

Managing Operations

Across the Supply Chain

Fifth Edition

Morgan Swink

Texas Christian
University

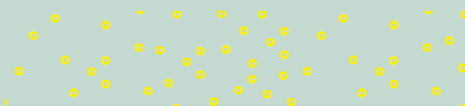
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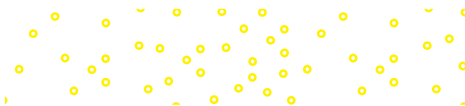
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MANAGING OPERATIONS ACROSS THE SUPPLY CHAIN, FIFTH EDITION

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Dedication

To Jenni, Derek, Danielle, Rachel, and Sarah, who make my life so full!
Morgan Swink

To my wife and children, Christine, Charles and Beth, for their support and patience.
To my colleagues in the United States, Bob Trebilcock, Bill Ritchie, and Chris Peters.
To these people, this book is dedicated.
Steven A. Melnyk

To Glenn and Caleb, for their love and support.
Janet Hartley



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Courtesy of Morgan Swink

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is Professor, Eunice and James L. West Chair of Supply Chain Management, and Executive Director of the Center for Supply Chain Innovation at the Neeley School of Business, Texas Christian University. He holds a BS in Mechanical Engineering from Southern Methodist University, an MBA from the University of Dallas, and a PhD in Operations Management from Indiana University. Before becoming a professor, Dr. Swink worked for 10 years in a variety of manufacturing and product development positions at Texas Instruments Incorporated. He has co-authored three books and published over 90 articles in a variety of academic and managerial journals. Dr. Swink is formerly the Co-Editor in Chief for the *Journal of Operations Management* and past president of the Decision Sciences Institute.



Courtesy of Steven A. Melnyk

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is Professor of Operations Management at Michigan State University. Dr. Melnyk obtained his undergraduate degree from the University of Windsor and his doctorate from the Ivey School of Business, the University of Western Ontario. He has co-authored 21 books focusing on operations and the supply chain and has published over 100 refereed articles in numerous international and national journals. He also is a member of several editorial advisory boards, including the *International Journal of Production Research* and the *International Journal of Operations and Production Management*. Dr. Melnyk has consulted with over 60 companies. He has also served as a member of the APICS Board of Directors (2014–2016) and the APICS leadership team (2015). In 2017, Dr. Melnyk was recognized as a Distinguished Scholar by the Operations and Supply Chain Management Division of the Academy of Management. From 2017 to 2019, Dr. Melnyk held a joint appointment with the University of Newcastle (Australia), where he was given the Global Innovation Chair in Supply Chain Management. In 2018, Dr. Melnyk was awarded the Withrow Award as a teacher/scholar by the Eli Broad College of Business, Michigan State University.



Courtesy of Janet L. Hartley

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is the Chan K. Hahn Professor and Associate Dean in the Schmidhorst College of Business at Bowling Green State University. She received her BS in Chemical Engineering from the University of Missouri-Rolla, and the MBA and PhD degrees in Business Administration from the University of Cincinnati. Prior to graduate school, she developed new products and designed new manufacturing processes for the Clorox Company. She has published 40 articles on supply management and supply chain management. She serves as an Associate Editor for the *Journal of Operations Management*, *Journal of Supply Chain Management*, *International Journal of Operations and Production Management*, and *Journal of Purchasing and Supply Management*. Dr. Hartley is a past president of the Decision Sciences Institute.

Preface

We continue to live in dynamic and exciting times. Recent years have seen many changes that have affected nearly every aspect of business, including operations management. In this fifth edition of our book, we continue to reflect key shifts in operations management, including transitions:

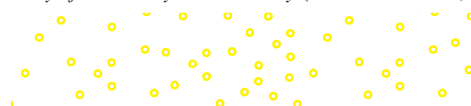
- **From a focus on the internal system to a focus on the supply chain.** In today's highly competitive business environment, organizations must leverage the capabilities of their suppliers and customers. Operations managers must look beyond the "four walls" of the firm and take an integrated supply chain perspective of operations.
- **From a local focus to a global focus.** As Thomas L. Friedman pointed out,¹ the world is indeed flat. Business solutions generated in Argentina are used to meet needs in the United States, and parts built by suppliers located in China are used to assemble cars in Canada. Commercial needs have overcome, to a large part, national borders, presenting new opportunities and challenges for operations managers.
- **From an emphasis on tools and techniques to an emphasis on systems, people, and processes.** To be successful, operations managers must think more broadly than just the application of analytical tools and techniques. They must take a systems view to address important managerial issues such as designing processes, working with people, managing information flows, and building interorganizational relationships.
- **From myopic pursuit of profit to a holistic pursuit of sustainability.** Pressures on businesses have risen to the point that they can no longer ignore or give only lip service to social and environmental issues. Operations managers have to balance the profit motive with the need to protect and even strengthen both people and the planet.
- **From a static to a dynamic treatment of operations and supply chain management.** We have revised each new edition to keep pace with changes taking place in the field. In recent years, very evident changes include the emergence of millennials

as key consumers and the rapid developments taking place in digital technologies. Consequently, in this edition, we introduce a new theme: digital. While the basics remain the same, the context in which operations are managed continues to change rapidly.

Managing Operations Across the Supply Chain provides a global, supply chain perspective of operations management for students in introductory courses in operations management and in supply chain management courses that do not require an operations management prerequisite. While the book is primarily written for undergraduates, it also can be used effectively in MBA courses. There are several features that help to differentiate this book in its view of operations management:

- **Broader Vision of Operations Management** While many operations management textbooks have revised or added a chapter to address supply chain issues, we developed our book from the ground up to effectively integrate operations management and the supply chain. The primary focus of the book is operations management, but we provide a "supply chain" perspective. Operations management cuts across a firm's boundaries, bringing together its internal activities with the operations of customers, suppliers, and other partners around the world. We clarify the functional roles of operations, supply management, and logistics while examining the integrative processes that make up the supply chain. One unique aspect of the book is that we examine both the upstream (supply-side) and downstream (demand-side) aspects of the supply chain, including a discussion of marketing and customer relationships.
- **Balanced Treatment** The book balances the quantitative and qualitative coverage needed to equip operations and supply chain managers for the challenges and opportunities they face. It describes and applies analytical tools that operations managers use to support decision making. However, we also address the important managerial issues such as systems, people, and processes that are critical in a supply chain context.


¹Thomas L. Friedman, *The World Is Flat: A Brief History of the Twenty-First Century* (New York: Farrar, Straus, and Giroux, 2006).





- **Integrative Frameworks** The book introduces and develops various topics in supply chain operations management using five integrative frameworks:


1. An *operations strategy* framework that brings together three critical elements: (1) the key customer, (2) the value proposition, and (3) capabilities, introducing students to a *broad supply chain perspective* of operations management.
2. A *foundations* framework that covers process fundamentals, innovation, quality, inventory, and lean thinking.
3. A *relational* framework that highlights functional, supplier, and customer management aspects of operations management.
4. A *planning* framework that covers demand and supply planning at multiple levels.
5. A *change management* framework that illustrates how projects and future developments can be used to drive innovation in operations management.

- **Use of Integrating Themes** Four key themes are highlighted throughout the book: digital transformation, global issues, relationships, and sustainability.

-  *Digital technologies* such as the Internet and other communication networks, automation, and artificial intelligence are rapidly and radically changing supply chain operations management. The book highlights numerous examples of these changes, explaining how technologies are enabling faster, better, cheaper, and richer customer experiences.

-  Because most organizations have supply chains that reach beyond a home country, we examine the dynamic *global environment* influencing supply chain operations management, taking care to represent business norms and cultures in many different parts of the world.

-  Operations managers must collaborate with other functional personnel, with suppliers, and with customers to accomplish most operations activities. The book showcases how to build, maintain, and benefit from cross-functional and interorganizational *relationships*.

-  To reduce costs and be competitive, organizations today must adopt *sustainable* business practices. Sustainability is increasingly becoming a key metric for operations managers, and an important expectation of customers. Accordingly, we have dedicated an

entire chapter to sustainability, while also incorporating it throughout the book.

- **Real, Integrated Examples** The book brings operations and supply chain management to life through opening vignettes, Get Real highlights, and rich examples throughout the book. New for the fifth edition, we have included links to useful videos that can be used to better illustrate the various points and concepts being discussed.

Managing Operations Across the Supply Chain, fifth edition, offers a new, global, supply chain perspective of operations management, a treatment that embraces the foundations of operations management but includes new frameworks, concepts, and tools to address the demands of today and changing needs of the future. The book is organized into five major sections:

- **Part 1 Supply Chain: A Perspective for Operations Management** provides an overview of operations management as a field, and describes the strategic role operations has in business from the perspective of supply chain management.
- **Part 2 Foundations of Operations Management** discusses foundational process concepts and principles that govern all operational activities. This section examines concepts such as product/process innovation, quality, lean, and inventory fundamentals.
- **Part 3 Integrating Relationships Across the Supply Chain** deals with the primary functional relationships between internal operations management activities, and other operational functions both inside and outside the firm. This section describes customer relationship management, supply management, and logistics management.
- **Part 4 Planning for Integrated Operations Across the Supply Chain** discusses planning approaches and technologies used at different levels of operations decision making. Key topics such as demand planning, forecasting, sales and operations planning, inventory management, and materials requirements planning are examined.
- **Part 5 Managing Change in Supply Chain Operations** discusses how operations managers use projects, change programs, and technologies to shape a sustainable future for operations and supply chain management.

CHAPTER-BY-CHAPTER REVISIONS FOR THE FIFTH EDITION

In this major revision of *Managing Operations Across the Supply Chain*, our key objective has been to further integrate and highlight the role of digital technologies

throughout all aspects of supply chain operations management. In addition, this revision identifies examples, tables, and problems where supporting Excel spreadsheets are available for easier management of data and enhanced learning. We also updated or replaced many of the opening vignettes and Get Real stories throughout the book to make them more reflective of contemporary issues such as the COVID19 pandemic, disruptions, labor concerns, and more. Additional changes are summarized below.

Chapter 1: Introduction to Managing Operations Across the Supply Chain

- Replaced opening vignette with a discussion of how the COVID19 pandemic highlighted the importance and challenges of supply chain management.

Chapter 2: Operations and Supply Chain Strategy

- Introduced Environment, Social, and Governance (ESG) model of sustainability.

Chapter 3 and 3 Supplement: Managing Processes and Capacity

- Added a new **Get Real** story describing challenges of building U.S. battery capacity in support of growing demand for electric vehicles.
- Added a new section further explaining the relationship between process design and capacity decisions.
- New **Get Real** story of how McDonald's has reduced drive-through wait times.
- Added questions focusing on how Little's Law can be used to assess and improve the performance of processes.

Chapter 4: Product/Process Innovation

- Added new "Taco Explosion" end-of-chapter case highlighting the interaction of new product introductions and supply chain planning in the restaurant industry.

Chapter 5: Manufacturing and Service Process Structures

- Revised Capability Enabling Technologies section to reflect established and emerging technologies including IoT, blockchain, robotics, and artificial intelligence.
- New **Get Real** on showing how cobots are used at White Castle.
- New **Get Real** on how machine learning and data science are integral to StitchFix.

Chapter 6: Managing Quality

- Expanded discussion of visibility platforms and the roles of technology.
- Updated discussion on the importance of prevention.
- Additional discussion questions.

Chapter 6 Supplement: Quality Improvement Tools

- Additional discussion questions and problems.

Chapter 7: Managing Inventories

- Updated and augmented data in Table 7-1.
- Added **Get Real** on how the COVID19 pandemic has influenced inventory decisions.
- Added **Get Real** on Spirit Halloween's use of pop-up stores and single period inventory model.

Chapter 8: Lean Systems

- Introduced a detailed discussion of how Lean Systems and practices have been influenced practices in healthcare.
- Added a discussion of how the COVID19 pandemic and the supply chain crises of 2020 to 2022 have influenced how researchers and managers now view Lean.

Chapter 9: Customer Service Management

- Revised opening vignette to highlight how online marketplaces are changing customers' service expectations.
- New **Get Real** on Target's creation of sortation centers for home delivery.
- New **Get Real** on overpromising, underpromising, and customer satisfaction.
- Replaced Amazon CRM **Get Real** with story of CRM at Erazor Bits.
- Added problems that use order data to calculate fill rates (with supporting spreadsheet).
- Added new "Global Glasses Glitches" end-of-chapter case.

Chapter 10: Sourcing and Supply Management

- Updated the opening vignette to include supply chain risk.
- New **Get Real** on French fry shortages at McDonald's in Japan.
- Updated the **Get Real** story on Takata airbags.
- New **Get Real** on sustainability issues in fashion at Lucy & Yak.
- New **Get Real** on Sherwin-Williams decision to insource key ingredients.
- Updated supply management strategies and tactics.
- Added discussion of the importance of supplier diversity as a selection criterion and a new **Get Real** about the diverse ice cream company Creamalicious.

Chapter 11: Logistics Management

- Added new learning objective (LO 11-8) regarding future state considerations for, and factors influencing, the logistics industry.

- Updated discussion on order processing to highlight its criticality as a first-step trigger for logistics processes.
- Updated the **Get Real** stories on Walmart's supplier order delivery window and Mobile Apps.
- New **Get Real** story on Toyota's inventory management strategy to tackle the computer chip shortage.
- Revised Transportation introductory section to highlight revised regulatory requirements and global state of the maritime sector and megaships.
- Updated the section on specialty carriers to reflect a more expanded view of the parcel industry and the influence of last-mile delivery startups like Shipt and Deliv.
- New **Get Real** story on the Ever Given megaship being stuck in the Suez Canal.
- Updated section on reverse logistics to emphasize the role of reverse logistics centers such as the one used by Acer America to support its remanufacturing processes.
- Added a new figure 11-5 to graphically illustrate the step-wise nature of primary warehouse processes.
- Expanded the sub-section on order picking and packing to highlight the effect of e-commerce growth on changing order picking profiles.
- Updated introduction to Material Handling and Packaging section to highlight logistics role in secondary and tertiary packaging functions.
- New **Get Real** on Ulta Beauty's partnership with Happy Returns to streamline the reverse logistics process.
- Added student activity about warehouse automation.
- Updated the section on inventory costs as part of logistics network design considerations, to highlight its connections with Chapter 7's discussion on the square root law.
- Updated the section on facility location to highlight its connections to overall network deployment strategy and total landed costs objectives.
- Replaced student activity on blockchains with one more focused on understanding the nature of the 3PL, 4PL, and LLP marketplace.
- Added a new section on Future Perspectives for the logistics industry.

Chapter 12: Demand Planning: Forecasting and Demand Management

- Updated **Get Real** stories.

Chapter 13: Sales and Operations Planning

- Added S&OP maturity model.
- Added discussion of planning technologies with accompanying student activity.
- Replaced Nintendo **Get Real** with **Get Real** on capacity planning for vinyl record production.
- Added discussion of labor shortages and availability as a planning constraint.
- Added new "Premium Foods COVID19 Pandemic Planning" end-of-chapter case on planning in a disruptive environment.

Chapter 14: Materials and Resource Requirements Planning

- Better explained certain key concepts such as Action Buckets, Scheduling, and Due Dates (and how they are central to the MRP logic).
- Updated the material so that it better reflects current understanding of MRP logic.
- Discussed the evolution of MRP over time (beginning with MRP, and moving through Closed Loop MRP, Manufacturing Resources Planning, and ERP).
- Corrected problems in the chapter (e.g., Causal Manufacturing case).

Chapter 15 and 15 Supplement: Project Management

- Updated opening Pixar vignette.

Chapter 16: Sustainable Operations Management—Preparing for the Future

- Undergone a major revision to reflect developments now taking place regarding sustainability.
- Extended the discussion of the Triple Bottom Line to transit to ESG (Environmental, Social, and Governance).
- Updated the material to include a discussion of DEI (Diversity, Equity, and Inclusion) initiatives—a factor now increasingly being observed in operations management systems today.
- Updated the discussion of sustainability standards to include the SASB standards.
- Included a discussion of how firms are now using sustainability as a corporate strategy.

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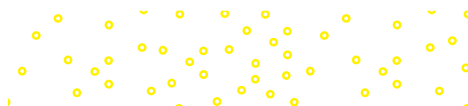
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*Morgan Swink
Steven A. Melynk
Janet L. Hartley*



Walkthrough

The following section highlights the key features of *Managing Operations Across the Supply Chain* and the text's accompanying resources, which have been developed to help you learn, understand, and apply operations concepts.

CHAPTER ELEMENTS

Within each chapter of the text, you will find the following elements. All of these have been developed to facilitate study and learning.

Opening Vignette

Each chapter opens with an introduction to the important operations topics covered in the chapter. Students need to see the relevance of operations management in order to actively engage in learning the material. Learning objectives provide a quick introduction to the important operations topics that will be covered in the chapter.

1

Introduction to Managing Operations Across the Supply Chain

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

LO1-1 Explain what operations management is and why it is important.

LO1-2 Describe the major decisions that operations managers typically make.

LO1-3 Explain the role of processes and "process thinking" in operations management.

LO1-4 Explain what the supply chain is and what it means to view operations management using a "supply chain perspective."

LO1-5 Identify the partners and functional groups that work together in operations management.

LO1-6 Define the planning activities associated with managing operations across the supply chain.

2



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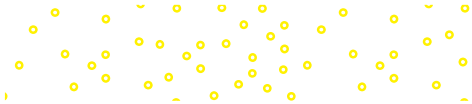
A COVID19 Pandemic Highlights the Challenges of Supply Chain Operations Management

The global COVID19 pandemic has easily been the biggest story in recent years, perhaps in decades, and it brought worldwide attention to the importance and complexity of supply chain operations management. People who had previously never heard the term "supply chain" are now fully aware of its impacts on their daily lives, as they have lived through shortages of toilet paper, personal protective equipment, vaccines, and test kits early in the COVID19 pandemic, followed by shortages of food items, sports equipment, furniture, toys, and many other products in subsequent months and even years.

How did this happen? The COVID19 pandemic-induced drivers of supply chain shortages include:

- Dramatic surges in demand for items such as consumables, electronics, furniture and home improvement products due to lockdowns, at-home work, government distribution of relief funds, and decreased spending on travel, eating out, and other services.
- Unprecedented surges in demand for items produced in China, as well as huge increases in online purchases. These changes shifted the demand load across different distribution channels and networks.
- Declines in supply resulting from labor shortages, small business failures, equipment decommissioning and shutdowns. While many of these sources of capacity could be quickly ramped down, longer periods are needed to ramp back up.
- Coincidental disruptions due to weather events and industrial accidents in areas that were key sources of important raw materials and components (e.g., integrated circuits). These disruptions exacerbated already short supplies of capacity.
- Limited ability of supply chain infrastructure (e.g., plants, ports, transport equipment) to scale up and down quickly enough to handle these severe supply-demand mismatches. These complex supply chain systems are sensitive to shortages of even one or a few of the many resources they need to operate.

The COVID19 pandemic highlighted for everyone, including both consumers and operations managers, the limitations and vulnerabilities of how



Key Terms

Key terms are presented in bold and defined in the margin as they are introduced. A list of chapter key terms is also available at the end of the chapter.

supply chain The global network of organizations and activities involved in designing, transforming, consuming, and disposing of goods and services.

A **supply chain** is the global network of organizations and activities involved in (1) designing a set of goods and services and their related processes, (2) transforming inputs into goods and services, (3) consuming these goods and services, and (4) disposing of these goods and services.

Think about all the different organizations located in different companies that are

Student Activity

At appropriate moments students are asked to do a personal activity that illustrates the concept being presented or covered, thereby helping them learn to apply the concepts and understand them more deeply.

student activity

Explore the information on restaurant supply chains provided at Supplychainscene.org. From the articles you find there, learn about ways that technologies and changing customer demands are changing restaurant operations. Which of the stages and organizations depicted in Figure 1-3 are likely to be most affected by a shift to more digital processes? How will the structure of the overall supply chain be changed?

Numbered Examples

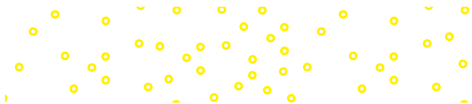
Numbered examples are integrated into chapters where analytic techniques are introduced. Students learn how to solve specific problems step by step and gain insight into general principles by seeing how they are applied.

EXAMPLE 2-1

Suppose that the director of marketing has approached you, as a member of the top management team, with a suggestion that appears very attractive. The proposal begins by noting that because demand is down, the firm (and its supply chain) has much unused capacity. Happily, the marketing group has identified a new potential customer segment. Unlike existing customers (who are price sensitive and who buy large quantities of fairly standard products), these new customers will likely order smaller quantities more frequently. The new customers are also likely to want to make last-minute changes to order sizes, due dates, and product mix. Your current operating system is not really set up to accommodate such changes. However, the marketing director feels that the prices these customers are willing to pay will provide gross margins (30 percent, as compared to the 10–15 percent currently being given by existing customers) that should be high enough to offset any operational problems. The chief financial officer has stated that, in order to enter any new market, it must be expected to generate at least a 25 percent return on assets (ROA).

Given the information provided below, would you recommend accepting the marketing director’s proposal?

Category	Estimated First Year Impact	Comments
Sales	\$420,000	
Cost of Goods Sold	\$294,000	30% gross margin




Get Real Boxes

Throughout the chapters, readings highlight important real-world applications. They provide examples of operations issues and offer a picture of the concepts in practice. These also provide a basis for classroom discussion and generate interest in the subject matter.

GET REAL

Bosch CS20: Finding a New Order Winner by Changing the Way Customers Cut Straight Lines

Managers at Bosch Power Tools faced a challenging problem—how to design and deliver a better circular saw. Such saws are found in nearly every handyman's workshop, and over the years their designs had become fairly standard. Consequently, there were few features except price to differentiate competing products. Bosch managers looked at circular saws from an outcome perspective. They saw that many of the circular saws on the market did a poor job of helping users attain a simple but critical outcome—cutting straight lines. Customers were frustrated because the lines were inevitably covered up by either sawdust or by the footplate of the saw itself. Bosch's solution? First, it installed a powerful fan to vacuum dust off the cut line. Second, it replaced the steel footplate with an acrylic one that allowed users to see the line as they cut. The result: an award-winning product that customers want to buy.²



picture alliance/Getty Images

²For more information about this innovative product, see: www.new-woodworker.com/reviews/bcs20rvu.html.

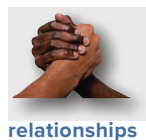
Icons

Instructive icons throughout the text point out relevant applications of our central themes of global issues, relationships, sustainability, and digital technologies.

Since most organizations have supply chains that reach beyond a home country, we examine *global issues* associated with operations and supply chain management.

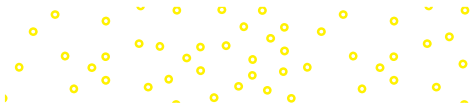


Operations managers must collaborate with other functional personnel, with customers, and with suppliers to accomplish many operations activities. The book showcases how to build, maintain, and benefit from cross-functional and interorganizational *relationships*.



To reduce costs and be competitive, organizations today must adopt sustainable business practices. In fact, *sustainability* is a key metric for operations managers and an important expectation of customers.





Digital technologies such as the Internet and other communication networks, automation, and artificial intelligence are rapidly and radically changing supply chain operations management. The book highlights numerous examples of these changes, explaining how technologies are enabling faster, better, cheaper, and richer customer experiences.



digital

END-OF-CHAPTER RESOURCES

For student study and review, the following features are provided at the end of each chapter:

Chapter Summary Chapter summaries provide an overview of the material covered.

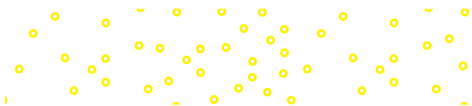
CHAPTER SUMMARY

This chapter provides a broad overview and introduction to operations management. In discussing the scope and complexity of operations management, we have made the following points:

1. The goal of the modern firm is to develop and run an operations management system able to deliver superior product value to the firm’s targeted consumers.
2. Operations management deals with the effective and efficient management of transformation processes. These processes include not only the making of products but also the design of products and related processes; sourcing of required materials and services; and delivery and management of relationships among customers, suppliers, and functions within the firm. As a system, operations management involves four major functional activities and their interactions: (1) customer relationships management, (2) internal operations (manufacturing and services) management, (3) supply management, and (4) logistics management.
3. The operations management system involves three major sets of partners outside the firm: (1) customers, (2) suppliers, and (3) stakeholders. Operations managers also work closely with other business functions within the firm.

Key Terms Key terms are highlighted in the text, and then repeated at the end of the chapter with page references.

KEY TERMS		
core capability 12	operational planning 19	supply chain management 12
customer management 15	operations management 4	supply management 15
customers 13	process 8	tactical planning 19
dematerialization 8	stakeholders 14	tier 16
echelon 16	strategic planning 19	total product experience 8
lean operation 10	suppliers 14	
logistics management 15	supply chain 4	



Discussion Questions Each chapter has a list of discussion questions. These are intended to serve as a student self-review or as class discussion starters.

DISCUSSION QUESTIONS

1. Review *Fortune* magazine's "Most Admired" American companies for 1959, 1979, 1999, and the most current year. (The issue normally appears in August each year.) Which companies have remained on the top throughout this period? Which ones have disappeared? What do you think led to the survival or demise of these companies?
2. Select two products that you have recently purchased; one should be a service and the other a manufactured good. Think about the process that you used to make the deci-

Solved Problems Solved problems illustrate problem solving and the main concepts in the chapter. These have been carefully prepared to enhance student understanding as well as to provide additional examples of problem solving.

SOLVED PROBLEM

Suppose you have been asked to determine the return on net worth for Great Northwest Canoe and Kayak, a small manufacturer of kayaks and canoes, located near Seattle, Washington. For this task, you have been given the following information:

Categories	Values
Sales	\$32,000,000
Cost of goods sold	\$20,000,000
Variable expenses	\$ 4,000,000
Fixed expenses	\$ 6,000,000
Inventory	\$ 8,000,000
Accounts receivable	\$ 4,000,000
Other current assets	\$ 3,000,000
Fixed assets	\$ 6,000,000

Problems Each chapter includes a set of problems for assignment. The problems are intended to be challenging but doable for students.

PROBLEMS

1. Given the following information:

Categories	Values
Sales	\$32,000,000
Cost of goods sold	\$20,000,000
Variable expenses	\$ 4,000,000
Fixed expenses	\$ 6,000,000
Inventory	\$ 8,000,000
Accounts receivable	\$ 4,000,000
Other current assets	\$ 3,000,000
Fixed assets	\$ 6,000,000



Cases The text includes short cases for most chapters. The cases were selected to provide a broader, more integrated thinking opportunity for students without taking a “full case” approach.

CASE

Otis Toy Trains Explores the Supply Chain

Otis Toy Trains of Minneapolis, Minnesota, was a landmark company in the toy business. Since the 1900s, it had been responsible for building electrical and steam-driven toy trains. Since the 1950s, Otis trains had developed a major presence on children’s television shows. Every person (especially boys) knew about Otis toy trains and nearly everyone wanted one. For many kids growing up in the 1960s to the 1980s, waking up on Christmas day and finding an Otis toy train set under the tree was a dream come true. However, the 1990s had not been good to Otis Toy Trains. The preferences of many children had changed. Instead of toys, what many children wanted was a game

United States), the Abraham Lincoln train (a train model based on the train coaches that were used to transport the body of assassinated President Lincoln from Washington, DC, to Springfield, IL, for final burial), the Zephyr (the famous streamlined train that ran between Chicago and Denver during the 1930s), and the Orange Blossom Special. Launched in limited numbers, this first series was an unqualified success. Subsequent launches were almost as successful. Over this time, the designers at Otis Toy Trains developed and refined the skill of identifying attractive train series and of designing products that were detailed, attractive, accurate, and highly evocative of past times.

INSTRUCTOR RESOURCES

The Connect Instructor Library provides complete materials for study and review. Instructors have access to teaching supports such as electronic files of the ancillary materials: Solutions Manual, PowerPoint Lecture Slides, Digital Image Library, and Test Bank.

Solutions Manual Prepared by the authors, this manual contains solutions to all the end-of-chapter problems and cases.

Test Bank Prepared by the authors, the Test Bank includes true/false, multiple-choice, and discussion questions/problems at varying levels of difficulty. The Test Bank questions are assignable within Connect or through the TestGen online platform and are also available as Word files. Each Test Bank question is tagged with the level of difficulty, chapter learning objective met, Bloom’s taxonomy question type, and the AACSB knowledge category.

PowerPoint Lecture Slides The PowerPoint slides draw on the highlights of each chapter and provide an opportunity for the instructor to emphasize the key concepts in class discussions.

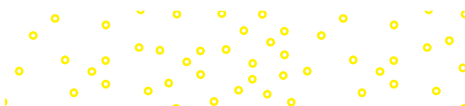
Digital Image Library All the figures in the book are included for insertion in PowerPoint slides or for class discussion.

STUDENT RESOURCES

Student resources are available within the Connect Library or as tools within the Connect assignments.

Integration of Excel Data Sets A convenient feature is the inclusion of an Excel data file link in many problems using data files in their calculation. The link allows students to easily launch into Excel, work the problem, and return to *Connect* to key in the answer.

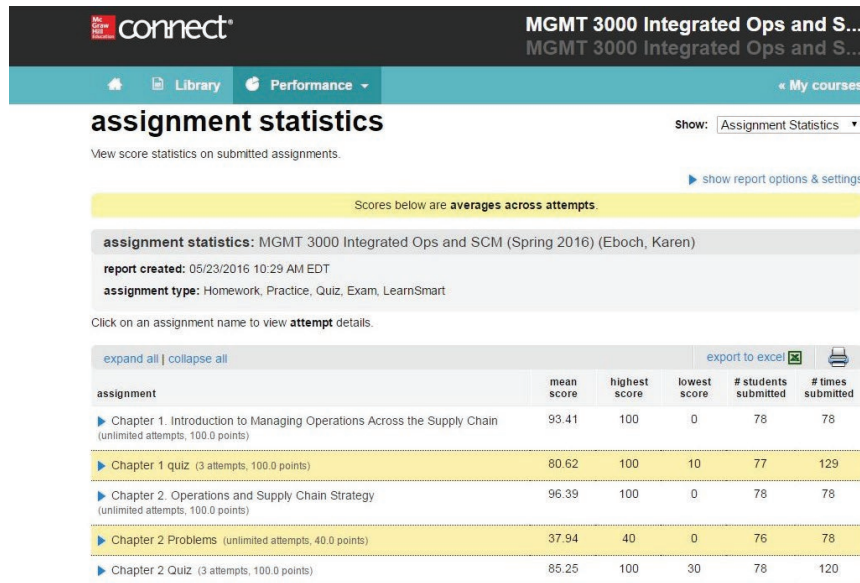
Guided Examples These narrated video walkthroughs provide students with step-by-step guidelines for solving problems similar to those contained in the text. The student is



given personalized instruction on how to solve a problem by applying the concepts presented in the chapter. The narrated voiceover shows the steps to take to work through an exercise. Students can go through each example multiple times if needed.

Student Reporting *Connect Operations Management* keeps instructors informed about how each student, section, and class is performing, allowing for more productive use of lecture and office hours. The progress-tracking function enables you to:

- View scored work immediately (Add Assignment Results Screen) and track individual or group performance with assignment and grade reports.
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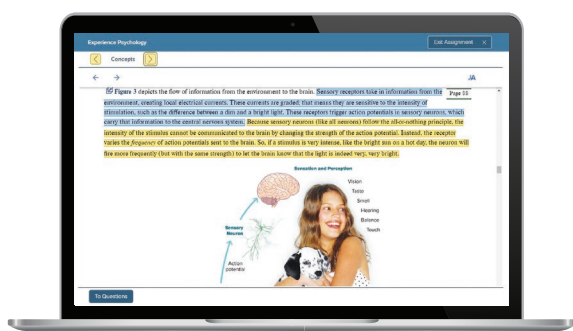
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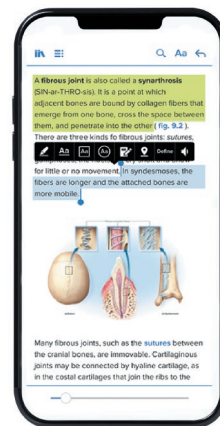
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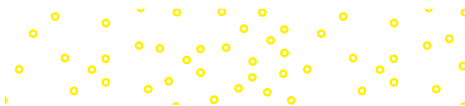
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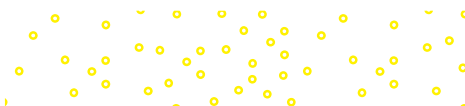
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