PRACTICAL
Operations Management

Second Edition

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Philip Hancock is co-owner of Glenochil Associates LLC, a consultant & trainer, and a Certified Professional in Supply Management (CPSM) and Supplier Diversity (CPSD) from the Institute for Supply Management (ISM). Philip received an MBA and PhD from Napier University in Scotland, and has substantial experience in both commercial banking and government procurement. He has earned numerous distinctions including the Diploma in Company Direction from the Institute of Directors (IoD) and is a Chartered Banker from the Chartered Institute of Bankers in Scotland (CIOBS).

Both Philip and Natalie also served as the original tutors in the NoteShaper® video tutorials that accompany the practice problems in this book.

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TO INSTRUCTORS

This book differs from other OM textbooks. First, we were determined to tell the whole story of operations management, including an entire chapter on incident and disruption management, recognizing that operations don't always proceed smoothly. Second, we wanted to provide this balanced story of OM at a reasonable price to students. We felt both objectives were worthy and both could be achieved, provided that we rebooted the usual format for this type of book by presenting concepts and analytics with a practical bent. The many fine comprehensive texts available are generally too lengthy and carry a high price. Our aim was to provide a learning tool students would use more of—and more affordably too. In our fifteen concise chapters, we hope to convince students that operations management is action itself, meaning that they should pick up a pencil and try it for themselves, to make it their own. To pursue all these ambitions simultaneously, we developed several features throughout the manuscript:

- **Threaded scenarios.** Every time an analytical methodology is introduced, it is demonstrated in the context of a case study that unfolds throughout the chapter. These demonstration scenarios "thread" through the general discussion of each chapter, presenting conceptual material in action. One major objective of the threaded scenarios is to clarify how operations management is an active process, by viewing it through the eyes of one who is putting the tools to work.
- **Tiered end-of-chapter content.** To support self-guided learning, end-of-chapter content is divided into tiers of resources, each suited to a different purpose. After each summary, key word review, and discussion questions, chapter exercises begin with a set of *Minute Answer* problems, or qualitative quiz questions most appropriately answered with one or two words. Minute Answer serves as a warm-up conceptual review to the subsequent *Quick Start* problems, which are quantitative questions that require the application of a single formula or numerical principle. Quick Start is followed by *Ramp Up* questions, which are also single-answer quantitative queries, but many are quite challenging. Ramp Up questions require additional confidence in the material, because some aspect of each problem is hidden. Chapter practice problems conclude with full-scale, multipart *Scenarios*, many of which are similar to threaded scenarios earlier in the chapter. In this second edition, we have added Case Scenarios which are more detailed problems, providing an extended description of some situation and multipart questions to solve. Finally, each chapter concludes with a Case Study, requiring a methodology from within the chapter but also requiring some creative adaptation to address the issues posed there. Short answers to all practice problems are available in the back of the text, but case notes are available only to instructors.
- **Online support.** To keep the overall size of this book under control, we placed problems in the book, along with additional problems—with answers—on-line at NoteShaper.com. To help with those moments when students get stuck, the NoteShaper® site houses a library of video tutorials providing step-by-step instruction on how to read and solve each of the problems in the book, accessible for a small fee. NoteShaper® also includes a wealth of teaching resources in the Instructor's Center, including quizzes, Exam questions, PowerPoint files, applications articles and videos, sample lecture videos, and more. Students do not have access to materials in the NoteShaper® Instructor's Center.

We controlled the size of the book by being judicious about extraneous material and photographs. While the second edition has an expanded collection of illustrations, this book has fewer pictures than some OM textbooks. We have worked diligently to be sure they provide learning and so the captions are detailed and present an operations management lesson or story. We used good page composition to make the book easy to use, nice to look at, and relatively lean, considering the size of that story.

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In this second edition, along with a better balance of photos, questions and new Case Scenario problems in each chapter, these are the key content changes:

- **Chapter 1** contains significant new introductory coverage of complexity, sustainability and corporate social responsibility.
- **Chapter 2** expands the discussion of competitive strategy and linking products with processes, introducing the product process matrix and service process matrix.
- **Chapter 3** provides more background on the development of quality concepts from quality as conformance through to TQM, Lean, Six Sigma and Lean Six Sigma.
- **Chapter 7** contains additional coverage on the nature of projects, hard vs soft projects and project life cycles.
- **Chapter 9** is reorganized and expanded significantly to include new and updated coverage of the supply chain, including; connectivity, frameworks, risk management, benchmarking, along with negotiation, outsourcing and make or buy decisions.
- **Chapter 12** adds new coverage and a scenario-example on Little's Law and integrates discussion of Six Sigma, Lean Six Sigma and ERP.
- **Chapter 13** introduces new scenario examples for process capability and acceptance sampling.

ACKNOWLEDGMENTS

Like many complex creative endeavors, this book did not appear instantly, nor is it the result of a few people. What we wrote first appeared as bulky, black-and-white spiral-bound prototypes of today's book, hauled around by over 1,200 undergraduate students at the University at Buffalo (UB) and the Singapore Institute of Management (SIM). We are forever grateful to this first wave of patient contributors, as their sharp eyes corrected and refined the manuscript each semester for two years before we then submitted it for publication.

UB and SIM students shaped this textbook's illustrations as well, because many of the images you see now were originally captured by them. We would like to thank Fang Song in particular, for providing no less than eight of the images of important conceptual content. In addition we thank these other student photographers:

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Several colleague reviewers provided useful suggestions that we did our best to incorporate into the final version. As in any other operation, we faced conflicting requests and suggestions, which we tried to balance with our overall goals of a practical and affordable text. And, we are especially grateful to all of the adopters of the first edition. In Operations Management, the bestselling texts have served the field very well for many decades and so our acceptance is genuinely heartfelt with sincere gratitude. We are most thankful to all those who reviewed the first edition and those who provided suggestions and guidance for this second edition for their thoughtful investment of time and personal expertise: Arash Azadegan, Gregory Bier, Susan Cholette, Chen H. Chung, Lori Cook, Matthew Drake, Derrick D'Souza, Harold Frazer, Hector Guerrero, Apurva Jain, Gordon Johnson, Casey Kleindienst, Taeho Park, Cynthia Wallin, Theresa Wells, Deb Kellogg, Chris Ellis, Will Price, Bill Sawaya, Jeff Bell, Pedro Reyes, Paul Delvy, Ricki Kaplan, Lisa Walters, Josh Chuang, Torsten Doering, Pat Jaska, Jim Mirabella, Joyce Orsini, Dalen Chiang, James Minas, Tom Frye, Ping Su, Ron Lembke, Marvin Gonzales, Faizul Huq, and Arvinda Loomba.

We hope all will be happy with the published result.

Copy editor Carol Rose trained the manuscript to speak out both confidently and correctly. Our grateful thanks go to Carol for her exceptional skill and to Laurie Entringer and Molly Montanaro for their transformative design and production work.

Finally, like anything new, this book needed a champion. Thank you, Dick Hercher, for stepping into that role and bringing all of us together.

Natalie C. Simpson
Philip G. Hancock

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TO STUDENTS

Operations management is ultimately about human endeavor, so it applies to any industry and any organization, be it a global supply chain for consumer goods, a local nonprofit agency, or an individual entrepreneur's latest project. While you may have been unaware of its formal terminology, you've been observing and participating in operations for years before you opened this book. Perhaps you felt a distinct frustration when you couldn't locate the back of a long waiting line, so you weren't sure where you should stand. In that case, the phrase "queue discipline" probably wasn't floating through your thoughts, but you were annoyed with the ambiguity. You may have once considered packing two of something because it was especially important to have at least one, such as bringing two calculators to an exam. You aren't likely to have thought explicitly of the role of redundancy in strengthening reliability, but that is the principal you were considering. So the purpose of this introductory book is really to *re*introduce you to a topic you began many years ago, this time empowering your senses with new language and analytics.

This book differs from other OM textbooks. First, we were determined to tell you the whole story of OM, including an entire chapter on incident and disruption management, recognizing that your endeavors won't always proceed smoothly, but that is no reason to be either fearful or unprepared. And yet, we wanted to create an affordable textbook, *plus* we hoped to convince you that operations management is action itself, meaning that you should pick up a pencil and try it for yourself, to make it your own. To pursue all these ambitions simultaneously, we developed several features you will see throughout the upcoming pages:

- **Threaded scenarios.** Operational analysis is an active process, one which you can—and in the future, probably will—participate in. We want you to see operations management as both an exciting and a hands-on undertaking that you can be involved in. To start you in that direction, each chapter features threaded scenarios in which each technique discussed in general is then put to work immediately in the setting of a certain organization. Within the scenario, you see the problem through the analyst's eyes, unfolding in the analyst's own handwriting. In this first phase of learning, you are looking over someone's shoulder, watching them tackle the situation, and seeing what insight they draw from it.
- **Tiered chapter problems.** When you arrive at the end of a chapter, you naturally look for similar problems to practice. To support your learning, practice problems here are divided into four distinct tiers, each with a different suggested purpose. To begin, *Minute Answer* questions are short, qualitative queries that can be answered with a word or two, quizzing you on conceptual terms and relationships. *Minute Answer* questions are suggested as a warm-up to computational practice. To start working with numbers, try *Quick Start* problems: these will always be single-answer queries, requiring the direct application of a single equation or method from the chapter. Once your confidence begins to build, try the *Ramp Up* problems next, although please don't discourage too quickly. Like Quick Start, Ramp Up problems are short, single-answer questions, but unlike Quick Start many of these questions are rather difficult. Ramp Up problems are puzzles, where something is missing or disguised, requiring use of the same material, but more creative thinking. Finally, the problem sets end in *Scenarios* inviting you to work as the analyst. These are the more comprehensive problems, providing an extended description of some situation and multipart questions to solve. Here you won't be using a single equation, but you will be working through many of the same analytical steps you first saw unfolding in the threaded scenarios in the chapter. All of these problems serve to prepare you to solve the most challenging problems of all, the *Case Scenarios and Case Study*.
- **Online support.** Analysis takes practice, and sometimes you get stuck. To help with practice but keep the size of this book under control, we placed some problems in the book, along with additional problems—with answers—online at NoteShaper.com.

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The NoteShaper® site houses a library of video tutorials providing step-by-step instruction on how to solve each of the problems with answers in the book, accessible for a small fee. There is also a wealth of entirely free supplements for use with the text available at NoteShaper.com, including terminology review flashcards, crossword puzzles, spreadsheet data files and models for text scenarios and problems, and more.

While we don't know if you are considering a supply chain major or if you consider yourself an artist (or both), what we do know is that there's something, somewhere in the story of OM that is of value to you. Keeping this in mind, we set out to weave this story from as many different endeavors as possible, including agile manufacturing, health care, disaster relief, airline logistics, and event management. We hope you'll see something in that rich landscape that fits your ambitions.

Thank you for your interest in operations management. We wish you the best of luck, wherever you may venture.

Natalie C. Simpson
Philip G. Hancock

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Having difficulty with a practice problem?
Then visit **noteshaper.com** to find:

- video tutorials explaining problems at the end of each chapter in this book
- additional problems for practice, including video tutorials

Happy studying!

16157her_00_FM_i-xiv.indd 6 1/13/17 10:29 AM

BRIEF CONTENTS

PART 1 ESSENTIALS

Chapter 1 Introduction to Operations Management 1
Chapter 2 Providing Goods and Services 35
Chapter 3 Product Quality and Development 65
Chapter 4 Forecasting 103

PART 2 PLANNING OPERATIONS

Chapter 5 Capacity and Waiting 143
Chapter 6 Process and Facility Selection 177
Chapter 7 Project Management 215
Chapter 8 Location Planning and Logistics 261

PART 3 MANAGING OPERATIONS

Chapter 9 Purchasing and Supply Chain Partnering 293
Chapter 10 Inventory Management 331
Chapter 11 Aggregate and Material Requirements Planning 369
Chapter 12 Lean Operations 417

PART 4 ACTION AND ADAPTATION

Chapter 13 Quality Control 443
Chapter 14 Scheduling and Real-Time Operations 485
Chapter 15 Incident and Disruption Management 521

Appendix A Answers 561
Appendix B *z*-Values from Infinity to *z* 566
Appendix C *z*-Values from Zero to *z* 567

Index 569

16157her_00_FM_i-xiv.indd 7 1/13/17 10:29 AM

CONTENTS

PART 1
ESSENTIALS

Chapter 1 **Introduction to Operations Management 1**

Essential Operations Management 2
Productivity/Sustainability/Responsibility

Classifying Operations 10
Tangibility/Supply Chains/Governance/Uncertainty and Control

Operations Managers 21
Decision Making/Operations Management within an Organization

About This Book 27

Summary 27 *Key Terms/Discussion Questions*

Problems 28

Case Scenarios 31

Case Study: Convex Productions 32

Chapter 2 **Providing Goods and Services 35**

Business Strategy 36
Strategic Planning/Supporting Strategic Plans through Operations

Operations Strategy 42
Core Competencies/Competitive Strategy

Process Selection 45
Process Choice/Linking Products and Processes/Productivity

Summary 56 *Key Terms/Discussion Questions*

Problems 57

Case Scenarios 60

Case Study: Rothera Point Utilities 61

Chapter 3 **Product Quality and Development 65**

Multiple Dimensions of Product Quality 66
Quality as Conformance/Quality as Perception and Expectations/Quality as Improvement/Quality through Time

Modern Quality Management 70
Distinguishing Features/Problem-Solving Tools/Long-Term Issues

Product Development 81
Designing for the Customer/Designing for Production

Summary 92 *Key Terms/Discussion Questions*

Problems 93

Case Scenarios 98

Case Study: Summerline Contracting 100

16157her_00_FM_i-xiv.indd 9 1/13/17 10:29 AM

Chapter 4 Forecasting 103

Forecasting Approaches 104
Qualitative Forecasting/Quantitative Forecasting/Selecting a Qualitative versus a Quantitative Approach

Evaluating Forecasts 107
Accuracy/Responsiveness/Cost

Associative Techniques 112
Regression Analysis/Calculating a Linear Regression Equation/Relevant Range and Nonlinear Relationships

Time Series Techniques 119
Time Series Decomposition/Simple Time Series Techniques/Prediction versus Historical Analysis

Summary 133 *Key Terms/Discussion Questions*

Problems 134

Case Scenarios 139

Case Study: Tiger Stripe Copy Center 140

PART 2

PLANNING OPERATIONS

Chapter 5 Capacity and Waiting 143

Capacity Planning 144
Measuring Capacity/Capacity Strategies

The Formation of Waiting Lines 152
Customer Arrivals/The Queue/Capacity of the System

Mathematical Models of Waiting 160
M/M/1 Model/Other Models

Psychological Models of Waiting 163
Absolute versus Perceived Time/Factors Influencing Perceived Time

Summary 166 *Key Terms/Discussion Questions*

Problems 167

Case Scenarios 172

Case Study: WMA Exit 53 Toll Plaza 174

Chapter 6 Process and Facility Selection 177

Process Strategies 178
Make-to-Stock/Make-to-Order/Assemble-to-Order

Product Layouts 181
Advantages and Disadvantages/Designing a Product Layout/Creative Applications

Process Layouts 194
Advantages and Disadvantages/Designing a Process Layout

Other Types of Layouts 200
Hybrid Layouts/Fixed-Position Layouts

Summary 204 *Key Terms/Discussion Questions*

Problems 205

Case Scenarios 210

Case Study: Myer Wine Racking and Cellar Company 211

Chapter 7 Project Management 215

The Essentials of a Project 216
How Projects Differ/Starting a Project

Critical Path Method (CPM) 221
Network Analysis/Task Timing/Project Crashing

Project Evaluation and Review Technique (PERT) 238
Probabilistic Task Times/Analyzing a Network/Estimating Risk

Project Life Cycles 246
Single-Phase Projects/Multi-Phase Projects

Summary 249 *Key Terms/Discussion Questions*

Problems 250

Case Scenarios 255

Case Study: Dalvey Point Storm Water Upgrade Project 256

Chapter 8 Location Planning and Logistics 261

Forces Influencing Location 262
Input Factors/Output Factors/Indigenous Factors/Globalization

Location Planning Techniques 264
Center of Gravity/Factor Rating/Cost versus Volume Analysis

Supply Chain Logistics 277
Transporting Goods/Transporting Services/Transporting Information

Forces Influencing Logistics 281
Economies of Scale/Speed and Accessibility/Supply Chain Linkages

Summary 285 *Key Terms/Discussion Questions*

Problems 285

Case Scenarios 290

Case Study: Celvin FoodStuff 291

PART 3
MANAGING OPERATIONS

Chapter 9 Purchasing and Supply Chain Partnering 293

Supply Chain Basics 294
Describing Supply Chain Structure/Supply Chain Frameworks/Benchmarking

Strategic Supply Chain Partnering 299
Selecting Supply Chain Partners/Outsourcing/Tools for Global Supply Chain Partnerships

Operating a Supply Chain 309
Governance/Diversity and Ethics/Sustainability/Supply Chain Risks

The Purchasing Process 315
Developing Contracts/Tender Evaluation Methods/Negotiation

Summary 321 *Key Terms/Discussion Questions*

Problems 322

Case Scenarios 326

Case Study: Champions' Gate Sports Camp 328

Chapter 10 Inventory Management 331

The Nature of Inventory 332
Types of Inventory/Costs of Inventory/Inventory Policies/Inventory Dynamics

Fixed Order Quantities 340
Economic Order Quantity/Economic Order Quantity with Price Breaks/Economic Production Quantity

Reorder Points 352
Demand During Lead Time/Performance Measures/Determining Reorder Points/Deriving Distributions for Demand During Lead Time

Summary 360 *Key Terms/Discussion Questions*

Problems 361

Case Scenarios 365

Case Study: Denton Pet Clinic 366

Chapter 11 Aggregate and Material Requirements Planning 369

Aggregate Planning Strategies 370
Aggregation/Essential Approaches

Developing Aggregate Plans 377
Introducing Inventory Logic/Implementing Other Options/Selecting a Plan and Replanning

Material Requirements Planning 388
Independent and Dependent Demand/Bill of Materials/Master Production Schedule

Developing Material Requirements Plans 397
MRP as an Information System/Advantages and Disadvantages of MRP

Summary 407 *Key Terms/Discussion Questions*

Problems 408

Case Scenarios 413

Case Study: Myer Wine Racking and Cellar Company, Revisited 414

Chapter 12 Lean Operations 417

Evolution of Inventory Systems 418
Reorder Point Systems/Material Requirements Planning/Lean Operations/JIT

Mechanics of Lean Systems 419
Reducing Lot Sizes/Signaling Replenishment/Smoothing Production

Philosophy of Lean Systems 429
Elimination of Waste/Visibility and Flexibility/Close Relationships with Suppliers/Continuous Improvement

Summary 437 *Key Terms/Discussion Questions*

Problems 438

Case Scenarios 440

Case Study: Rothera Point Utilities, Revisited 441

PART 4 ACTION AND ADAPTATION

Chapter 13 Quality Control 443

The Nature of Variation 444
Natural Process Variation/Assignable Process Variation/Statistical Process Control

Traditional Quality Control 453
Distinguishing Features/Vulnerabilities

Designing Control Charts 457
Mean Charts with Known Variation/Mean Charts with Unknown Variation/ Control Charts for Attributes

Acceptance Sampling 468
Operating Characteristic Curves/Average Outgoing Quality

Summary 475 *Key Terms/Discussion Questions*

Problems 476

Case Scenarios 480

Case Study: Exit 53 WMA Fast Lane Toll System, Revisited 482

Chapter 14 Scheduling and Real-Time Operations 485

Scheduling Environments 486
Long Planning Horizons/Medium Planning Horizons/Short Planning Horizons

Single Work Center Scheduling 488
Evaluating Sequences/Priority Rules/Personal Time Management

Multiple Work Center Scheduling 495
Johnson's Rule/Gantt Charts/Critical Ratio/General Approaches/Bottleneck Scheduling and the Theory of Constraints

Real-Time Operations 509
Uncertainty and Criticality/Successful Practices

Summary 512 *Key Terms/Discussion Questions*

Problems 513

Case Scenarios 517

Case Study: Tiger Stripe Copy Center, Revisited 518

Chapter 15 Incident and Disruption Management 521

Understanding Disruption 522
Traditional Decision Theory/Types of Risk/Types of Disruption/Vulnerabilities of Modern Operations

Planning for Disruption 534
Business Continuity Planning/Reliability and Redundancy/Strategic Risks in Tactical Decisions

Operating Despite Disruption 544
Temporary Organization/Performance/Disaster Logistics

Summary 552 *Key Terms/Discussion Questions*

Problems 553

Case Scenarios 556

Case Study: Convex Productions, Revisited 557

Appendix A Answers 561
Appendix B *z*-Values from Infinity to *z* 566
Appendix C *z*-Values from Zero to *z* 567

Index 569