Operations and Process Management Principles and Practice for Strategic Impact Fourth Edition

HHIG

Illin mettl in

Nigel Slack Alistair Brandon-Jones Robert Johnston Alan Betts

OPERATIONS AND PROCESS MANAGEMENT

PEARSON

At Pearson, we have a simple mission: to help people make more of their lives through learning.

We combine innovative learning technology with trusted content and educational expertise to provide engaging and effective learning experiences that serve people wherever and whenever they are learning.

From classroom to boardroom, our curriculum materials, digital learning tools and testing programmes help to educate millions of people worldwide – more than any other private enterprise.

Every day our work helps learning flourish, and wherever learning flourishes, so do people.

To learn more, please visit us at www.pearson.com/uk

OPERATIONS AND PROCESS MANAGEMENT

Principles and Practice for Strategic Impact

Fourth Edition

Nigel Slack Alistair Brandon-Jones Robert Johnston Alan Betts



Harlow, England • London • New York • Boston • San Francisco • Toronto • Sydney Auckland • Singapore • Hong Kong • Tokyo • Seoul • Taipei • New Delhi Cape Town • São Paulo • Mexico City • Madrid • Amsterdam • Munich • Paris • Milan

PEARSON EDUCATION LIMITED

Edinburgh Gate Harlow CM20 2JE 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)

© Pearson Education Limited 2006, 2009 (print) © Pearson Education Limited 2012, 2015 (print and electronic)

The rights of Nigel Slack, Alistair Brandon-Jones, Alan Betts and Robert Johnston to be identified as authors of this work have been asserted by them in accordance with the Copyright, Designs and Patents Act 1988.

The print publication is protected by copyright. Prior to any prohibited reproduction, storage in a retrieval system, distribution or transmission in any form or by any means, electronic, mechanical, recording or otherwise, permission should be obtained from the publisher or, where applicable, a licence permitting restricted copying in the United Kingdom should be obtained from the Copyright Licensing Agency Ltd, Saffron House, 6–10 Kirby Street, London EC1N 8TS.

The ePublication is protected by copyright and must not be copied, reproduced, transferred, distributed, leased, licensed or publicly performed or used in any way except as specifically permitted in writing by the publishers, as allowed under the terms and conditions under which it was purchased, or as strictly permitted by applicable copyright law. Any unauthorised distribution or use of this text may be a direct infringement of the author's and the publishers' rights and those responsible may be liable in law accordingly.

All trademarks used herein are the property of their respective owners. The use of any trademark in this text does not vest in the author or publisher any trademark ownership rights in such trademarks, nor does the use of such trademarks imply any affiliation with or endorsement of this book by such owners.

Pearson Education is not responsible for the content of third-party internet sites.

ISBN: 978–1-292–01784–6 (print) 978–1-292–01787–7 (PDF) 978–1-292–01785–3 (eText)

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

A catalog record for the print edition is available from the Library of Congress

10 9 8 7 6 5 4 3 2 1 19 18 17 16 15

Cover image © Getty Images.

Print edition typeset in 9.25/12.5 pt Syntax Com by 71 Print edition printed and bound in Slovakia by Neografia

NOTE THAT ANY PAGE CROSS REFERENCES REFER TO THE PRINT EDITION

Brief Contents

Guide to case studies	xiii
Preface	xv
About the authors	xix
Acknowledgements	xxi
Operations and processes	1
Operations strategy	35
Supply network design	73
Process design 1 – positioning	115
Process design 2 – analysis	143
Designing the innovation process	187
Supply chain management	221
Capacity management	255
Inventory management	289
Resource planning and control	321
Lean synchronisation	361
Quality management	395
Improvement	435
Risk and resilience	475
Project management	507
Index	541
	Preface About the authors Acknowledgements Operations and processes Operations strategy Supply network design Process design 1 – positioning Process design 2 – analysis Designing the innovation process Supply chain management Capacity management Inventory management Resource planning and control Lean synchronisation Quality management Improvement Risk and resilience Project management

Contents

	Guide to case studies	xiii
	Preface	xv
	About the authors	xix
	Acknowledgements	xxi
1	Operations and processes	1
	Executive summary	2
	What is operations and process management?	4
	Does the business take a process perspective?	9
	Does operations and process management have a strategic impact?	18
	Should all processes be managed in the same way?	21
	Critical commentary	26
	Summary checklist	27
	Case study: Design house partnerships at Concept Design Services	28
	Applying the principles	31
	Notes on chapter	32
	Taking it further	33
	Useful websites	33
2	Operations strategy	35
	Executive summary	36
	What is operations strategy?	38
	Does the operation have a strategy?	41
	Does operations strategy make sense from the top and the bottom of the business?	51
	Does operations strategy align market requirements with operations resources?	54
	Does operations strategy set an improvement path?	59
	Critical commentary	63
	Summary checklist	64
	Case study: McDonald's: half a century of growth	65
	Applying the principles	69
	Notes on chapter	70
	Taking it further	70
	Useful websites	71

3	Supply network design	73
	Executive summary	74
	What is supply network design?	76
	How should the supply network be configured?	80
	Where should operations be located?	85
	How much capacity should each operation in the supply network have?	89
	Critical commentary	95
	Summary checklist	97
	Case study: Disneyland Resort Paris (abridged)	98
	Applying the principles	103
	Notes on chapter	103
	Taking it further	104
	Useful websites	105
	Supplement: Forecasting	106
4	Process design 1 - positioning	115
	Executive summary	116
	What is process design – positioning?	118
	Do processes match volume-variety requirements?	121
	Are process layouts appropriate?	126
	Is process technology appropriate?	131
	Are job designs appropriate?	133
	Critical commentary	137
	Summary checklist	138
	Case study: McPherson Charles Solicitors	139
	Applying the principles	141
	Notes on chapter	142
	Taking it further	142
	Useful websites	142
5	Process design 2 - analysis	143
	Executive summary	144
	What is process design – analysis?	146
	Are process performance objectives understood?	149
	How are processes currently designed?	151
	Are processes tasks and capacity configured appropriately?	156
	Is process variability recognised?	166
	Critical commentary	171
	Summary checklist	172
	Case study: The Action Response Applications Processing Unit (ARAPU)	173
	Applying the principles	175
	Notes on chapter	177

		Contents IX
	Taking it further	177
	Supplement: Queuing analysis	178
6	Designing the innovation process	187
	Executive summary	188
	What is innovation and why does it matter?	190
	Are the innovation process objectives specified?	195
	Is the innovation process defined?	198
	Are the resources for developing innovations adequate?	204
	Is the design of the offering and of the process simultaneous?	208
	Critical commentary	214
	Summary checklist	215
	Case study: Developing 'Savory Rosti-crisps' at Dreddo Dan's	216
	Applying the principles	218
	Notes on chapter	219
	Taking it further	219
	Useful websites	220
7	Supply chain management	221
	Executive summary	222
	What is supply chain management?	224
	Are supply chain objectives clear?	229
	How should supply chain relationships be managed?	234
	How should the supply side be managed?	236
	How should the demand side be managed?	241
	Are supply chain dynamics under control?	244
	Critical commentary	247
	Summary checklist	249
	Case study: Supplying fast fashion	250
	Applying the principles	252
	Notes on chapter	253
	Taking it further	254
	Useful websites	254
8	Capacity management	255
	Executive summary	256
	What is capacity management?	258
	What is the operation's current capacity?	261
	How well are demand-capacity mismatches understood?	265
	What should be the operation's base capacity?	268
	How can demand-capacity mismatches be managed?	270

277
280
281
282
287
288
288
288

9 Inventory management

289

321

Executive summary	290
What is inventory management?	292
Why should there be any inventory?	296
Is the right quantity being ordered?	300
Are inventory orders being placed at the right time?	308
Is inventory being controlled effectively?	311
Critical commentary	315
Summary checklist	316
Case study: supplies4medics.com	317
Applying the principles	319
Notes on chapter	319
Taking it further	320
Useful websites	320

10 Resource planning and control

Executive summary 322 What is resource planning and control? 324 Does resource planning and control have all the right elements? 326 Is resource planning and control information integrated? 331 Are core planning and control activities effective? 335 Critical commentary 345 Summary checklist 347 Case study: subText Studios Singapore 348 Applying the principles 351 Notes on chapter 352 Taking it further 353 Useful websites 353 Supplement: Materials requirements planning (MRP) 354

11	Lean synchronisation	361
	Executive summary	362
	What is lean synchronisation?	364

	What are the barriers to 'lean synchronisation'?	369
	Is flow streamlined?	374
	Does supply exactly match demand?	377
	Are processes flexible?	379
	Is variability minimised?	380
	Is lean synchronisation applied throughout the supply network?	383
	Critical commentary	386
	Summary checklist	389
	Case study: Lean implementation in the National Tax Service	390
	Applying the principles	392
	Notes on chapter	393
	Taking it further	393
	Useful websites	394
12	Quality management	395
	Executive summary	396
	What is quality management?	398
	Is the idea of quality management universally understood and applied?	401
	Is 'quality' adequately defined?	404
	Is 'quality' adequately measured?	407
	Is 'quality' adequately controlled?	411
	Does quality management always lead to improvement?	415
	Critical commentary	417
	Summary checklist	418
	Case study: Turnround at the Preston plant	419
	Applying the principles	421
	Notes on chapter	422
	Taking it further	422
	Useful websites	423
	Supplement: Statistical process control (SPC)	424
13	Improvement	435
	Executive summary	436

Executive summary	436
What is improvement?	438
What is the gap between current and required performance?	442
What is the most appropriate improvement path?	453
What techniques should be used to facilitate improvement?	459
How can improvement be made to stick?	463
Critical commentary	467
Summary checklist	468
Case study: GCR Insurance	469
Applying the principles	472

I	Notes on chapter	473
-	Taking it further	473
	Useful websites	474

14 Risk and resilience

Executive summary	476
What are risk and resilience?	478
Have potential failure points been assessed?	481
Have failure prevention measures been implemented?	489
Have failure mitigation measures been implemented?	493
Have failure recovery measures been implemented?	497
Critical commentary	500
Summary checklist	501
Case study: Slagelse Industrial Services (SIS)	502
Applying the principles	503
Notes on chapter	504
Taking it further	505
Useful websites	505

15 Project management

Executive summary	508
What is project management?	510
Are the nature of the project and its stakeholders understood?	513
Is the project well defined?	520
Is project management adequate?	521
Has the project been adequately planned?	523
Is the project adequately controlled?	530
Critical commentary	533
Summary checklist	534
Case study: United Photonics Malaysia Sdn Bhd	535
Applying the principles	538
Notes on chapter	540
Taking it further	540
Useful websites	540

Index

Guide to case studies

Chapter	Company name and description	Region	Manufacturing/ service	Company size	Topics/techniques
Chapter 1 Operations and processes	Design House Partnerships at Concept Design Services	Europe	M, S	Medium	Role of operations, process objectives, types of operation and process
Chapter 2 Operations strategy	McDonald's: half a century of growth	World	S	Large	Operations strategy, operations objectives, strategic fit
Chapter 3 Supply network design	Disneyland Resort Paris (abridged)	France	S	Large	Location strategy, service design, capacity, job design
Chapter 4 Process design 1 – positioning	McPherson Charles Solicitors	UK	S	Medium	Process design, job design. Process technology, process resourcing
Chapter 5 Process design 2 – analysis	The Action Response Applications Processing Unit (ARAPU)	Africa, Asia, UK	S	Small	Process design, process mapping, balancing, Little's law
Chapter 6 Designing the innovation process	Developing 'Savory Rosti-crisps' at Dreddo Dan's	World	Μ	Large	Product development, operations strategy, process performance
Chapter 7 Supply chain management	Supplying fast fashion	World	S M	Large	Outsourcing, supply chain design, fast response
Chapter 8 Capacity management	Blackberry Hill Farm	UK	SM	Small	Capacity management, forecasting, cumulative production and demand plotting
Chapter 9 Inventory management	supplies4medics.com	Europe	S	Medium	Inventory management, Inventory information systems, ABC analysis
Chapter 10 Resource planning and control	subText Studios Singapore	Singapore	S	Medium	Planning and control, Gantt charts, activity monitoring, controlling activities
Chapter 11 Lean synchronisation	Lean implementation in the National Tax Service	World	S	Large	Improvement principles, lean philosophy, change management, public sector operations
Chapter 12 Quality management	Turnround at the Preston plant	Canada	Μ	Medium	Improvement principles, statistical process control, process learning, operations capabilities
Chapter 13 Improvement	GCR Insurance	World	S	Large	Improvement principles, Six Sigma, change management
Chapter 14 Risk and resilience	Slagelse Industrial Services (SIS)	Denmark	S M	Large	Risk, failure prevention, supplier selection, relationship management
Chapter 15 Project management	United Photonics Malaysia Sdn Bhd	Malaysia	S	Large	Project planning, project risk, project monitoring



Preface

Because it 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 4th edition of this book reflects this in a number of ways.

It 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 important, develop the capabilities that provide for future competitive advantage.

It stresses the real strategic impact 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.

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

At one time operations management was seen as being of most relevance to manufacturing and a few types of mass service businesses. Now the lessons are seen as 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.

It 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 relevant to every manager.

It 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 book 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, which 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 book?

This book 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 helps to provide an understandable route through the subject.

What makes this book distinctive?

It has a clear structure

The book 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 uses diagnostic logic chains

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 two real-life examples 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 takes the topics in the chapter further, or treats some important related issues.

Instructor's manual and PowerPoint slides

Visit www.pearsoned.co.uk/slack to find valuable online resources. A dedicated new Web-based instructor's manual is available to lecturers adopting this textbook. It includes teaching notes for all chapters, guided solutions for all case studies in the book, guided solutions for active cases and ideas for teaching with them. A set of PowerPoint slides featuring figures and illustrations from the main text is also available.

About the authors

NIGEL SLACK is Emeritus Professor of Operations Management and Strategy at Warwick University. Previously he was Professor of Service Engineering at Cambridge University, Professor of Manufacturing Strategy and Lucas Professor of Manufacturing System Engineering at Brunel University, University Lecturer in Management Studies at Oxford University 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 is a chartered engineer, and the author of numerous publications in the operations management area, including books, academic papers and chapters in books. Most recently, in 2013, Operations Management, 7th edition and 2011 Essentials of Operations Management, both with Alistair Brandon-Jones and Robert Johnston and published by Pearson. He is also the author and editor of other books including, The Blackwell Encyclopaedic Dictionary of Operations Management, 3rd edition, published by Blackwell in 2015; Operations Strategy, 4th edition, published by Pearson in 2015, and Perspectives in Operations Management (Volumes I to IV), published by Routledge in 2003, all three with Michael Lewis of Bath University. 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 process management operations strategy areas.

ALISTAIR BRANDON-JONES is a Professor in Operations and Supply Management and Associate Dean for Post-Experience Education at the University of Bath School of Management. He formerly held academic positions at Manchester Business School (Reader), Bath School of Management (Assistant and Associate Professor), and Warwick Business School (Teaching Fellow), where he also completed his PhD. His other co-authored books include Operations Management, 7th edition (2013), Essentials of Operations Management (2011) and Quantitative Analysis in Operations Management (2008). Alistair is an active empirical researcher focusing on e-enabled operations and supply management, healthcare operations and professional services. This work, supported by a range of grants, has been published in leading management journals. Alistair has consulting and executive development experience with

organisations around the world, in various sectors including petrochemicals, health, financial services, manufacturing, defence and government. In addition, he has won several university, national and international awards for teaching excellence.

ROBERT JOHNSTON was Professor of Operations Management at Warwick Business School and its Deputy Dean. He was the founding editor of the International Journal of Service Industry Management and he also served on the editorial board of the Journal of Operations Management and the International Journal of Tourism and Hospitality Research. He was the author of the market-leading text Service Operations Management (with Graham Clark), now in its 4th edition (2012), published by Financial Times Prentice Hall. Before moving to academia, Professor Johnston held several line management and senior management posts in a number of service organisations in both the public and private sectors. As a specialist in service operations, his research interests included service design, service recovery, performance measurement and service quality. He was the author or co-author of many books, as well as chapters in other texts, numerous papers and case studies.

We very much regret that our friend and colleague Bob Johnston passed away shortly before the preparation of this edition. He is greatly missed by all his many friends, colleagues and students.

ALAN BETTS is a freelance consultant and trainer working, primarily, with executives of service organisations to apply the principles of operations and process management. Following a career in financial services, Alan completed Institute of Personnel and Development qualifications and an MA in Human Resource Management and moved to the Operations Management group at Warwick Business School as a Senior Research Fellow. His chief interests are the development of innovative approaches to e-learning and m-learning, together with the coaching and development of managers and executives. Alan is a director of Bedford Falls Learning Limited, HT2 Limited and Capability Development Limited. He is a visiting Professor at the University of San Diego and is a Fellow of the Royal Society of Arts.

Acknowledgements

In preparing this book, the authors, as usual, unashamedly exploited their friends and colleagues. In particular, we had invaluable help from a great and distinguished reviewer team and for colleagues who have provided valuable feedback on various aspects of the project. For their help we are particularly grateful to:

Pär Åhlström, Stockholm School of Economics, Sweden Malcolm Afferson, Sheffield Hallam University, UK David Bamford, University of Huddersfield, UK Vikram Bhakoo, University of Melbourne, Australia Mattia Bianchi, Stockholm School of Economics, Sweden Umit Bitici, Strathclyde University, UK Emma Brandon-Jones, University of Bath Briony Boydell, Portsmouth University, UK Raffaella Cagliano, Politecnico di Milano Dan Chicksand, Aston University Ben Clegg, Aston University Paul Coughlan, Trinity College Dublin, Ireland Pamela Danese, University of Padova Marc Day, Reading University, UK Stephen Disney, Cardiff University, UK Des Doran, Kingston University, UK Joy Field, Boston College, USA Paul Forrester, Keele University, UK Gino Franco, Derby University, UK Abby Ghobadian, Reading University, UK Janet Godsell, Warwick University Roger Hall, Huddersfield University, UK Ingjaldur Hannibalsson, University of Iceland, Iceland Linda Hendry, Lancaster University Matthias Holweg, Oxford University, UK Koos Krabbendam, University of Twente, The Netherlands Bart MacCarthy, Nottingham University, UK John Maguire, Sunderland University, UK Harvey Maylor, Cranfield University, UK Duncan McFarlane, Cambridge University, UK Ian McCarthy, Simon Fraser University, Canada Ronnie Mcmillan, University of Strathclyde, UK Phil Morgan, Oxford Brookes University, UK Andy Neely, Cambridge University, UK Steve New, Oxford University, UK Carrie Queena, University of South Carolina, USA Peter Race, Reading University, UK Pietro Romano, Usine University Sarah Schiffling, Lincoln University Mike Shulver, Birmingham University Alison Smart, Manchester Business School, University of Manchester, UK Rui Sousa, Universidade Católica Portuguesa Nigel Spinks, Reading University, UK Martin Spring, Lancaster University, UK Jan Olhager, Lund University Zoe Radnor, Loughborough University, UK

Rohit Verma, Cornell University, USA Venu Venugopal, Nyenrode University, The Netherlands Ann Vereecke, Vlerick Business School Jan de Vries, University of Groningen, The Netherlands Graham Walder, Wolverhampton University, UK Helen Walker, Cardiff University, UK Maggie Zeng, Gloucestershire University

Our academic colleagues in the Operations Management Group at Warwick Business School and the School of Management at Bath University also helped, both by contributing ideas and by creating a lively and stimulating work environment. Our thanks to colleagues at Warwick go to:

Nicola Burgess Mehmet Chakkol Max Finne Emily Jamieson Mark Johnson Pietro Micheli Nigel Pye Ross Richie Rhian Silvestro Nick Wake Chris Voss

Our thanks to colleagues at Bath go to:

Brian Squire Andrew Graves Chris Archer-Brown Emma Brandon-Jones Jie Chen Günes Erdogan Marco Formentini **Emmanuel Fragniere** Jooyoung Jeon **Richard Kamm** Mike Lewis Sheik Meeran Niki Panteli Dimitris Paraskevopoulos Joao Quariguasi Frota Neto Jens Roehrich Christos Vasilakis Baris Yalabik

The prerequisite for any book 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, Kate Brewin. Our thanks also go to Janey Webb at Pearson Education. Although not directly involved with this edition, without her considerable effort, enthusiasm, common sense and professional dedication, the first edition of this project would have been significantly impaired.

Publisher's acknowledgements

We are grateful to the following for permission to reproduce copyright material:

Figures

Figure 15.4 from *Reinventing Project Management: The Diamond Approach to Successful Growth and Innovation*, Harvard Business School Press (Shenhar, A.J. and Dvir, D. 2007) p. 14, Figure 1-2, Copyright © 2007 by the Harvard Business Publishing Corporation, all rights reserved. Reprinted by permission of Harvard Business Review Press.

Tables

Table 13.2 adapted from Kaizen—*The Key To Japan's Competitive Success*, McGraw-Hill (Imai, M. 1986) p. 24, Figure 2.1, © 1986 McGraw-Hill Education.

Photos

The publisher would like to thank the following for their kind permission to reproduce their photographs:

(Key: b-bottom; c-centre; l-left; r-right; t-top)

123RF.com: 148, Kevin George 5bl, Andrew Mayovskyy 487, Igor Zakharevich 489; Alamy Images: Apex News and Pictures Agency 39, Arcaid Images 526, Derek Audette 348, Roger Bamber 263, By Ian Miles-Flashpoint Pictures 5cl, Bill Cheyrou 449, David Pearson 61, D. Hurst 78, Image Source 403, Thomas Jackson 227, Justin Kase z02z 226, Art Kowalsky 368, laboratory 451, Hannu Liivaar 367, M4OS Photos 259, Paul Marriott 119, Mediablitzimages (UK) Ltd 216, North Wind Picture Archives 206, Paul Painter 5tl, Hugh Threlfall 28, World of Asia 439, Zoonar GmbH 376; Alistair Brandon-Jones: 272; Bridgeman Art Library Ltd: The Swedish Warship 'Vasa' (gouache on paper), Bruce, Ralph (20th centrury) (after) / Private Collection / © Look and Learn / Bridgeman Images 512; Corbis: Zakir Hossain Chowdhury / NurPhoto / NurPhoto 79, MICHAEL SPOONEYBARGER / Reuters 497, Raf Willems 5cr; Courtesy of Dyson: 190; Digital Vision: 295; Getty Images: China Photos 500, Hendrik Holler / LOOK-foto 274, Janet Kimber 139, Ian MacNichol 480, Franciscus Tan 146, Ron Vesely 275, Paul Zimmerman 371; Imagemore Co., Ltd: 317; Imagestate Media: John Foxx Collection 282, 399; PhotoDisc: Mitch Hrdlicka 406, Nick Rowe 294, Kim Steele 419; Shutterstock. com: Alhovik 324, Aaron Amat 535, anyunov 502, Archman 120, August_0802 5br, Anna Baburkina 479, Diego Cervo 7, Konstantin Chagin 5tr, Deymos Photo 98, Foodpics 438, HANA 398, highviews 414, InnervisionArt 250, Brian A Jackson 469, Minerva Studio 191, morrison77 40, Massimiliano Pieraccini 260, shadow216 511, StudioSmart 337, Jordan Tan 325, Toria 8, Tania Zbrodko 460, zhangyang13576997233 173, Zurijeta 65

All other images © Pearson Education

In some instances we have been unable to trace the owners of copyright material, and we would appreciate any information that would enable us to do so.

Operations and processes

Introduction

Operations and process management is about how organisations produce goods and services. Everything you wear, eat, use, or read comes to you courtesy of the operations managers who organised its production, as does every bank transaction, hospital visit, and hotel stay. The people who produced them may not always be called operations managers, but that is what they really are. Within the operations function of any enterprise, operations managers look after the processes that produce services and products. But operations and process management is even wider than this. Managers in other functions, such as Marketing, Sales and Finance, also manage processes. These processes often 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 which function they work in. And that is what this book 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 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.

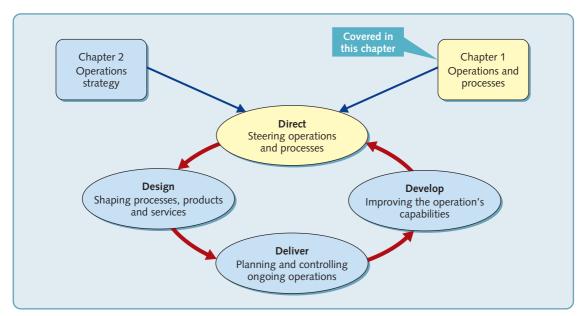
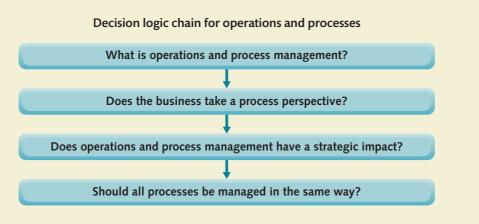


Figure 1.1 Operations and process management is about how organisations produce goods and services

EXECUTIVE SUMMARY



Each chapter has a short executive summary structured around the 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.

What is 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. 'Operations' is not always called by that name, but whatever its name, it is always concerned with managing the core purpose of the business – producing some mix of products and services. Processes also produces 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.

Does the business 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.

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. But also, through the way it provides service and quality it should be looking to enhance the business's ability to generate revenue. 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.

Should all processes be managed in the same way?

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.

DIAGNOSTIC QUESTION

What is operations and process management?



Operations and process management is the activity of managing the resources and processes that produce products and services. The core body of knowledge for the subject comes from 'operations management', which examines how the 'operations function' of a business produces products and services for external customers. We also use the shorter terms 'the operation' or 'operations', interchangeably with the 'operations function'. 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.

All business have 'operations', because all businesses 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. Look at the six businesses illustrated in Figure 1.2. There are two financial service companies, two manufac-

OPERATIONS PRINCIPLE All organisations have 'operations' that produce some mix of products and services. turing 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 us 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 the main difference between their operations activities are not necessarily what one expects. There are often bigger differences *within* economic sectors than *between* them. All the 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

OPERATIONS PRINCIPLE

The economic sector of an operation is less important in determining how it should be managed than its intrinsic characteristics. 'up-market' products and services that are more expensive to produce and compete on some combination 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 its intrinsic characteristics, such as the volume of its output, the variety of different products and services it needs to produce, and, above all, how it is trying to compete in its market.

Operations and process management

Within the operations shown in Figure 1.2, resources such as people, information systems, buildings and equipment will be organised into several individual 'processes'. A 'process' is an arrangement of resources and activities that transform inputs into outputs that satisfy (internal or external) customer needs. So, amongst other processes, banking operations contain

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. account management processes, hotel operations contain room cleaning processes, furniture manufacturing operations contain assembly processes, and so on. The difference between *operations* and *processes* is one of scale, and therefore complexity. Both transform inputs into outputs, but processes are the smaller version. They are the component parts of operations, so the total operations function is made up of individual processes. But, within any business, the production of products and services is not confined to the operations function. For example, the marketing function 'produces'



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

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. So, 'operations and process management', is the term we use to encompass the management of all 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 manager have something to learn from studying operations and process management.

From 'production', to 'operations', to 'operations and process' management

Figure 1.3 illustrates how the scope of this subject has expanded. Originally, operations management was seen as very much associated with the manufacturing sector. In fact it would have been called 'production' or 'manufacturing' management, and was concerned exclusively with the core business of producing physical products. Starting in the 1970s and 1980s the term *operations management* became more common. It 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 production of

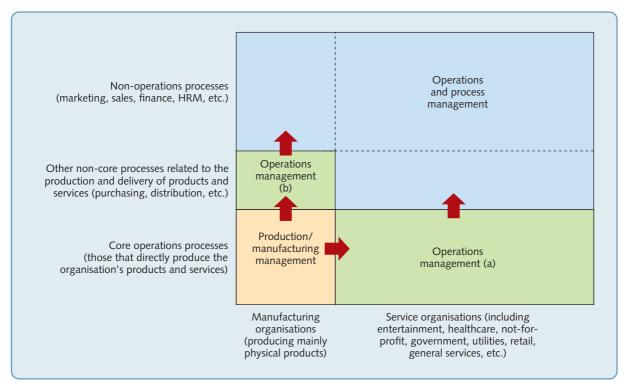


Figure 1.3 Operations management has expanded from treating only the core production processes in manufacturing organisations to include service organisations, non-core operations processes and processes in other functions such as marketing, finance and HRM

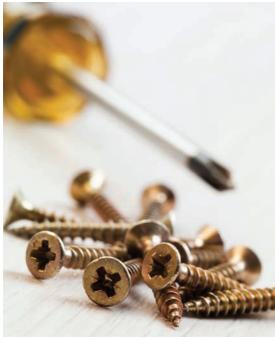
services. The second use of the term was to expand the scope of 'production' in manufacturing companies to include, not just the core processes that directly produce products, but also the non-core production-related processes that contribute to the production and delivery of product. This would include such processes as purchasing, physical distribution, after sales service, and so on. 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. It is a far wider term than operations management because it applies to all parts of the organisation. This is very much how we treat the subject in this book. That is why it is called 'Operations and *Process Management'*. It includes the examination of the operations function in both manufacturing and service sectors and also the management of processes in non-operations functions.

Towards the beginning of all chapters we present two examples of individual businesses, or types of business, that illustrate the topic being examined in the chapter. Here we look at two businesses, one service company, and one manufacturing company, which have succeeded in large part because of their effective use of operations and process management principles.

EXAMPLE

IKEA¹

It's the school holidays in an IKEA superstore in London, and parents with children in tow are crowding the isles and café area. Families push their way past the 'Anniversary Edition' of the 'Billy' bookcase (one of the firm's most popular products) proudly displayed by the entrance. Looking at the crowds it is easy to believe that IKEA is the most successful furniture retailer ever. With stores all over the world, they have managed to develop their own special way of selling furniture. Their stores' layout means customers often spend two hours in the store – far longer than in rival furniture retailers. IKEA's philosophy goes back to the original business,



started in the 1950s in Sweden by Ingvar Kamprad. He built a showroom on the outskirts of Stockholm where land was cheap and simply set the furniture out as it would be in a domestic setting. Also, instead of moving the furniture from the warehouse to the showroom area, he asked customers themselves to pick the furniture up from the warehouse – still the basis of IKEA's process today.

The stores are all designed to facilitate the smooth flow of customers, from parking, moving through the store itself, to ordering and picking up goods. At the entrance to each store large notice-boards provide advice to shoppers who have not used the store before. For young children, there is a supervised children's play area, a small cinema, a parent and baby room, and toilets, so parents can leave their children in the supervised play area for a time. Parents are recalled via the loudspeaker system if the child has any problems. IKEA 'allow customers to make up their minds in their own time' but 'information points' have staff who can help. All furniture carries a ticket with a code number which indicates its location in the warehouse. (For larger items customers go to the information desks for assistance.)

There is also an area where smaller items are displayed, and can be picked directly. Customers then pass through the warehouse where they pick up the items viewed in the showroom. Finally, customers pay at the checkouts, where a ramped conveyor belt moves purchases up to the checkout staff. The exit area has service points, and a loading area that allows customers to bring their cars from the car park and load their purchases.

IKEA's success is founded on 'listening to its customers' and a disciplined (some would say, obsessive) elimination of waste in its processes; not just its retail processes, but also its design, distribution and administrative processes. Yet success brings its own problems and some customers became increasingly frustrated with overcrowding and long waiting times. In response, IKEA in the UK launched a programme to 'design out' the bottlenecks. The changes included:

- clearly marked in-store short cuts allowing customers who just want to visit one area to avoid having to go through all the preceding areas
- express checkout tills for customers with a bag only rather than a trolley
- extra 'help staff' at key points to help customers
- redesigned car parks, making them easier to navigate
- dropping the ban on taking trolleys out to the car parks for loading (originally implemented to stop vehicles being damaged)
- a new warehouse system to stop popular product lines running out during the day
- more children's play areas.

IKEA spokeswoman Nicki Craddock said: 'We know people love our products but hate our shopping experience. We are being told that by customers every day, so we can't afford not to make changes. We realised a lot of people took offence at being herded like sheep on the long route around stores. Now if you know what you are looking for and just want to get in, grab it and get out, you can.'

And the future? Martin Hansson, who runs the UK arm of IKEA, wants to see more emphasis on promoting their environmental agenda. 'We can be better at that. We're not good at showing how we handle waste and energy – it's a lost opportunity.'

EXAMPLE

Torchbox: award winning web designers¹

We may take it for granted, yet browsing websites, as part of your studies, job or leisure, is an activity that we all do; probably every day, probably many times each day. So it's important. All organisations need to have a web presence if they want to sell products and services, interact with their customers or promote their cause. 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 independently owned web design and development company based in Oxfordshire. Founded back in 2000, it now employs 30 people, 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.'

Co-founder and Technical Director Tom Dyson has been responsible for the technical direction of all major developments. 'There are a number of advantages about being a relatively small operation,' he said. '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. If you're an arms dealer, you can safely assume that we're not going to be interested.'

Nevertheless, straightforward operational effectiveness is also essential to Torchbox's business. 'We know how to make sure that our projects run not only on time and to budget,' said Olly Willans, also a co-founder and 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 kanban project management methodology which helps us manage our obligations to our clients.'

The 'kanban' approach used by the Torchbox web development teams originated from car manufacturers like Toyota (it is fully explained in Chapter 11). 'Using sound operations management techniques helps us constantly to deliver value to our clients,' said Tom Dyson, '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.'

What do these two examples have in common?

These two operations are very different. One is the largest (and most successful) home wears companies in the world, the other is a small (but also successful) company working in an industry that did not exist when IKEA was founded. Yet the operations of both these companies share

the same basic objective - managing the processes that produce their products and services in a manner that satisfies their customers while making enough profit to thrive in the long term. And many, if not most, of the managers in each company who are called by some other title, will also be concerned with managing their own processes that contribute to the success of their business. Of course, there will be differences between each company's operations and processes, such as the type of services they provide, the resources they use, and so on. But the managers in each company will be making the same type of decisions, even if what they actually decide is different. The fact that both companies are successful because of their innovative and effective operations and processes also implies further commonality. First, it means that they both understand the importance of taking a 'process perspective' in understanding their supply networks, running their operations, and managing all their individual processes. Without this they could not have sustained their strategic impact in the face of stiff market competition. Second, both businesses will expect their operations to make a contribution to their overall competitive strategy. Third, in achieving a strategic impact, they both will have come to understand the importance of managing all their individual processes throughout the business so that they too can all contribute to the businesses success.

DIAGNOSTIC QUESTION

Does the business take a process perspective?

If a business takes a process perspective, it understands that all parts of the business can be seen as processes, and that all processes can be managed using operations management principles. But it is also important to understand that 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. On the other hand, one could describe the organisation's 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 book.

OPERATIONS PRINCIPLE

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