short term some costs and revenues may remain unchanged for all alternatives under consideration. For example, if you wish to determine the costs of driving to work in your own car or using public transport, the cost of the road fund licence and insurance will remain the same for both alternatives, assuming that you intend to keep your car for leisure purposes. Therefore the costs of these items are not relevant for assisting you in your decision to travel to work by public transport or using your own car. Costs that remain unchanged for all alternatives under consideration are not relevant for decision-making.

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s). Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

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

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

KEY TERMS AND CONCEPTS

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

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

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

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

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

Direct labour costs Labour costs that can be specifically and exclusively identified with a particular cost object.

Direct material costs Material costs that can be specifically and exclusively identified with a particular cost object.

Fixed costs Costs that remain constant for a specified time period and which are not affected by the volume of activity.

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

Indirect costs Costs that cannot be identified specifically and exclusively with a given cost object, also known as overheads.

Irrelevant costs and revenues Future costs and revenues that will not be affected by a decision.

Marginal cost The additional cost of one extra unit of output.

Marginal revenue The additional revenue from one extra unit of output.

Mixed costs Costs that contain both a fixed and a variable component, also known as semi-variable costs.

Opportunity costs Costs that measure the opportunity that is sacrificed when the choice of one course of action requires that an alternative is given up.

Overheads Costs that cannot be identified specifically and exclusively with a given cost object, also known as indirect costs.

Period costs Costs that are not included in the inventory valuation of goods and which are treated as expenses for the period in which they are incurred.

Prime cost The sum of all direct manufacturing costs.

Product costs Costs that are identified with goods purchased or produced for resale and which are attached to products and included in the inventory valuation of goods.

Relevant costs and revenues Future costs and revenues that will be changed by a decision.

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s). Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

Responsibility accounting Accounting that involves tracing costs and revenues to responsibility centres.

Responsibility centres Units or departments within an organization for whose performance a manager is held responsible.

Semi-fixed costs Costs that remain fixed within specified activity levels for a given amount of time but which eventually increase or decrease by a constant amount at critical activity levels; also known as step-fixed costs.

Semi-variable costs Costs that contain both a fixed and a variable component, also known as mixed costs.

Step-fixed costs Costs that remain fixed within specified activity levels for a given amount of time but which eventually increase or decrease by a constant amount at critical activity levels; also known as semi-fixed costs.

Sunk costs Costs that have been incurred by a decision made in the past and that cannot be changed by any decision that will be made in the future.

Unavoidable costs Costs that cannot be saved, whether or not an alternative is adopted.

Variable costs Costs that vary in direct proportion to the volume of activity.

ASSESSMENT MATERIAL

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

The review problems are more complex and require you to relate and apply the content to various business problems. Solutions to review problems are provided in a separate section at the end of the book. Additional review problems can be accessed by lecturers and students on the dedicated online support resources for this book. Solutions to these review problems are provided for lecturers in the *Instructor's Manual* accompanying this book that can be downloaded from the dedicated online instructor's resources (see Preface for details).

The dedicated online digital support resources for this book also includes over 30 case study problems.

REVIEW QUESTIONS

2.1 Define the meaning of the term 'cost object' and provide three examples of cost objects. *(p. 25)*

2.2 Distinguish between a direct and indirect cost. *(pp. 26–29)*

2.3 Describe how a given direct cost item can be both a direct and indirect cost. *(pp. 28–29)*

2.4 Provide examples of each of the following: (a) direct labour, (b) indirect labour, (c) direct materials, (d) indirect materials and (e) indirect expenses. *(pp. 26–27)*

2.5 Explain the meaning of the terms: (a) prime cost, (b) overheads and (c) cost allocations. *(pp. 27–29)*

2.6 Distinguish between product costs and period costs. *(pp. 29–31)*

2.7 Provide examples of decisions that require knowledge of how costs and revenues vary with different levels of activity. *(pp. 31–32)*

2.8 Explain the meaning of each of the following terms: (a) variable costs, (b) fixed costs, (c) semi-fixed costs and (d) semi-variable costs. Provide examples of costs for each of the four categories. *(pp. 33–35)*

2.9 Distinguish between relevant (avoidable) and irrelevant (unavoidable) costs and provide examples of each type of cost. *(pp. 35–36)*

2.10 Explain the meaning of the term 'sunk cost'. *(pp. 36–37)*

2.11 Distinguish between incremental and marginal costs. *(pp. 39–40)*

2.12 What is an opportunity cost? Give some examples. *(pp. 37–38)*

2.13 Explain responsibility accounting. *(p. 41)*

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s). Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

REVIEW PROBLEMS

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

(a) direct labour
(b) depreciation of machinery
(c) factory rental
(d) supplies and other indirect materials
(e) advertising
(f) maintenance of machinery
(g) factory manager's salary
(h) supervisory personnel
(i) royalty payments.

2.15 Which of the following costs are likely to be controllable by the head of the production department?

(a) price paid for materials
(b) charge for floor space
(c) raw materials used
(d) electricity used for machinery
(e) machinery depreciation
(f) direct labour
(g) insurance on machinery
(h) share of cost of Human Resources (HR) department.

2.16 A direct cost is a cost that:

(a) is incurred as a direct consequence of a decision
(b) can be economically identified with the item being costed
(c) cannot be economically identified with the item being costed
(d) is immediately controllable
(e) is the responsibility of the board of directors.

2.17 Which of the following would be classed as indirect labour?

(a) assembly workers in a company manufacturing televisions
(b) a stores assistant in a factory store
(c) plasterers in a construction company
(d) an audit clerk in a firm of auditors.

2.18 Which one of the following costs would not be classified as a production overhead cost in a food processing company?

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

2.19 Fixed costs are conventionally deemed to be:

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

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

Cost type	Total cost for 125 units £	Total cost for 180 units £
T1	1 000	1 250
T2	1 750	2 520
T3	2 475	2 826
T4	3 225	4 644

Calculate the costs per unit. Which cost types would be classified as being semi-variable?

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

2.21

Data	(£)
Cost of motor car	5 500
Trade-in price after 2 years or 60 000 miles is expected to be	1 500
Maintenance – 6-monthly service costing	60
Spares/replacement parts, per 1000 miles	20
Vehicle licence, per annum	80
Insurance, per annum	150
Tyre replacements after 25 000 miles, four at £37.50 each	
Petrol, per gallon	1.90
Average mileage from one gallon is 25 miles.	

(a) From the above data you are required:
(i) To prepare a schedule to be presented to management showing for the mileages of 5000, 10 000, 15 000 and 30 000 miles per annum:
(1) total variable cost
(2) total fixed cost
(3) total cost
(4) variable cost per mile (in pence to nearest penny)
(5) fixed cost per mile (in pence to nearest penny)
(6) total cost per mile (in pence to nearest penny).
If, in classifying the costs, you consider that some can be treated as either variable or fixed, state the assumption(s) on which your answer is based together with brief supporting reason(s).
(ii) On graph paper, plot the information given in your answer to (i) above for the costs listed against (1), (2), (3) and (6).
(iii) To read off from your graph(s) in (ii) and state the approximate total costs applicable to 18 000 miles and 25 000 miles and the total cost per mile at these two mileages.
(b) 'The more miles you travel, the cheaper it becomes.' Comment briefly on this statement.

(25 marks)

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s). Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

2.22 Sunk and opportunity costs for decision-making

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

	(€)	(€)
Sales	120 000	
Less Value-added tax (VAT)	20 000	
Sales less VAT		100 000
Cost of goods sold	50 000	
Wages and wage-related costs	12 000	
Rent including the down payment	10 000	
Rates, heating, lighting and insurance	13 000	
Audit, legal and general expenses	2 000	
		87 000
Net profit before tax		13 000

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

You are required to:

(a) explain and identify the 'sunk' and 'opportunity' costs in the situation depicted above

(b) state what decision Mrs Johnston should make according to the information given, supporting your conclusion with a financial statement.

(11 marks)

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s). Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

PART TWO

INFORMATION FOR DECISION-MAKING

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

The objective of Part Two, which contains four chapters, is to consider the provision of financial information that will help managers to make better decisions. Chapters 3–5 are concerned mainly with short-term decisions based on the environment of today, and the physical, human and financial resources that are currently available to a firm. These decisions are determined to a considerable extent by the quality of the firm's long-term decisions. An important distinction between long-term and short-term decisions is that the former cannot easily be reversed whereas the latter can often be changed. The actions that follow short-term decisions are frequently repeated, and it is possible for different actions to be taken in the future. For example, the setting of a particular selling price or product mix can often be changed fairly quickly. With regard to long-term decisions, such as capital investment, which involves, for example, the purchase of new plant and machinery, it is not easy to change such decisions in the short term. Resources may only be available for major investments in plant and machinery at lengthy intervals, and it is unlikely that plant replacement decisions will be repeated in the short term.

Chapters 3–5 concentrate mainly on how accounting information can be applied to different forms of short-term decisions. Chapter 3 focuses on what will happen to the financial results if a specific level of activity or volume fluctuates. This information is required for making optimal short-term output decisions. Chapter 4 focuses on the approaches that should be used to establish the relevant costs and revenues for a range of non-routine short-term and long-term decisions. Chapter 5 is concerned with profitability analysis and the provision of financial information for pricing decisions.

The final chapter is concerned with long-term decisions. It looks at the appraisal methods that are used for evaluating capital investment decisions, and introduces the concept of the time value of money.

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

3 COST–VOLUME–PROFIT ANALYSIS

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

- justify the use of linear cost and revenue functions
- apply the numerical approach to answer questions similar to those listed in Example 3.1
- construct break-even, contribution and profit–volume graphs
- apply cost–volume–profit analysis in a multi-product setting
- explain the meaning of operating leverage and describe how it influences profits
- identify and explain the assumptions on which cost–volume–profit analysis is based.

You will remember from Chapter 1 that the decision-making process involves selecting from a range of possible courses of action. Before they make their choice, managers need to compare the likely effects of the options they are considering. This chapter looks at one technique that allows them to consider the consequences of particular courses of action. It provides answers to questions such as:

- How many units must be sold to break even?
- What would be the effect on profits if we reduce our selling price and sell more units?
- What sales volume is required to meet the additional fixed charges arising from an advertising campaign?
- Should we pay our sales people on the basis of a salary only, or on the basis of a commission only, or by a combination of the two?

These and other questions can be answered using cost–volume–profit (CVP) analysis.

CVP analysis examines the relationship between changes in activity (i.e. output) and changes in total sales revenue, costs and net profit. It allows us to predict what will happen to the financial results if a specified level of activity or volume fluctuates. This information is vital to management, since one of the most important variables influencing total sales revenue, total costs and profits is output or volume. Knowledge of this relationship will enable management to identify critical output levels, such as the level at which neither a profit nor a loss will occur (i.e. the **break-even point**).

CVP analysis is based on the relationship between volume and sales revenue, costs and profit in the short run. This is normally a period of 1 year, or less, a time in which

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s). Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

the output of a firm is likely to be restricted to that available from the current operating capacity. In the short run some inputs can be increased, but others cannot. Additional supplies of materials and unskilled labour may be obtained at short notice, but operating capacity cannot be significantly changed. For example, it is not possible for a hospital to expand its facilities in the short run in order to increase the number of hospital beds. Similarly, a hotel cannot increase the number of rooms in the short run to increase the number of guests. It is also important to remember that most of the costs and prices of a firm's products or services will already have been predetermined over a short-run period, and the major area of uncertainty will be sales volume. Short-run profitability will therefore be most sensitive to sales volume. CVP analysis thus highlights the effects of changes in sales volume on the level of profits in the short run.

The term 'volume' is used within CVP analysis but this has multiple meanings. Different measures can be used to represent the term. For example, sales revenue is a generic term that can be used by most organizations. However, units of output, or activity, tend to be the most widely used terms. This raises the question of what constitutes a unit of output or activity. For a manufacturing organization, such as a car manufacturer, determining units of output is straightforward. It is the number of cars produced. For a computer manufacturer it is the number of computers produced. Service organizations face a more difficult choice. Hotels may define units as the number of guest nights, leisure centres may use the number of visitors as a measure of output/activity and airlines might use the number of passenger miles.

CVP analysis is dependent on the ability to estimate costs at different activity levels and to do this requires that costs are analysed into their fixed and variable elements. Cost estimation techniques are explained at the end of this chapter.

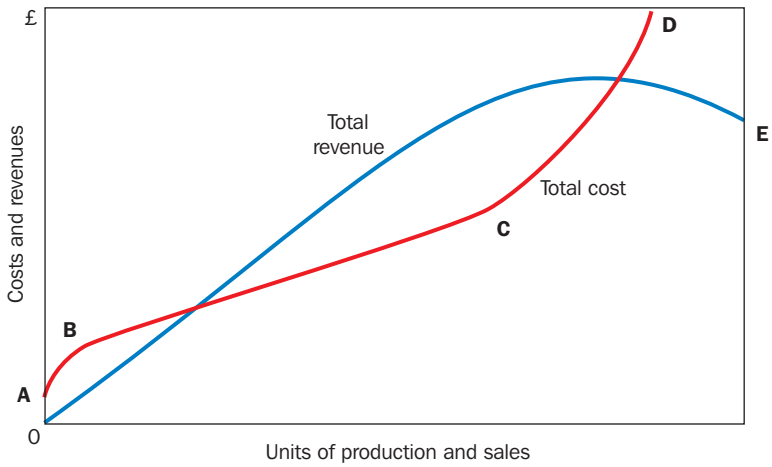
CURVILINEAR CVP RELATIONSHIPS

A diagram showing CVP behaviour is presented in Figure 3.1. You will see that the total revenue and total cost lines are curvilinear. The total revenue line (0E) initially resembles a straight line but then begins to rise less steeply and eventually starts to decline. This arises because the firm is only able to sell increasing quantities of output by reducing the selling price per unit; thus the total revenue line does not increase proportionately with output. To increase the quantity of sales, it is necessary to reduce the unit selling price, which results in the total revenue line rising less steeply, and eventually beginning to decline. The decline occurs because the adverse effect of price reductions outweighs the benefits of increased sales volume.

The total cost line (AD) illustrates cost behaviour in a manufacturing firm but similar cost behaviour also applies in non-manufacturing firms. At zero output level fixed costs equivalent to 0A are incurred. Between points A and B, total costs rise steeply at first as the firm operates at the lower levels of the volume range. This reflects the difficulties of efficiently using manufacturing facilities designed for much larger volume levels. Between points B and C, the total cost line begins to level out and rise less steeply because the firm is now able to operate its manufacturing facilities within the efficient operating range and can take advantage of economies of scale (e.g. specialization of labour, smooth production schedules and discounts for bulk purchases). Economists describe this situation as **increasing returns to scale**. In the upper portion of the volume range the total cost line

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

FIGURE 3.1
Curvilinear CVP relationships



between points C and D rises more steeply as the cost per unit increases. This is because manufacturing facilities are being operated beyond their capacity. Bottlenecks develop, production schedules become more complex and equipment breakdowns begin to occur. The overall effect is that the cost per unit of output increases and causes the total cost line to rise steeply. Economists describe this situation as **decreasing returns to scale**.

It is also clear from Figure 3.1 that the shape of the total revenue line is such that it crosses the total cost line at two points. In other words, there are two output levels at which the total costs are equal to the total revenues; or, more simply, there are two break-even points.

LINEAR CVP RELATIONSHIPS

In Figure 3.2 the blue total cost line XY and the yellow total revenue line 0V assume that variable cost and selling price are constant per unit of output. This results in a linear relationship (i.e. a straight line) for total revenue and total cost as output/volume changes. If you look at these two lines you will see that a linear relationship results in only one break-even point. You can also see that the profit area (i.e. the difference between the total revenue line 0V and the total cost line XY) widens as volume increases. For comparative purposes the curvilinear relationships shown in Figure 3.1 are also reproduced in Figure 3.2 (with blue line AD and yellow line 0E showing, respectively, curvilinear total cost and total revenue relationships).

Management accounting assumes linear CVP relationships when applying CVP analysis to short-run business problems. Curvilinear relationships appear to be more realistic of cost and revenue behaviour, so how can we justify CVP analysis based on the assumption of linear relationships? The answers are provided in the following sections.

Relevant range

Linear relationships are not intended to provide an accurate representation of total cost and total revenue throughout all ranges of output. The objective is to represent the

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s). Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

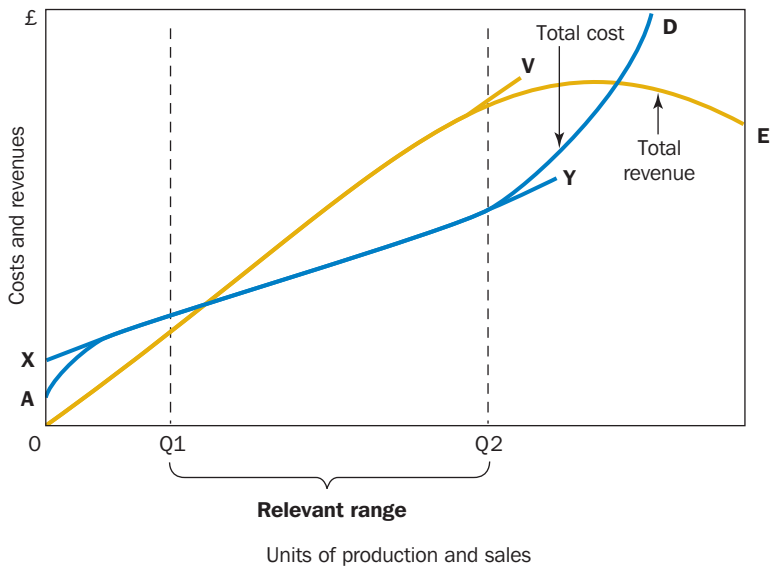


FIGURE 3.2
Linear CVP relationships

behaviour of total cost and revenue over the range of output at which a firm expects to be operating within a short-term planning horizon. This range of output is represented by the output range between points Q1 and Q2 in Figure 3.2. The term **relevant range** is used to refer to the output range at which the firm expects to be operating within a short-term planning horizon. This relevant range also broadly represents the output levels that the firm has had experience of operating in the past and for which cost information is available.

It is clear from Figure 3.2 that, between points Q1 and Q2, the cost and revenue relationships are more or less linear. It would be unwise, however, to make this assumption for output levels outside the relevant range. CVP analysis should therefore only be applied within the relevant range. If the relevant range changes, different fixed and variable costs and selling prices must be used.

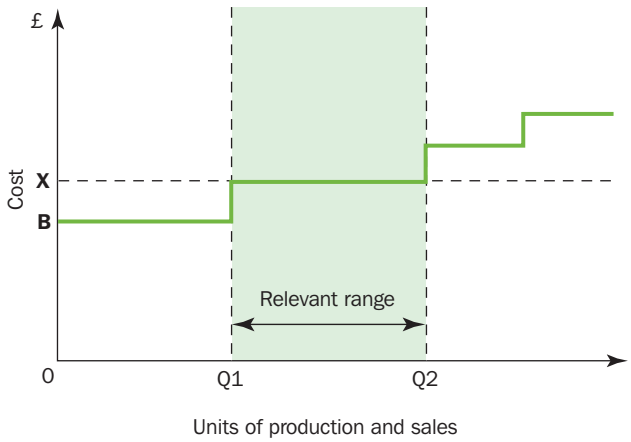
Fixed cost function

The linear fixed cost function line in Figure 3.2 indicates that at zero output level fixed costs equivalent to 0X would be incurred. This fixed cost level of 0X is assumed to be applicable to activity level Q1 to Q2, shown in Figure 3.3. If there were to be a prolonged economic recession then output might fall below Q1, and this could result in redundancies and shutdowns. Therefore, fixed costs may be reduced to 0B if there is a prolonged and significant decline in sales demand. Alternatively, additional fixed costs will be incurred if long-term sales volume is expected to be greater than Q2. Over a longer-term time horizon, the fixed cost line will consist of a series of step functions as shown in Figure 3.3. However, since within its short-term planning horizon the firm expects to be operating between output levels Q1 and Q2 (i.e. the relevant range), it will be committed, in the short term, to fixed costs of 0X. Thus the fixed cost of 0X shown in Figures 3.2 and 3.3 represent the fixed costs that would be incurred only for the relevant range.

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

FIGURE 3.3

Fixed costs applicable within the relevant range



Total revenue function

Linear CVP relationships assume that selling price is constant over the relevant range of output, and therefore the total revenue line is a straight line. This is a realistic assumption in those firms that operate in industries where selling prices tend to be fixed in the short term. Also, beyond the relevant range, increases in output may only be possible by offering substantial reductions in price. As it is not the intention of firms to operate outside the relevant range it is appropriate to assume constant selling prices.

A NUMERICAL APPROACH TO COST–VOLUME–PROFIT ANALYSIS

As an alternative to using diagrams for CVP analysis we can also use a numerical approach. Diagrams are useful for presenting the outcomes in a more visual form to non-accounting managers, but the numerical approach is often a quicker and more flexible method for producing the appropriate information. Indeed, it is possible to express CVP relationships in a simple mathematical equation format so that they can form an input for computer financial models. To keep things simple we shall avoid mathematical formulae and use a simple numerical approach.

In the previous sections we pointed out that CVP analysis is based on the assumption that selling price and variable cost are constant per unit of output. In contrast, you will remember from Chapter 2 that over a short-run period fixed costs are a constant total amount whereas unit cost changes with output levels. As a result, profit per unit also changes with volume. For example, if fixed costs are £10 000 for a period and output is 10 000 units, the fixed cost will be £1 per unit. Alternatively, if output is 5000 units, the fixed cost will be £2 per unit. Profit per unit will not therefore be constant over varying output levels and it is incorrect to unitize fixed costs for CVP decisions.

Instead of using profit per unit we shall use contribution margins to apply the numerical approach. **Contribution margin** is equal to sales revenue minus variable costs. Because the variable cost per unit and the selling price per unit are assumed to be constant the contribution margin per unit is also assumed to be constant. We will use Example 3.1 to illustrate the application of the numerical approach to CVP analysis.

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

REAL WORLD VIEWS 3.1

Break-even rail fares

Many countries are noted for having high rail fares nowadays, which some commentators attribute to the fact that many railways are no longer in public ownership. However, even if a railway is in public ownership, it is not unreasonable to expect the fares to be set at a level which covers cost i.e. a break-even price. A cross border high-speed rail link between Hong Kong and China provides a good numerical example, as detailed in an article in the *South China Morning Post* (5 February 2018).

According to the article, 'the HK$84.4 billion cross-border high-speed rail link may become profitable eight years after its launch, Hong Kong's transport chief said yesterday'. Thus it will take about eight years to achieve a break-even scenario. The article's author provides some interesting calculations based on figures available for costs and revenues. He notes, 'now put it all together: operating income less operating costs, depreciation and interest charges, and we come to a loss of HK$3.18 billion a year'. He then takes this loss and calculates the fare needed to break-even – 'if we wanted this railway to break even, we would have to set the fare to Guangzhou at something like HK$662 and to Shenzen at about HK$230, crossing our fingers … that such extremely high ticket prices would have no dampening effect at all on passenger numbers'. The original planned fares were HK$45 to Shenzen, and HK$180 to Guangzhou.

Question

1 Can you think of some of the fixed costs associated with the railway described above which might contribute to high break-even level fares?

Reference

Jake Van Der Kamp, (2018) Dodgy mathematics puts the break-even point of Hong Kong's high-speed rail forever away, *South China Morning Post*, available at www.scmp.com/business/banking-finance/article/2132104/dodgy-mathematics-puts-break-even-point-hong-kongs-high

EXAMPLE 3.1

Norvik Enterprises operates in the leisure and entertainment industry and one of its activities is to promote concerts at locations throughout Europe. The company is examining the viability of a concert in Helsinki. Estimated fixed costs are £60 000. These include the fees paid to performers, the hire of the venue and advertising costs. Variable costs consist of the cost of a pre-packed buffet that will be provided by a firm of caterers at a price, which is currently being negotiated, but it is likely to be in the region of £10 per ticket sold. The proposed price for the sale of a ticket is £20. The management of Norvik have requested the following information:

1. The number of tickets that must be sold to break even (that is, the point at which there is neither a profit nor loss).
2. How many tickets must be sold to earn £30 000 target profit?
3. What profit would result if 8000 tickets were sold?
4. What selling price would have to be charged to give a profit of £30 000 on sales of 8000 tickets, fixed costs of £60 000 and variable costs of £10 per ticket?
5. How many additional tickets must be sold to cover the extra cost of television advertising of £8000?

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s). Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

Example 3.1 calculations

1. Break-even point in units (i.e. number of tickets sold)

You will see from Example 3.1 that each ticket sold generates a contribution of £10 (£20 selling price – £10 variable cost), which is available to cover fixed costs and, after they are covered, to contribute to profit. When we have obtained sufficient total contribution to cover fixed costs, the break-even point is achieved, and so:

$$\text{Break-even point in units} = \frac{\text{Fixed costs (£60 000)}}{\text{Contribution per unit (£10)}}$$
$$= \text{6 000 tickets}$$

2. Units to be sold to obtain a £30 000 profit

To achieve a profit of any size we must first obtain sufficient contribution to cover the fixed costs (i.e. the break-even point). If the total contribution is not sufficient to cover the fixed costs then a loss will occur. Once a sufficient total contribution has been achieved, any excess contribution represents profit. Thus to determine the total contribution to obtain a target profit we simply add the target profit to the fixed costs and divide by the contribution per unit so that:

$$\text{Units sold for the target profit} = \frac{\text{Fixed costs (£60 000)} + \text{Target profit (£30 000)}}{\text{Contribution per unit (£10)}}$$
$$= \text{9 000 tickets}$$

3. Profit from the sale of 8000 tickets

The total contribution from the sale of 8000 tickets is £80 000 (8000 × £10). To ascertain the profit, we deduct the fixed costs of £60 000 giving a net profit of £20 000. Let us now assume that we wish to ascertain the impact on profit if a further 1000 tickets are sold so that sales volume increases from 8000 to 9000 tickets. Assuming that fixed costs remain unchanged, the impact on a firm's profits resulting from a change in the number of units sold can be determined by multiplying the unit contribution margin by the change in units sold. Therefore, the increase in profits will be £10 000 (1000 units times a unit contribution margin of £10).

4. Selling price to be charged to show a profit of £30 000 on sales of 8000 tickets

First we must determine the total required revenue to obtain a profit of £30 000. This is £170 000, which is derived from the sum of the fixed costs (£60 000), variable costs (8000 × £10) and the target profit (£30 000). Dividing the required sales revenues of £170 000 by the sales volume (8000 tickets) gives a selling price of £21.25.

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

REAL WORLD VIEWS 3.2

Importance of break-even oil prices due to widely different costs of extraction

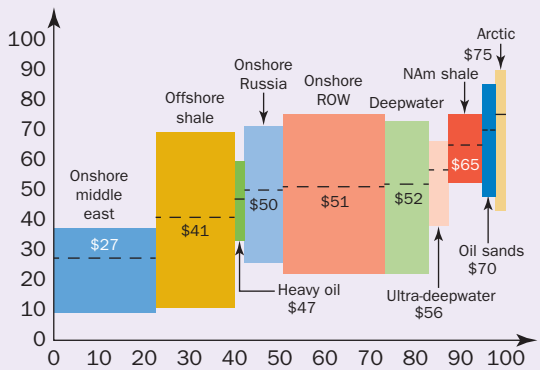
A break-even oil price is the price at which oil must be sold in order to recover the costs associated with its production. With the recent downturn in the global oil industry, break-even oil prices are an important measure of an oil extractor's ability to remain profitable. Break-even oil prices vary greatly throughout the world due to the widely differing costs associated with extracting different types of oil, the unique circumstances associated with oil extraction in different oil-producing regions, and so on.

In times of economic downturn, oil resources with higher break-even prices are the first to be discontinued. Unconventional oil resources, such as oil sands and shale oil, are more expensive to produce than conventional oil, and therefore suffer when oil prices drop. Since the oil glut began in 2014, even conventional oil deposits that are more expensive to extract are decreasing production. This has led to significant economic impacts in places where the economy is closely tied to oil, such as Venezuela, which has oil sands deposits in addition to conventional oil resources.

The chart below extracted from a 2015 publication reveals some interesting insights into the break-even price for producing crude oil. Petroleum extraction in the Arctic regions shows the highest break-even price of $75 per barrel. On the other hand, middle eastern countries have the lowest price at $27 per barrel. US shale oil producers have a break-even price of $65 per barrel. These estimates are average break-even prices. The costs may vary depending on the oil well and its location.

While oil prices have increased slightly since a record low in January 2016, it is uncertain how long it will take for oil prices to recover more substantially, if at all. According to the publication *WTI (West Texas Intermediate)* crude oil was trading in 2015 at $45 per barrel, and Brent crude oil was trading at $46.4 per barrel. As of early 2018, these prices stood at $61, with Brent crude at $62. This suggests margins of high break-even-price US shale oil producers are not good, assuming the break-even prices from 2015 are still a good estimate. This in turn may mean that shale oil or oil from Arctic regions will see a fall in production, as oil prices during 2016 and 2017 have remained below the $75 mark.

Breakeven Price of Crude Oil



Note: *Market Realist*
Source: Seadrill, Morgan Stanley Equity Research, International Energy Agency

Questions

1 Why does the break-even differ according to the location of the oil wells?
2 Is the break-even price of crude oil more important than the break-even volume?

References

Kristopher, G. (2015) A key investor's guide to the crude oil market (Part 4 of 1 of 15 Market Monitor). Available at marketrealist.com/2015/01/crude-oil-market-key-overview

Breakeven oil prices in Middle Eastern and North African countries in 2016. Available at www.statista.com/statistics/486086/breakeven-oil-prices-middleeast-northenafrica

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s). Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

5. Additional sales volume to meet £8000 additional fixed advertisement charges

The contribution per unit is £10 and fixed costs will increase by £8000. Therefore, an extra 800 tickets must be sold to cover the additional fixed costs of £8000.

THE PROFIT–VOLUME RATIO

The **profit–volume ratio** (also known as the **contribution margin ratio**) is the contribution divided by sales. It represents the proportion of each £1 of sales available to cover fixed costs and provide for profit. In Example 3.1 the contribution is £10 per unit and the selling price is £20 per unit; the profit–volume ratio is 0.5. This means that for each £1 sale a contribution of £0.50 is earned. Because we assume that selling price and contribution per unit are constant, the profit–volume ratio is also assumed to be constant. This means that the profit–volume ratio can be computed using either unit figures or total figures. Given an estimate of total sales revenue, it is possible to use the profit–volume ratio to estimate total contribution. For example, if total sales revenue is estimated to be £200 000, the total contribution will be £100 000 (£200 000 × 0.5). To calculate the profit, we deduct fixed costs of £60 000; thus a profit of £40 000 will be obtained from total sales revenue of £200 000.

This computation can be expressed in equation form:

$$\text{Profit} = (\text{Sales revenue} \times \text{PV ratio}) - \text{Fixed costs}$$

We can rearrange this equation:

$$\text{Profit} + \text{Fixed costs} = \text{Sales revenue} \times \text{PV ratio}$$

Therefore the break-even sales revenue (where profit = 0) = Fixed costs/PV ratio.

If we apply this approach to Example 3.1, the break-even sales revenue is £120 000 (£60 000 fixed costs/0.5 PV ratio).

RELEVANT RANGE

It is vital to remember that CVP analysis can only be used for decisions that result in outcomes within the relevant range. Outside this range the unit selling price and the variable cost are no longer deemed to be constant per unit, and any results obtained from the formulae that fall outside the relevant range will be incorrect. The concept of the relevant range is more appropriate for production settings but it can apply within non-production settings. Returning to Norvic Enterprises in Example 3.1, we shall assume that the caterers' charges will be higher per ticket if ticket sales are below 4000 but lower if sales exceed 12 000 tickets. Thus the £10 variable cost relates only to a sales volume within a range of 4000 to 12 000 tickets. Outside this range other costs

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

apply. Also the number of seats made available at the venue is flexible and the hire cost will be reduced for sales of less than 4000 tickets and increased for sales beyond 12 000 tickets. In other words, we will assume that the relevant range is a sales volume of 4000 to 12 000 tickets and outside this range the results of our CVP analysis do not apply.

MARGIN OF SAFETY

The **margin of safety** indicates by how much sales may decrease before a loss occurs. Using Example 3.1, where unit selling price and variable cost were £20 and £10 respectively and fixed costs were £60 000, we noted that the break-even point was 6000 tickets or £120 000 sales value. If sales are expected to be 8000 tickets or £160 000, the margin of safety will be 2000 tickets or £40 000. Alternatively, we can express the margin of safety in a percentage form based on the following ratio:

$$\text{Percentage margin of safety} = \frac{\text{Expected sales} - \text{Break-even sales}}{\text{Expected sales}}$$

$$= \frac{£16\,0000 - £120\,0000}{£160\,000} = 25\%$$

Note that higher margins of safety are associated with less risky activities.

REAL WORLD VIEWS 3.3

Guardian staff brace for more job cuts as part of break-even plan

According to an article published in the *Financial Times* the chief executive of *The Guardian* newspaper group and the paper's editor stated in a memo to staff that the publisher had 'made progress' and 'successfully' met its first year's objective of reducing losses as part of a three-year plan to break even. However, the memo warned that 'our operating costs remain too high, trading conditions remain tough and further changes and cost savings will be necessary if we are to meet our target of breaking even at an operating level by 2018/19.'

The article reported that *The Guardian* has been hit by declining print revenue and a digital advertising market where most revenues flow to Google and Facebook. This has prompted the Guardian Media Group, the parent company of the Guardian and Observer print and digital businesses, to reduce their print operations, shed jobs, move the newspapers from their Berliner formats to tabloid editions and to also outsource printing to Trinity Mirror.

Questions

1 Is break-even a good performance monitor over the longer term?
2 How do decreasing margins affect the break-even point and margin of safety?

Source

Financial Times March 22, 2017 www.ft.com/content/eb23fe42-63a8-3984-904f-4d6d4050fe09

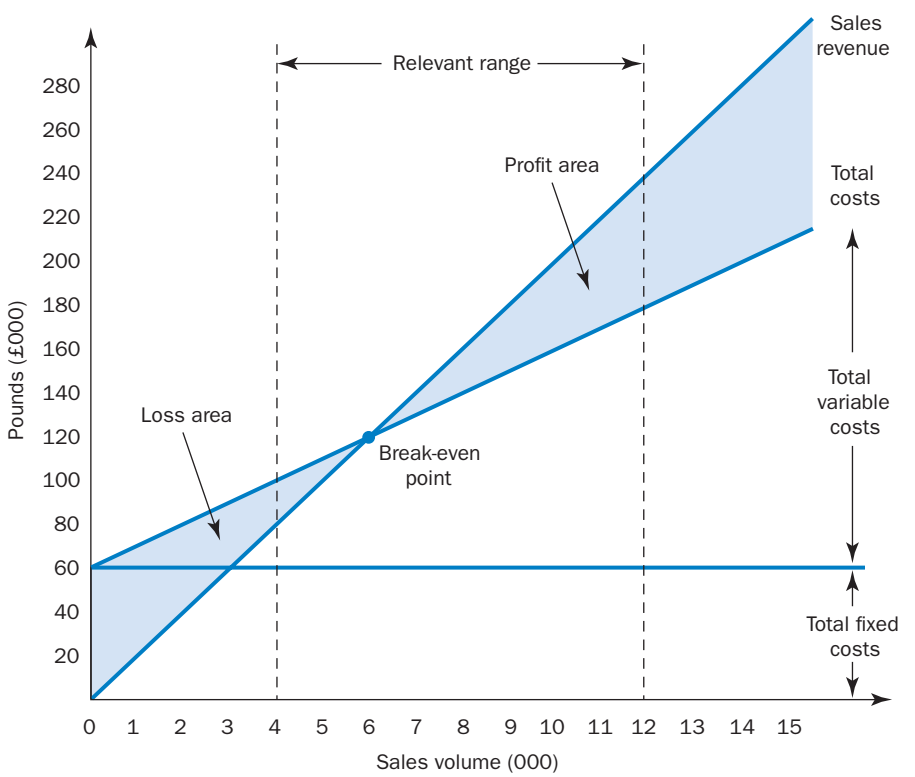
Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s). Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

CONSTRUCTING THE BREAK-EVEN CHART

Managers may obtain a clearer understanding of CVP behaviour if the information is presented in graphical format. Using the data in Example 3.1 we can construct the **break-even chart** for Norvik Enterprises (Figure 3.4). Note that activity/output is plotted on the horizontal axis and monetary amounts for total costs, total revenues and total profits (or loss) are recorded on the vertical axis. In constructing the graph, the fixed costs are plotted as a single horizontal line at the £60 000 level. Variable costs at the rate of £10 per unit of volume are added to the fixed costs to enable the total cost line to be plotted. Two points are required to insert the total cost line. At zero sales volume total cost will be equal to the fixed costs of £60 000. At 12 000 units sales volume total costs will be £180 000 consisting of £120 000 variable costs plus £60 000 fixed costs. The total revenue line is plotted at the rate of £20 per unit of volume. At zero output total sales are zero and at 12 000 units total sales revenue is £240 000. The total revenues for these two points are plotted on the graph and a straight line is drawn that joins these points. The constraints of the relevant range consisting of two vertical lines are then added to the graph; beyond these lines we have little assurance that the CVP relationships are valid.

The point at which the total sales revenue line cuts the total cost line is the point where the concert makes neither a profit nor a loss. This is the break-even point and is 6000 tickets or £120 000 total sales revenue. The distance between the total sales

FIGURE 3.4
Break-even chart for Example 3.1



Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s). Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

revenue line and the total cost line at a volume below the break-even point represents losses that will occur for various sales levels below 6000 tickets. Similarly, if the company operates at a sales volume above the break-even point, the difference between the total revenue and the total cost lines represents the profit that results from sales levels above 6000 tickets.

ALTERNATIVE PRESENTATION OF COST–VOLUME–PROFIT ANALYSIS

Contribution graph

In Figure 3.4 the fixed cost line is drawn parallel to the horizontal axis, and the variable cost is the difference between the total cost line and the fixed cost line. An alternative to Figure 3.4 for the data contained in Example 3.1 is illustrated in Figure 3.5. This alternative presentation is called a **contribution graph**. In Figure 3.5 the variable cost line is drawn first at £10 per unit of volume. The fixed costs are represented by the difference between the total cost line and the variable cost line. Because fixed costs are assumed to be a constant sum throughout the entire output range, a constant sum of £60 000 for fixed costs is added to the variable cost line, which results in the total cost line being drawn parallel to the variable cost line. The advantage of this form of presentation is that it emphasizes the total contribution which is represented by the difference between the total sales revenue line and the total variable cost line.

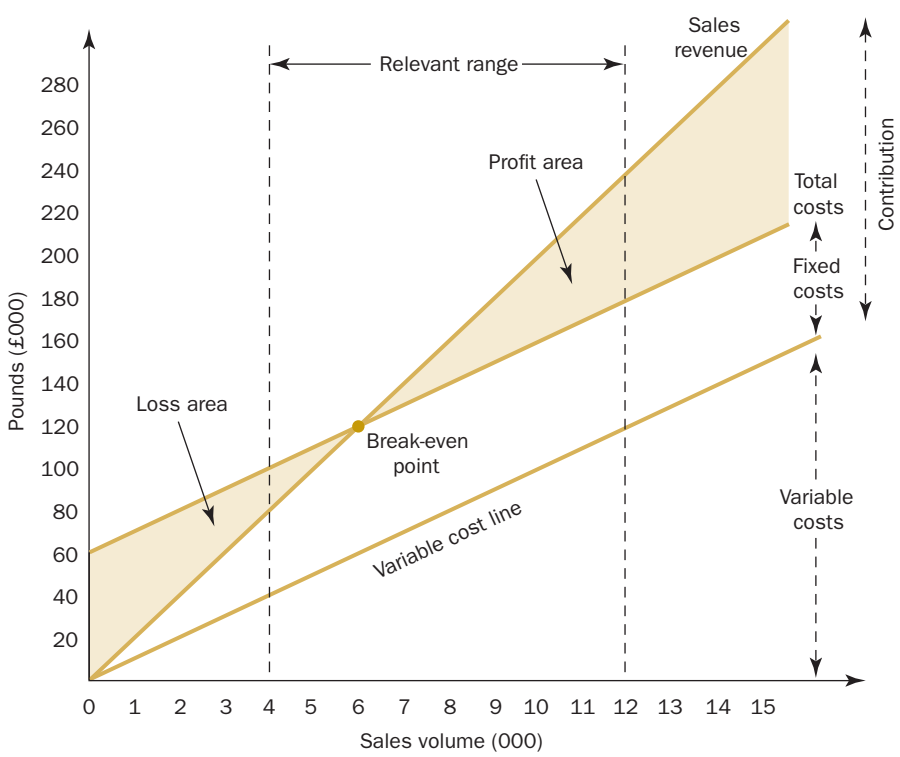


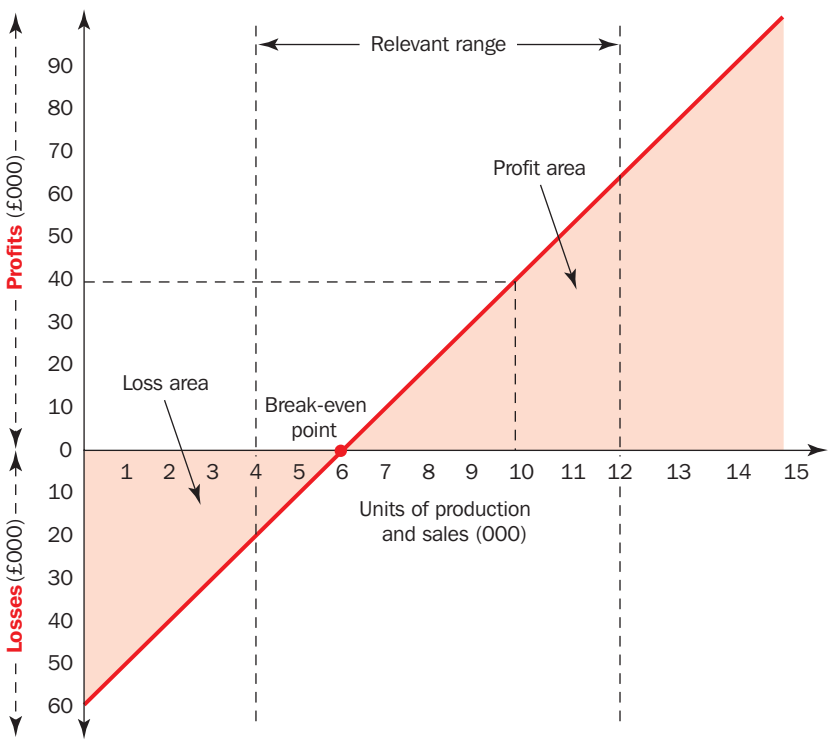
FIGURE 3.5
Contribution chart for Example 3.1

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s). Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

Profit–volume graph

Neither the break-even nor the contribution graphs highlight the profit or loss at different volume levels. To ascertain the profit or loss figures from a break-even graph, it is necessary to determine the difference between the total cost and total revenue lines. The **profit–volume graph** is a more convenient method of showing the impact of changes in volume on profit. Such a graph is illustrated in Figure 3.6. The horizontal axis represents the various levels of sales volume, and the profits and losses for the period are recorded on the vertical scale. You will see from Figure 3.6 that profits or losses are plotted for each of the various sales levels, and these points are connected by a profit line. Two points are required to plot the profit line. When units sold are zero a loss equal to the amount of fixed costs (£60 000) will be reported. At the break-even point (zero profits) sales volume is 6000 units. This is plotted at the point where the profit line intersects the horizontal line at a sales volume of 6000 tickets. The profit line is drawn between the two points. With each unit sold, a contribution of £10 is obtained towards the fixed costs, and the break-even point is at 6000 tickets, when the total contribution exactly equals the total of the fixed costs. With each additional unit sold beyond 6000 tickets, a surplus of £10 per ticket is obtained. If 10 000 tickets are sold, the profit will be £40 000 (4000 tickets at £10 contribution). You can see this relationship between sales and profit at 10 000 tickets from the dotted lines in Figure 3.6.

FIGURE 3.6
Profit–volume graph for Example 3.1



Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s). Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

REAL WORLD VIEWS 3.4

Alternative presentation of CVP – sales volumes and profits at Mazda

Auto manufacturers are keen to report their production and sales figures. This may be to assess market share or the data may be considered a key performance indicator given the high fixed costs an auto manufacturer may have to cover. Take Mazda for example. On their website (www.mazda.com) there are regular news releases providing investors with data on sales and production volumes by month and quarter, alongside the previous year data for comparison. Other auto companies like Ford, Honda and BMW also publish similar data.

Looking at the financial statements of Mazda for the year ended 31 March 2017, the company made a gross profit of approximately $1.2 billion and an operating (net) profit before interest and tax of $1.1 billion. The number of vehicles produced during the 2017 financial year was 1.56 million, the vast majority of which were passenger cars.

Questions

1 Do you think a profit–volume graph presentation of the relationships between costs volume and profits may be more useful than the typical break-even chart to auto manufacturers like Mazda?
2 Could you draw a rough profit–volume chart from the above data?

Reference

Mazda, 2017 Annual Report. Available at www.mazda.com/globalassets/en/assets/investors/library/annual/files/mazdaar17_e.pdf

MULTI-PRODUCT COST–VOLUME–PROFIT ANALYSIS

Our analysis so far has assumed a single-product setting. However, most firms produce and sell many products or services. In this section we shall consider how we can adapt CVP analysis to a multi-product setting. Consider the situation presented in Example 3.2. You will see that there are two types of fixed costs. Direct avoidable fixed costs can be specifically identified with each product and would not be incurred if the product was not made. For example, the deluxe and standard machines might be produced in different departments and the departmental supervisors' fixed salaries would represent fixed costs directly attributable to each machine. The common fixed costs relate to the costs of common facilities (e.g. factory rent) that cannot be specifically identified with either of the products since they can only be avoided if both products are not sold.

You might think that the break-even point for the firm as a whole can be derived if we allocate the common fixed costs to each individual product. However, this approach is inappropriate because the allocation will be arbitrary. The common fixed costs cannot be specifically identified with either of the products and can only be avoided if *both* products are not sold. The solution to our problem is to convert the sales volume measure of the individual products into standard batches of products based on the

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s). Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

EXAMPLE 3.2

The Super Bright Company sells two types of washing machines – a de-luxe model and a standard model. The financial controller has prepared the following information based on the sales forecast for the period:

Sales volume (units)	*De-luxe machine 1 200 (£)*	*Standard machine 600 (£)*	*Total (£)*
Unit selling price	300	200	
Unit variable cost	150	110	
Unit contribution	150	90	
Total sales revenues	360 000	120 000	480 000
Less: Total variable cost	180 000	66 000	246 000
Contribution to direct and common fixed costs[a]	180 000	54 000	234 000
Less: Direct avoidable fixed costs	90 000	27 000	117 000
Contribution to common fixed costs[a]	90 000	27 000	117 000
Less common (indirect) fixed costs			39 000
Operating profit			78 000

The common fixed costs relate to the costs of common facilities and can only be avoided if neither of the products is sold. The managing director is concerned that sales may be less than forecast and has requested information relating to the break-even point for the activities for the period.

Note

[a]Contribution was defined earlier in this chapter as sales less variable costs. Where fixed costs are divided into direct and common (indirect) fixed costs it is possible to identify two separate contribution categories. The first is described as contribution to direct and common fixed costs and this is identical to the conventional definition, being equivalent to sales less variable costs. The second is after a further deduction of direct fixed costs and is described as 'Contribution to common or indirect fixed costs'.

planned sales mix. You will see from Example 3.2 that Super Bright plans to sell 1200 de-luxe and 600 standard machines giving a sales mix of 1200:600. Reducing this sales mix to the smallest whole number gives a mix of 2:1. In other words, for the sale of every two de-luxe machines one standard machine is expected to be sold. We therefore define our standard batch of products as comprising two de-luxe and one standard machine giving a contribution of £390 per batch (two de-luxe machines at a contribution of £150 per unit sold plus one standard machine at a contribution of £90).

The break-even point in standard batches can be calculated by using the same break-even equation that we used for a single product, so that:

$$\text{Break-even number of batches} = \text{Total fixed costs (£156 000)/Contribution margin per batch (£390)}$$

$$= 400 \text{ batches}$$

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s). Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

The sales mix used to define a standard batch (2:1) can now be used to convert the break-even point (measured in standard batches) into a break-even point expressed in terms of the required combination of individual products sold. Thus 800 de-luxe machines (2 × 400) and 400 (1 × 400) standard machines must be sold to break even. The following profit statement verifies this outcome:

Units sold	De-luxe machine 800 (£)	Standard machine 400 (£)	Total (£)
Unit contribution margin	150	90	
Contribution to direct and common fixed costs	120 000	36 000	156 000
Less: Direct fixed costs	90 000	27 000	117 000
Contribution to common fixed costs	30 000	9 000	39 000
Less: Common fixed costs			39 000
Operating profit			0

Let us now assume that the actual sales volume for the period was 1200 units, the same total volume as the break-even volume, but consisting of a sales mix of 600 units of each machine. Thus the actual sales mix is 1:1 compared with a planned sales mix of 2:1. The total contribution to direct and common fixed costs will be £144 000 ([£150 × 600 for de-luxe] + [£90 × 600 for standard]) and a loss of £12 000 (£144 000 contribution – £156 000 total fixed costs) will occur. It should now be apparent to you that *the break-even point (or the sales volumes required to achieve a target profit) is not a unique number: it varies depending upon the composition of the sales mix*. Because the actual sales mix differs from the planned sales mix, the sales mix used to define a standard batch has changed from 2:1 to 1:1 and the contribution per batch changes from £390 to £240 ([1 × £150] + [1 × £90]). This means that the revised break-even point will be 650 batches (£156 000 total fixed costs/£240 contribution per batch), which converts to a sales volume of 650 units of each machine based on a 1:1 sales mix. Generally, an increase in the proportion of sales of higher contribution margin products will decrease the break-even point whereas increases in sales of the lower margin products will increase the break-even point.

OPERATING LEVERAGE

Companies can sometimes influence the proportion of fixed and variable expenses in their cost structures. For example, they may choose to either rely heavily on automated facilities (involving high fixed and low variable costs) or on manual systems (involving high variable costs and low fixed costs). The chosen cost structure can have a significant impact on profits. Consider the situation presented in Exhibit 3.1 where the managers of an airline company are considering an investment in automated ticketing equipment.

You will see from Exhibit 3.1 that it is unclear which system should be chosen. If periodic sales exceed £960 000 the automated system will result in higher profits. Automation enables the company to lower its variable costs by increasing fixed costs. This cost structure results in a greater increase in profits as sales increase compared with

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

EXHIBIT 3.1 Sensitivity of profits arising from changes in sales for an automated and manual system

An airline company is considering investing in automated ticketing equipment. The estimated sales revenues and costs for the current manual system and the proposed automated system for a typical period are as follows:

	Automated system £		*Manual system* £	
Sales revenue	1 000 000		1 000 000	
Less: Variable expenses	300 000		800 000	
Contribution	700 000	(70%)	200 000	(20%)
Less: Fixed expenses	600 000		120 000	
Profit	100 000		80 000	

The above cost structure suggests that the automated system yields the higher profits. However, if sales decline by 10 per cent the following calculations show that the manual system will result in the higher profits:

	Automated system £		*Manual system* £	
Sales revenue	900 000		900 000	
Less: Variable expenses	270 000		720 000	
Contribution	630 000	(70%)	180 000	(20%)
Less: Fixed expenses	600 000		120 000	
Profit	30 000		60 000	

What will happen if sales are 10 per cent higher than the predicted sales for the period?

	Automated system £		*Manual system* £	
Sales revenue	1 100 000		1 100 000	
Less: Variable expenses	330 000		880 000	
Contribution	770 000	(70%)	220 000	(20%)
Less: Fixed expenses	600 000		120 000	
Profit	170 000		100 000	

The sales revenue where both systems result in the same profits is £960 000. The automated system yields higher profits when periodic sales revenue exceeds £960 000 whereas the manual system gives higher profits when sales revenue is below £960 000.[a]

	Automated system £		*Manual system* £	
Sales revenue	960 000		960 000	
Less: Variable expenses	288 000		768 000	
Contribution	672 000	(70%)	192 000	(20%)
Less: Fixed expenses	600 000		120 000	
Profit	72 000		72 000	

Note

[a] The profit–volume ratio is 0.7 for the automated system and 0.2 for the manual system. Let x = periodic sales revenue: the indifference point is where $0.7x - £600\,000 = 0.2x - £120\,000$, so $x = £960\,000$.

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s). Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

the manual system. Unfortunately, it is also true that a high fixed cost and lower variable cost structure will result in a greater reduction in profits as sales decrease. The term **operating leverage** is used as a measure of the sensitivity of profits to changes in sales. The greater the **degree of operating leverage**, the more that changes in sales activity will affect profits. The degree of operating leverage can be measured for a given level of sales by the following formula:

Degree of operating leverage = Contribution margin/Profit

The degree of operating leverage in Exhibit 3.1 for sales of £1 million is 7 (£700 000/£100 000) for the automated system and 2.5 (£200 000/£80 000) for the manual system. This means that profits change by seven times more than the change in sales for the automated system and 2.5 times for the manual system. Thus, for a 10 per cent increase in sales from £1 million to £1.1 million profits increase by 70 per cent for the automated system (from £100 000 to £170 000) and by 25 per cent for the manual system (from £80 000 to £100 000). In contrast, you will see in Exhibit 3.1 that if sales decline by 10 per cent from £1 million, to £0.9 million, profits decrease by 70 per cent (from £100 000 to £30 000) for the automated system and by 25 per cent (from £80 000 to £60 000) for the manual system.

The degree of operating leverage provides useful information for the airline company in choosing between the two systems. Higher degrees of operating leverage can provide significantly greater profits when sales are increasing but higher percentage decreases will also occur when sales are declining. Higher operating leverage also results in a greater volatility in profits. The manual system has a break-even point of £600 000 sales (£120 000 fixed expenses/PV ratio of 0.2) whereas the break-even point for the automated system is £857 143 (£600 000 fixed expenses/PV ratio of 0.7). Thus, the automated system has a lower margin of safety. High operating leverage leads to higher risk arising from the greater volatility of profits and higher break-even point. On the other hand, the increase in risk provides the potential for higher profit levels (as long as sales exceed £960 000). We can conclude that if management are confident that sales will exceed £960 000 the automated system is preferable.

It is apparent from the above discussion that labour intensive organizations, such as McDonald's and Pizza Hut, have high variable costs and low fixed costs, and thus have low operating leverage. These companies can continue to report profits even when they experience wide fluctuations in sales levels. Conversely, organizations that are highly capital intensive, such as easyJet and Volkswagen, have high operating leverage. These companies must generate high sales volumes to cover fixed costs, but sales above the break-even point produce high profits. In general, these companies tend to be more vulnerable to sharp economic and business cycle swings.

COST–VOLUME–PROFIT ANALYSIS ASSUMPTIONS

It is essential that anyone preparing or interpreting CVP information is aware of the underlying assumptions on which the information has been prepared. If these assumptions are not recognized, or the analysis is modified, errors may result and incorrect conclusions

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s).
Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.

REAL WORLD VIEWS 3.5

The impact of operating leverage at Inktomi

Operating leverage can tell investors a lot about a company's risk profile, and although high operating leverage can often benefit companies, firms with high operating leverage are also vulnerable to sharp economic and business cycle swings. In good times, high operating leverage can supercharge profit. But companies with a lot of costs tied up in machinery, plants, real estate and distribution networks cannot easily cut expenses to adjust to a change in demand. So, if there is a downturn in the economy, earnings do not just fall, they can plummet.

Consider the software developer Inktomi. During the dotcom boom investors marvelled at the nature of its software business. The company spent tens of millions of dollars to develop each of its digital delivery and storage software programs. But thanks to the Internet, Inktomi's software could be distributed to customers at almost no cost. In other words, the company had close to zero cost of goods sold. After its fixed development costs were recovered, each additional sale was almost pure profit.

After the collapse of dotcom technology market demand, Inktomi suffered the dark side of operating leverage. As sales took a nosedive, profits swung dramatically to a staggering $58 million loss compared with the $1 million profit the company had enjoyed in the same period for the previous year. The high leverage involved in counting on sales to repay fixed costs can put companies and their shareholders at risk. High operating leverage during a downturn (such as the recession following the 2008 financial crisis) can be an Achilles heel, putting pressure on profit margins and making a contraction in earnings unavoidable.

Indeed, companies such as Inktomi with high operating leverage typically have larger volatility in their operating earnings and share prices. As a result, investors need to treat these companies with caution.

Discussion point

1 Provide examples of other companies that have high and low degrees of operating leverage.

Reference

Investopedia (nd) www.investopedia.com/articles/stocks/06/opleverage.asp

may be drawn from the analysis. We shall now consider these important assumptions. They are as follows:

1. All other variables remain constant.
2. A single product or constant sales mix.
3. Total costs and total revenue are linear functions of output.
4. Costs can be accurately divided into their fixed and variable elements.
5. The analysis applies only to the relevant range.
6. The analysis applies only to a short-term time horizon.

Copyright 2019 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part. Due to electronic rights, some third party content may be suppressed from the eBook and/or eChapter(s). Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. Cengage Learning reserves the right to remove additional content at any time if subsequent rights restrictions require it.