Nigel Slack and Alistair Brandon-Jones

Operations and Process Management

Principles and Practice for Strategic Impact

Sixth Edition

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PEARSON EDUCATION LIMITED
KAO Two
KAO Park
Harlow
CM17 9NA
United Kingdom
Tel: +44 (0)1279 623623
Web: www.pearson.com/uk

First published 2006 (print)
Second edition published 2009 (print)
Third edition published 2012 (print and electronic)
Fourth edition published 2015 (print and electronic)
Fifth edition published 2018 (print and electronic)
Sixth edition published 2021 (print and electronic)

ISBN: 978-1-292-35006-6 (print)
978-1-292-35010-3 (PDF)
978-1-292-35011-0 (ePub)

British Library Cataloguing-in-Publication Data
A catalogue record for the print edition is available from the British Library

Library of Congress Cataloging-in-Publication Data
Names: Slack, Nigel, author. | Brandon-Jones, Alistair, author.
Title: Operations and process management : principles and practice for strategic impact / Nigel Slack, Alistair Brandon-Jones.
Description: Sixth edition. | Harlow, England ; London ; New York : Pearson, 2021. | Includes bibliographical references and index. | Description based on print version record and CIP data provided by publisher; resource not viewed.
Identifiers: LCCN 2020055631 (print) | LCCN 2020055632 (ebook) | ISBN 9781292350103 (PDF) | ISBN 9781292350110 (ePub) | ISBN 9781292350066 (print)
Subjects: LCSH: Manufacturing processes. | Process control. | Operations research.
Classification: LCC TS183 (ebook) | LCC TS183 .O64 2021 (print) | DDC 658.5–dc23
LC record available at https://lccn.loc.gov/2020055631
LC record available at https://lccn.loc.gov/2020055632

10 9 8 7 6 5 4 3 2 1
25 24 23 22 21

Front cover image: Jackal Pan/Moment/Getty Images
Cover design by Design Deluxe
Print edition typeset in Syntax Com of 9.25/12.5 pt Regular by SPi Global
Printed in Slovakia by Neografia

NOTE THAT ANY PAGE CROSS REFERENCES REFER TO THE PRINT EDITION

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Preface

Why is operations and process management essential?

Because making operations and processes better will make the whole organisation better. Because operations and process management is about getting things done. Because without effective operations and processes there can be no long-term success for any organisation. Because it is at the heart of what all organisations do; they create value through their productive resources. Because it is the essential link that connects broad long-term strategy and day-to-day ongoing activities. This is why operations and process management has been changing. It has always been exciting, and it has always been challenging, but now it has acquired a much more prominent profile. The current edition reflects this in a number of ways.

This text stresses the importance of operations and process management

Of course, it has always been important, but increasingly managers in all types of enterprise are accepting that operations management can make or break their businesses. Effective operations management can keep costs down, enhance the potential to improve revenue, promote an appropriate allocation of capital resources and, most importantly, develop the capabilities that provide future competitive advantage.

This text stresses the real strategic impact of operations and process management

Operations are not always operational. The operations function also has a vital strategic dimension, and operations management is now expected to play a part in shaping strategic direction, not just responding to it.

This text stresses that operations and process management matters to all sectors of the economy

At one time, operations management was seen as being most relevant to manufacturing and a few types of mass-service businesses. Now the lessons are seen applying to all types of enterprise: all types of service and manufacturing, large or small organisations, public or private, for-profit or not-for-profit.

This text stresses that operations and process management is of interest to all managers

Perhaps most importantly, because operations management is accepted as being founded on the idea of managing process, and because managers in all functions of the business are now accepting that they spend much of their time managing processes, it is clear that, to some extent, all managers are operations managers. The principles and practice of operations management are therefore relevant to every manager.

This text extends the scope of operations and process management

The obvious unit of analysis of operations management is the operations function itself – the collection of resources and processes that produce products and services. But, if managers

from other functions are to be included, operations management must also address itself to process management at a more generic level. Also, no operation can consider itself in isolation from its customers, suppliers, collaborators and competitors. It must see itself as part of the extended supply network. Operations management increasingly needs to work at all three levels of analysis – the individual process, the operation itself and the supply network.

All this has implications for the way operations management is studied, especially at post-experience and postgraduate levels, and the way operations management is practised. It has also very much shaped the way this text has been structured. In addition to covering all the important topics that make the subject so powerful, it places particular emphasis on the following:

- *Principles* – that is, the core ideas that describe how operations behave, how they can be managed and how they can be improved. These are not immutable laws or prescriptions that dictate how operations *should* be managed, nor are they descriptions that simply explain or categorise issues. But they are indications of important underlying ideas.
- *Diagnosis* – an approach that questions and explores the fundamental drivers of operations performance. Aims to uncover or 'diagnose' the underlying trade-offs that operations need to overcome, and the implications and consequences of the courses of action that could be taken.
- *Practice* – anyone with managerial experience, or who is approaching careers choices, understands the importance of developing practical knowledge and skills that can be applied in practice. This requires an approach, as well as frameworks and techniques, that can be adapted to take account of the complexity and ambiguity of operations, yet give guidance to identifying and implementing potential solutions.

Who should use this text?

This text is intended to provide an introduction to operations and process management for everyone who wishes to understand the nature, principles and practice of the subject. It is aimed primarily at those who have some management experience (although no prior academic knowledge of the area is assumed), or who are about to embark on a career in management. For example:

- *MBA students* should find that its practical discussions of operations management activities enhance their own experience.
- *Postgraduate students* on other specialist masters degrees should find that it provides them with a well-grounded and, at times, critical approach to the subject.
- *Executives* should find its diagnostic structure helpful to provide an understandable route through the subject.

What makes this text distinctive?

It has a clear structure

The text is structured on a model of operations management that distinguishes between activities that contribute to the direction, design, delivery and development of operations and processes.

It is based on practical diagnostic logic

Every chapter follows a series of questions that forms a 'diagnostic logic' for the topic. These are the questions that anyone can ask to reveal the underlying state of their, or any other, operations. The questions provide an aid to diagnosing where and how an operation can be improved.

It is illustrations-based

Operations management is a practical subject and cannot be taught satisfactorily in a purely theoretical manner. Because of this, each chapter starts with a real-life example of how the topic is treated in practice and provides additional examples in relation to specific issues within each chapter.

It identifies key operations principles

Whenever a core idea of operations and process management is described in the text, a brief 'operations principle' summary is included in the margin. This helps to distil those essential points of the topic.

It includes critical commentaries

Not everyone agrees about what is the best approach to the various topics and issues within the subject. This is why we have, at the end of each chapter, included a 'critical commentary'. These are alternative views to the one being expressed in the main flow of the text. They do not necessarily represent our view, but they are worth debating.

Each chapter includes summary checklists

Each chapter is summarised in the form of a list of checklist questions. These cover the essential questions that anyone should ask if they wish to understand the way their own or any other operation works. More importantly, they can also act as prompts for operations and process improvement.

Each chapter finishes with a case study

Every chapter includes a case study, relating real or realistic situations that require analysis, decision, or both. The cases have sufficient content to serve as the basis of case sessions in class, but are short enough to serve as illustrations for the less formal reader.

Each chapter includes an 'applying the principles' section

Selected problems, short exercises and activities are included at the end of each chapter. These provide an opportunity to test out your understanding of the principles covered in the chapter.

Each chapter includes a 'taking it further' section

A short annotated list of further reading and useful websites is provided, which take the topics in the chapter further, or treat some important related issues.

Suggested 'model answers' are available for all the 'applying the principles' exercises

Answers to the first two questions are available on the companion website for students. Answers to all the questions are available to bone fide tutors and lecturers.

Instructor's manual and PowerPoint slides

Visit go.pearson.com/uk/he/resources to find valuable online resources. A dedicated updated web-based instructor's manual is available to lecturers adopting this text. It includes teaching notes for all chapters, guided solutions for all case studies in the text, guided solutions for active cases and ideas for teaching them. A set of PowerPoint slides featuring figures and illustrations from the main text is also available.

About the authors

NIGEL SLACK is an Emeritus Professor of Operations Management and Strategy at the University of Warwick, an Honorary Professor at the University of Bath and an Honorary fellow of the European Operations Management Association. Previously he has been Professor of Service Engineering at the University of Cambridge, Professor of Manufacturing Strategy at Brunel University London, a University Lecturer in Management Studies at the University of Oxford and Fellow in Operations Management at Templeton College, Oxford. He worked initially as an industrial apprentice in the hand-tool industry and then as a production engineer and production manager in light engineering. He holds a Bachelor's degree in Engineering and Master's and Doctor's degrees in Management, and is a Chartered Engineer. He is the author of many books in Operations Management, including *The Operations Advantage*, published in 2017, *Operations Management* (with Alistair Brandon-Jones), the ninth edition published in 2019, *Operations Strategy* (with Michael Lewis), the sixth edition published in 2020, *The Manufacturing Advantage*, published in 1991, *Making Management Decisions* (with Steve Cooke), published in 1991, *Service Superiority* (with Robert Johnston), published in 1993, *The Blackwell Encyclopedic Dictionary of Operations Management*, published in 1997 and *Perspectives in Operations Management* (with Michael Lewis), published in 2003. Nigel has authored numerous academic papers and chapters in books. He also acts as a consultant to many international companies around the world in many sectors, especially financial services, transport, leisure and manufacturing. His research is in the operations and manufacturing flexibility and operations strategy areas.

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Author's acknowledgements

In preparing this text, the authors, as usual, unashamedly exploited their friends and colleagues. In particular we had invaluable help from a great and distinguished reviewer team and from colleagues who have provided valuable feedback on various aspects of the project. For their help in case writing, we particularly thank: Vaggelis Giannikas, University of Bath, UK; Jas Kalra, University College London, UK; Jens Roehrich, University of Bath, UK; Nigel Spinks, Henley Business School, UK; and Brian Squire, University of Bath, UK.

Colleagues at many universities have helped and contributed to our understanding of the subject, including: Malcolm Afferson, Sheffield Hallam University, UK; Pär Åhlström, Stockholm School of Economics, Sweden; David Bamford, University of Huddersfield, UK; Vikram Bhakoo, University of Melbourne, Australia; Mattia Bianchi, Stockholm School of Economics, Sweden; Umit Bitici, Strathclyde University, UK; Briony Boydell, Portsmouth University, UK; Raffaella Cagliano, Politecnico di Milano, Italy; Dan Chicksand, Aston University, UK; Ben Clegg, Aston University, UK; Paul Coughlan, Trinity College Dublin, Ireland; Pamela Danese, University of Padova, Italy; Marc Day, Reading University, UK; Stephen Disney, Exeter University, UK; Des Doran, Kingston University, UK; Joy Field, Boton College, USA; Paul Forrester, Keele University, UK; Gino Franco, Derby University, UK; Abby Ghobadian, Reading University, UK; Janet Godsell, Warwick University, UK; Roger Hall, Huddersfield University, UK; Ingjaldur Hannibalsson, University of Iceland, Iceland; Linda Hendry, Lancaster University, UK; Matthias Holweg, Oxford University, UK; Koos Krabbendam, University of Twente, The Netherlands; Bart MacCarthy, Nottingham University, UK; John Maguire, Sunderland University, UK; Ian McCarthy, Simon Fraser University, Canada; Ronnie Mcmillan, University of Strathclyde, UK; Harvey Maylor, Cranfield University, UK; Phil Morgan, Oxford Brookes University, UK; Andy Neely, Cambridge University, UK; Steve New, Oxford University, UK; Jan Olhager, Lund University, Sweden; Carie Queenan, University of South Carolina, USA; Zoe Radnor, City, University of London, UK; Pietro Romano, Udine University, Italy; Sarah Schiffling, Lincoln University, UK; Mike Shulver, Bath University, UK; Alison Smart, University of Glasgow, UK; Rui Sousa, Universidade Católica Portuguesa, Portugal; Martin Spring, Lancaster University, UK; Venu Venugopal, Nyenrode University, The Netherlands; Ann Vereecke, Vlerick Business School, Belgium; Rohit Verma, Cornell Univerity, USA; Jan de Vries, University of Groningen, The Netherlands; Graham Walder, Wolverhampton University, UK; Helen Walker, Cardiff University, UK; and Maggie Zeng, Kent University, UK.

Our very particular thanks go to our academic colleagues in the Operations Management Group at Warwick Business School, and Information, Decisions and Operations Division in Bath School of Management. They helped, both by contributing ideas and by creating a lively and stimulating work environment.

Our thanks to colleagues at Warwick go to: Vikki Abusidualghoul; Haley Beer; Nicola Burgess; Mehmet Chakkol; Max Finne; Emily Jamieson; Mark Johnson; Pietro Micheli; Giovanni Radaelli; Ross Ritchie; Rhian Silvestro; and Chris Voss.

Our thanks to colleagues at Bath go to: Meriem Bouazzaoui; Teslim Bukoye; Melih Celik; Soheil Davari; Britt Davidson; David Ellis; Günes Erdogan; Emmanuel Fragniere; Vaggelis Giannikas; Elvan Goklap; Andrew Graves; Joanne Hinds; Adam Joinson; Richard Kamm; Gilbert Laporte; Michael Lewis; Sheik Meeran; Meng Meng; Fotios Petropoulos; Lukasz Piwek; Jens Roehrich; Ece Sanci; Gamila Shoib; Michael Shulver; Brian Squire; Oliver Thomasson; Christos Vasilakis; and Baris Yalabik.

Many practitioners also contributed, not least by keeping us honest to what really works in real operations. We thank and acknowledge: Vian Davys, CLP Holdings; David Garman, Deputy Chairman, John Menzies plc; Paul Gaskell, MD, The Value Engineers; and Tony Harpur, Ramblers Walking Holidays.

The prerequisite for any text of this type is that it serves a real market need. We were privileged to receive advice from the Pearson team; some of the most insightful people in business education publishing, in particular, Anita Atkinson, Felicity Baines and Rufus Curnow. Finally, to our families, Angela and Kathy, and Emma, Noah and George, your ongoing support is invaluable.

Nigel Slack and Alistair Brandon-Jones

1 Operations and processes

Introduction

Operations management is about how organisations produce goods and services. Every product you use and every service you experience comes to you courtesy of the operations managers who organised its production. They may not always be called operations managers, but that is what they really are. They are the people who design, run and improve the processes that produce services and products for their customers. But operations *and process* management is even wider than this. After all, managers in other functions, such as marketing, sales and finance, also manage processes. They supply internal 'customers' with services such as marketing plans, sales forecasts, budgets, and so on. In fact, all parts of all organisations are made up of processes. That is why operations and process management is of direct relevance to all managers, irrespective of what type of organisation they work for, or which function they work in. And that is what this text is about – the tasks, issues and decisions that are necessary to manage processes effectively, both within the operations function and in other parts of the business where effective process management is equally important. This first chapter is an introductory chapter, so we will examine some of the basic principles of operations and process management. The model that is developed to explain the subject is shown in Figure 1.1.

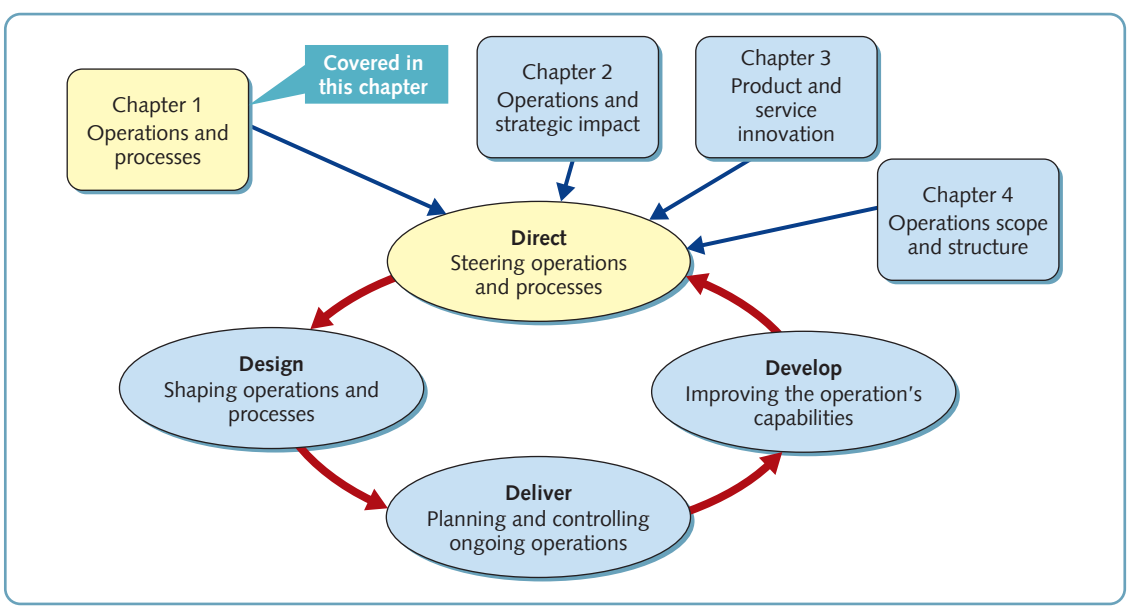
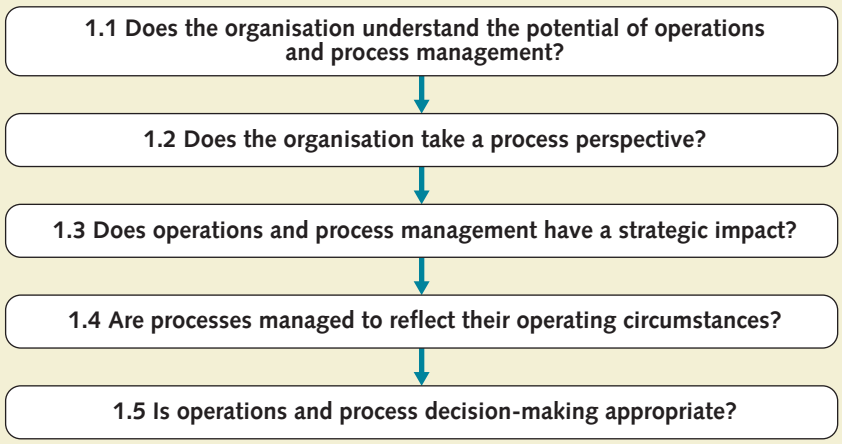


Figure 1.1 **Operations and process management is about how organisations produce goods and services**

EXECUTIVE SUMMARY



Each chapter has a short executive summary structured around the number of diagnostic questions used in the chapter. These diagnostic questions represent the basic line of enquiry that can reveal the nature and relevance of the topic covered in each chapter.

1.1 Does the organisation understand the potential of operations and process management?

The operations function is the part of the organisation that produces products or services. Every organisation has an operations function because every organisation produces some mixture of products and services. It is a central and important activity for *any* organisation. 'Operations' is not always called by that name, but whatever its name, it is always concerned with managing the core purpose of the business – serving its customers by producing some mix of products and services. 'Processes' also produce products and services, but on a smaller scale. They are the component parts of operations. But other functions also have processes that need managing. In fact *every* part of *any* business is concerned with managing processes. All managers have something to learn from studying operations and process management, because the subject encompasses the management of all types of operation, no matter in what sector or industry, and all processes, no matter in which function.

1.2 Does the organisation take a process perspective?

A 'process perspective' means understanding businesses in terms of all their individual processes. It is only one way of modelling organisations, but it is a particularly useful one. Operations and process management uses the process perspective to analyse businesses at three levels: the operations function of the business; the higher and more strategic level of the supply network; and at a lower, more operational level of individual processes. Within the business, processes are only what they are defined as being. The boundaries of each process can be drawn as thought appropriate. Sometimes this involves radically reshaping the way processes are organised, for example, to form end-to-end processes that fulfil customer needs.

1.3 Does operations and process management have a strategic impact?

Operations and process management can make or break a business. When they are well managed, operations and processes can contribute to the strategic impact of the business in four ways: cost, revenue, investment and capabilities. Because the operations function has responsibility for much of a business's cost base, its first imperative is to keep costs under control. Additionally, it should be looking to enhance the business's ability to generate revenue through the way it provides service and quality. Furthermore, all failures are ultimately process failures; well-designed processes should have less chance of failing and more chance of recovering quickly from failure. Also, because operations are often the source of much investment, it should be aiming to get the best possible return on that investment. Finally, the operations function should be laying down the capabilities that will form the long-term basis for future competitiveness.

1.4 Are processes managed to reflect their operating circumstances?

Not necessarily. Processes differ, particularly in what are known as the four Vs: volume, variety, variation and visibility. High-volume processes can exploit economies of scale and be systematised. High-variety processes require enough inbuilt flexibility to cope with the wide variety of activities expected of them. High-variation processes must be able to change their output levels to cope with highly variable and/or unpredictable levels of demand. High-visibility processes add value while the customer is 'present' in some way and therefore must be able to manage customers' perceptions of their activities. Generally, high volume together with low variety, variation and visibility facilitate low-cost processes, while low volume together with high levels of variety, variation and visibility all increase process costs. Yet in spite of these differences, operations managers use a common set of decisions and activities to manage them. These activities can be clustered under four groupings: directing the overall strategy of the operation; designing the operation's products, services and processes; planning and controlling process delivery; and developing process performance.

1.5 Is operations and process decision-making appropriate?

The range of operations decisions is wide and covers four broad areas that we categorise as: '*directing* the overall strategy of the operation'; '*designing* the operation's processes'; 'planning and control process *delivery*'; and '*developing* process performance'. However, there are always overlaps and interrelationships between the categories. Yet, no matter what type of decision, operations managers use models (many of which are included in this text) to help them make decisions. Some models are quantitative, some are qualitative, but in practice a blend of qualitative and quantitative is often the most useful approach. Remember, though, that all models are simplifications of a far more complex reality. Which is one reason for the interest in 'behavioural operations management', which attempts to incorporate real (usually non-rational) behaviour into operations decision-making.

1.1 Diagnostic question: *Does the organisation understand the potential of operations and process management?*

Operations and process management is the activity of managing the resources and processes that produce products and services, for internal and external customers. It is a central and important activity for *any* organisation. The core body of knowledge for the subject comes from 'operations management', which examines how the 'operations function' of an organisation produces products and services for external customers. In some organisations an operations manager could be called by some other name, for example, a 'fleet manager' in a logistics company, an 'administrative manager' in a hospital or a 'store manager' in a supermarket. Note also that throughout this text the terms 'the operation', 'the operations function', and 'operations', will be used, more or less interchangeably. Also 'the organisation', 'the business', 'the firm' and 'the enterprise' are used to mean whatever formal body (public or private) one is working for.

All enterprises have 'operations'

All organisations have 'operations', because all organisations produce products, services or some mixture of both. If you think that you don't have an operations function, you are wrong. If you think that your operations function is not important, you are also wrong. In most enterprises the operations function represents the bulk of its assets and the majority of its people. It is the means by which they serve their customers and provide an economic and/or social return for their stakeholders. An effective operations function has the potential to survive in a turbulent environment and the ability to maintain a steady improvement in its performance. By contrast, a poorly managed operations function, especially if it fails to provide adequate service to its customers or fails to provide the efficiency to work within its cost constraints, will always prevent an organisation from achieving its objectives, whether social or economic. But the subject does have something of an image problem. It is sometimes seen as dealing with routine, 'technical', low-level activities that obviously have to be done – but preferably by someone else. Worthy maybe, and even challenging, but neither exciting nor of direct interest to anyone outside the operations function itself. Wrong. 'Operations' is how one makes things happen. It is how organisations release whatever expertise they have, in order to create value. It is through one's operations that customers are served. It is through operations that one uses resources to their best advantage. And it is through one's operations that strategy is made into reality.

OPERATIONS PRINCIPLE
All organisations have 'operations' that produce some mix of products and services.

But not all operations are the same

Look at the six businesses illustrated in Figure 1.2. There are two financial service companies, two manufacturing companies and two hotels. All of them have *operations functions* that produce the things that their customers are willing to pay for. Hotels produce accommodation services; financial services invest, store, move or sell money and investment opportunities; and manufacturing businesses physically change the shape and the nature of materials to produce products. These businesses are from different sectors (banking, hospitality and manufacturing), but it is not that they operate in different sectors of the economy that makes these businesses different from each other. There are often bigger differences *within* economic sectors than *between* them. The main difference between how their operations activities need to be managed is more closely related to the market position that they occupy. So, for example, all three operations in the left-hand column provide value-for-money products and services and compete largely on cost. The three in the right-hand column provide more 'upmarket' products and services that are more expensive to produce and compete on some combination

OPERATIONS PRINCIPLE
The economic sector of an operation is less important in determining how it should be managed than its intrinsic characteristics.

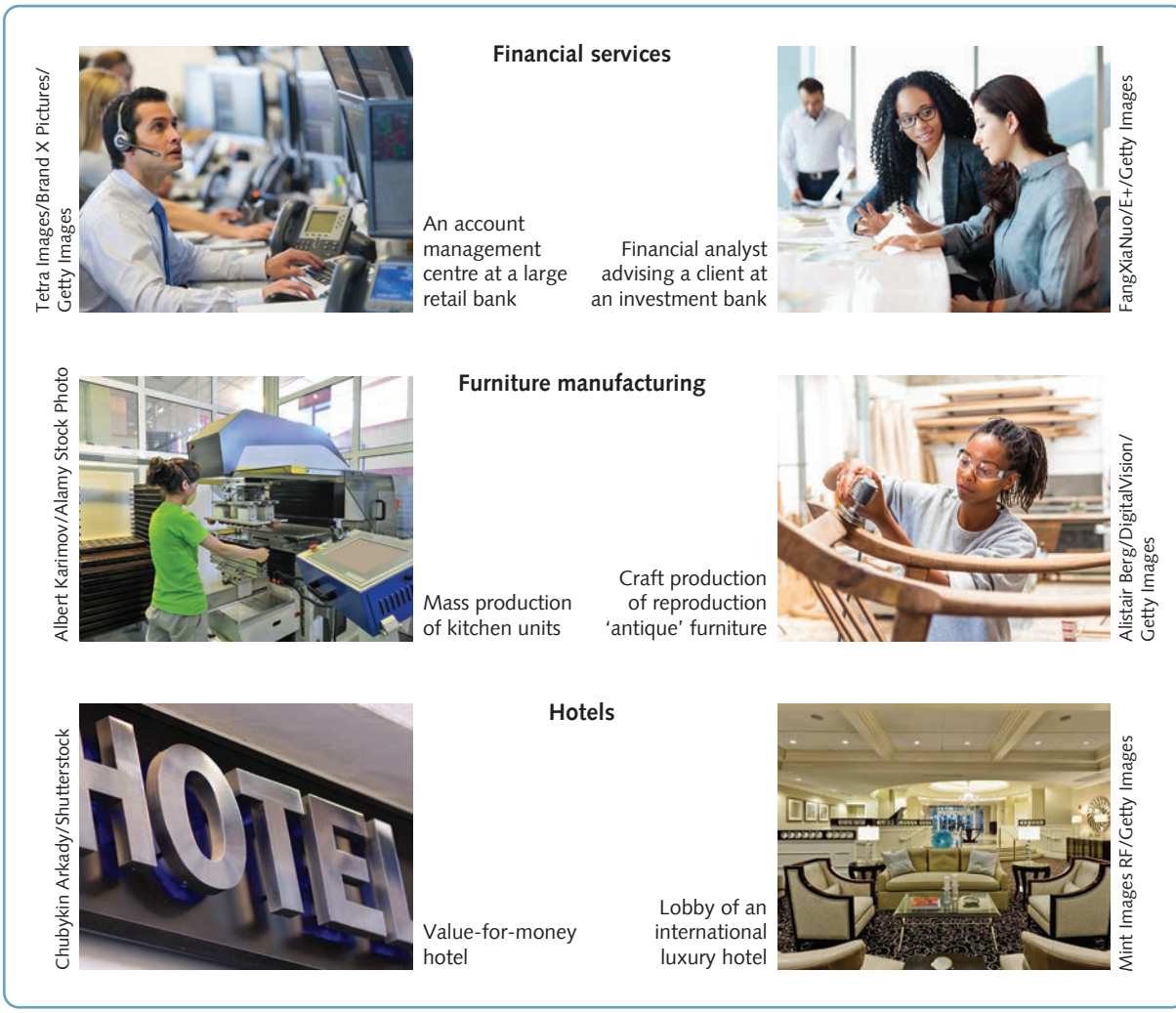


Figure 1.2 **All types of business have 'operations' because all businesses produce some mix of products and services. And the differences in the operations *within* a category of business are often greater than the differences *between* business sectors**

of high specification and customisation. The implication of this is important. It means that the surface appearance of a business and its economic sector are less important to the way its operations should be managed than the intrinsic characteristics of what it is trying to achieve, such as the volume of its output, the variety of the products and services it needs to produce and, above all, how it is trying to compete in its market.

From production to operations management

Figure 1.3 illustrates how the scope of this subject has expanded over time. Originally, operations management was almost exclusively associated with the manufacturing sector. It would have been called 'production' or 'manufacturing' management. Starting in the 1970s and 1980s the term *operations management* was used to reflect two trends. First, and most importantly, it was used to imply that many of the ideas, approaches and techniques traditionally used in the manufacturing sector could be equally applicable in the (much larger) service sector. The second use of the term was to expand the scope of 'production' in manufacturing companies to include 'non-core', but important, production-related processes such as purchasing, physical distribution, after-sales service, product development and so on.

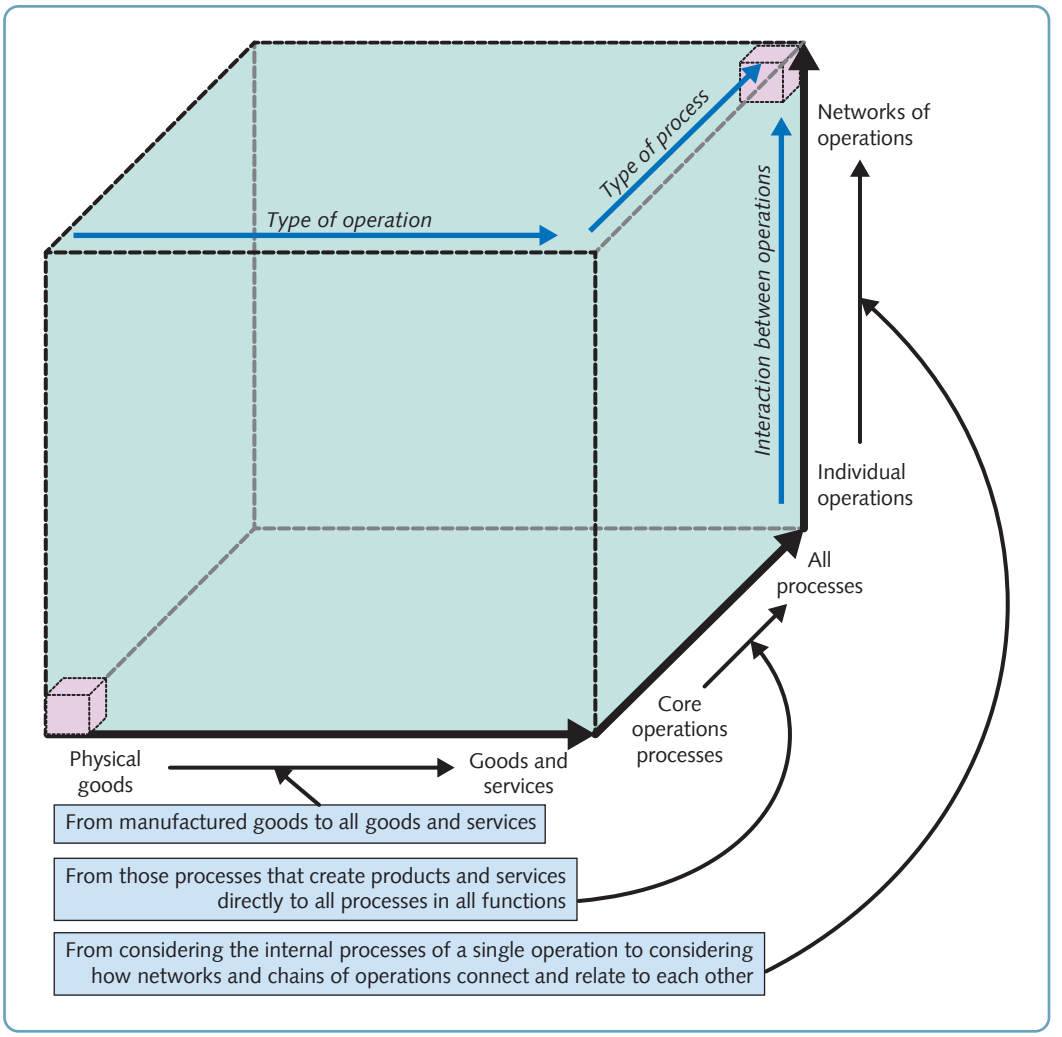


Figure 1.3 **The scope of operations management has expanded from focusing on processes in manufacturing organisations to include service organisations, processes in other functions (such as marketing, finance and HRM) and how operations interact with each other in supply networks and chains**

From operations management to operations and process management . . .

More recently the term *operations and process management* (or sometimes just process management) has been used to denote the shift in the scope of the subject to include the whole organisation. Within any business, the production of products and services is not confined to the operations function. After all, every part of any business achieves its objectives by organising its resources such as people, information systems, buildings and equipment into individual 'processes'. A 'process' is an arrangement of resources and activities that transform inputs into outputs that satisfy (internal or external) customer needs. For example, the marketing function 'produces' marketing plans and sales forecasts, the accounting function 'produces' budgets, the human resources function 'produces' development and recruitment plans, and so on. In fact *every* part of *any* business is concerned with managing processes.

The difference between *operations* and *processes* is one of scale, and therefore complexity. Both transform inputs into outputs (we shall look at this idea later), but processes are the smaller version. They are the component parts – the building blocks – of an operation. So, 'operations and process management' is the term we use to encompass the management of all

OPERATIONS PRINCIPLE
All operations are composed of processes. A process is an arrangement of resources and activities that transform inputs into outputs that satisfy (internal or external) customer needs.

types of operation, no matter in what sector or industry, and all processes, no matter in which function of the business. The general truth is that processes are everywhere, and all types of managers have something to learn from studying operations and process management. This is very much how we treat the subject in this text. That is why it is called *Operations and Process Management*: it includes an examination of the operations function in both manufacturing and service sectors, as well as the management of processes in non-operations functions.

. . . and operations and supply management

The third big development in how the subject was viewed was the (almost) universal acceptance that operations outside the conventional boundary of an enterprise would have an important effect on how it performed. The suppliers of goods and services to an operation could have as much impact on its activities as how it managed its internal resources and processes. Moreover, the boundary of an enterprise is not fixed or immutable, it is determined by decisions made by the operation itself. For example, should an operation perform activities itself, or should it outsource the activity? No operation does everything itself; some degree of outsourcing is inevitable. Therefore, confining this subject to internal activities would clearly give only a partial picture. This is why we frequently refer to operations and process-based issues in the wider 'supply network' (we shall define this term later) and devote two chapters specifically to supply network issues (Chapters 4 and 7).

Case example

Torchbox: award-winning web designers[1]

There are around two billion websites in the world. So many that we usually take them for granted, yet browsing websites as part of our studies, our job or our leisure is an activity that we all do; probably every day, probably many times each day. It's important. And, not surprisingly, there is a whole industry devoted to designing websites so that they have the right type of impact. In fact, taken over the years, web development has been one of the fastest-growing industries in the world. But it's also a tough industry. Not every web design company thrives, or even survives beyond a couple of years. To succeed, web designers need technology skills, design capabilities, business awareness and operational professionalism. One that has succeeded is Torchbox, an independent web design and development company, with offices in Oxfordshire, Bristol and Cambridge in the UK. Founded back in 2000 by Tom Dyson and Olly Willans, on Employee Ownership Day 2019 they handed over the ownership of the company to its employees, who elected a board of employee trustees to oversee the company's work and who have ultimate control over the business.

It was a move that fitted their ethos of providing high-quality, cost-effective and ethical solutions for clients who come primarily, but not exclusively, from the charity, non-governmental organisations and public sectors. *'There are a number of advantages about being a relatively small operation'*, says co-founder and Technical Director Tom Dyson, who has been responsible for the technical direction of all major developments. *'We can be hugely flexible and agile, in what is still a dynamic market. But at the same time we have the resources and skills to provide a creative and professional service. Any senior manager in a firm of our size cannot afford to be too specialised. All of us here have their own specific responsibilities; however, every one of us shares the overall responsibility for the firm's general development. We can also be clear and focused on what type of work we want to do. Our ethos is important to us. We set out to work with clients who share our commitment to environmental sustainability and responsible, ethical business practice; we take our work, and that of our clients, seriously.'*

Nevertheless, straightforward operational effectiveness is essential to Torchbox's business. *'We know how to make sure that our projects run not only on time and to budget'*, says Olly Willans, the firm's Creative Director, *'but we also like to think that we provide an enjoyable and stimulating experience – both for our customers' development teams and for our staff too. High standards of product and*

service are important to us: our clients want accessibility, usability, performance and security embedded in their web designs, and of course, they want things delivered on-time and on-budget. We are in a creative industry that depends on fast-moving technologies, but that doesn't mean that we can't also be efficient. We back everything we do with a robust feature-driven development process using a kan-ban project management methodology which helps us manage our obligations to our clients.' Tom Dyson adds, *'Using sound operations management techniques helps us constantly to deliver value to our clients. We like to think that our measured and controlled approach to handling and controlling work helps ensure that every hour we work produces an hour's worth of value for our clients and for us.'*

Maskot/Getty Images

1.2 Diagnostic question: *Does the organisation take a process perspective?*

Central to making operations and process management a significant contributor to an enterprise's success is the idea of a 'process perspective'. A process perspective means understanding that all parts of the business can be seen as processes, and that all processes can be managed using operations management principles. Yet, although important, a process perspective is not the only way of describing businesses, or any type of organisation. One could represent an organisation as a conventional 'organisational structure' that shows the reporting relationships between various departments or groups of resources. But even a little experience in any organisation shows that rarely, if ever, does this fully represent the way the organisation actually works. Alternatively, one could describe an organisation through the way it makes decisions: how it balances conflicting criteria, weighs up risks, decides on actions and learns from its mistakes. Or, one could describe an organisation by explaining its culture – its shared values, ideology, pattern of thinking and day-to-day rituals, or its power relationships – how it is governed, seeks consensus (or at least reconciliation), and so on. Or, and this is the significant point, one can represent the organisation as a collection of processes, interconnecting and (hopefully) all contributing to fulfilling its strategic aims. This is the perspective that we emphasise throughout this text. As we define it here, the process perspective analyses businesses as a collection of interrelated processes. Some of these processes will be within the operations function, and will contribute directly to the production of its products and services. Other processes will be in the other functions of the business, but will still need managing using similar principles to those within the operations function.

None of these various perspectives on organisations gives a total picture. Each perspective adds something to our ability to understand, and therefore more effectively manage a business. Nor are these perspectives mutually exclusive. A process perspective does not preclude understanding the influence of power relationships on how processes work, and so on. We use the process perspective here, not because it is the *only* useful and informative way of understanding businesses, but because it is the perspective that directly links the way we manage resources in a business with its strategic impact. Without effective process management, the best strategic plan can never become reality. The most appealing promises made to clients or customers will never be fulfilled. In addition, the process perspective has traditionally been undervalued. The subject of operations and process management has only recently come to be seen as universally applicable and, more importantly, universally valuable.

OPERATIONS PRINCIPLE
There are many valid approaches to describing organisations. The process perspective is a particularly valuable one.

Operations and process management is relevant to all parts of the business

If processes exist everywhere in the organisation, operations and process management will be a common responsibility of all managers, irrespective of which function they are in. Each function will have its 'technical' knowledge, of course. In marketing, this includes the market expertise needed for designing and shaping marketing plans; in finance, it includes the technical knowledge of financial reporting conventions. Yet each will also have an *operations* role that entails using its processes to produce plans, policies, reports and services. For example, the marketing function has processes with inputs of market information, staff, computers and so on. Its staff transforms the information into outputs such as marketing plans, advertising campaigns and sales force organisation. In this sense, all functions are operations with their own collection of processes. The implications of this are very important. As every manager, in all parts of an organisation is, to some extent, an operations manager, they all should want to give good service to their (internal) customers, and they all should want to do this efficiently. So, operations management must be relevant for all functions, units and groups within the organisation. And the concepts, approaches and techniques of operations management can be used to help improve any process in any part of the organisation.

OPERATIONS PRINCIPLE
All parts of the business manage processes so all parts of the business have an operations role and need to understand operations management.

The 'input–transformation–output' model

OPERATIONS PRINCIPLE
All processes have inputs of transforming and transformed resources that they use to create products and services.

Central to understanding the processes perspective is the idea that all processes and operations transform *inputs* into *outputs*. Figure 1.4 shows the *general transformation process model* that is used to describe the nature of processes and operations. Put simply, processes and operations take in a set of input resources, some of which are transformed into outputs of products and/or services and some of which do the transforming.

Input resources

Transformed resource inputs are the resources that are changed in some way within a process. They are usually materials, information or customers. For example, one process in a bank prints statements of accounts for its customers. In doing so, it is processing materials. In the bank's branches, customers are processed by giving them advice regarding their financial affairs, making payments, etc. However, behind the scenes, most of the bank's processes are concerned

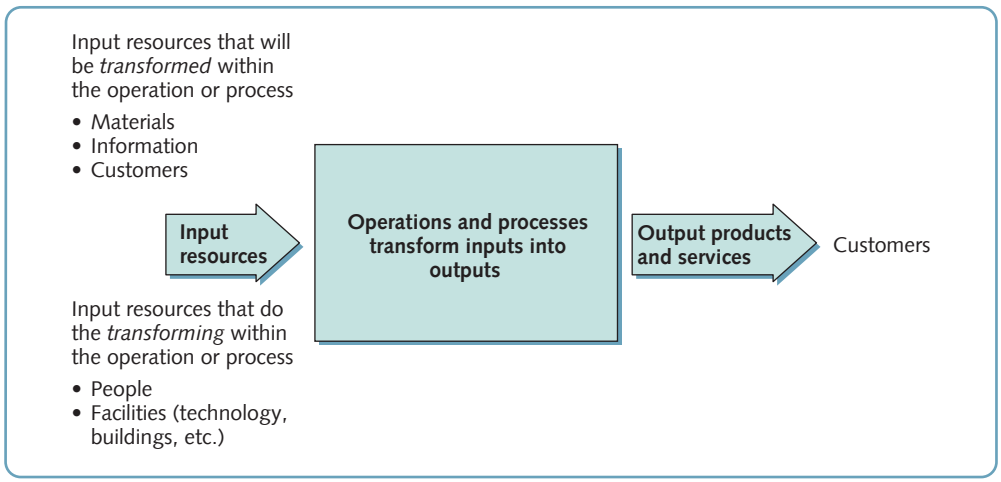


Figure 1.4 **All processes and operations are input–transformation–output systems that use 'transforming' resources to work on 'transformed' resources in order to produce products and services**