

OPERATIONS MANAGEMENT



SECOND CANADIAN EDITION

OPERATIONS MANAGEMENT

SUSTAINABILITY AND SUPPLY
CHAIN MANAGEMENT

JAY HEIZER BARRY RENDER PAUL GRIFFIN

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PEARSON

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To Kathryn Ann Heizer

—JH

To Donna, Charlie, Jesse, and Reva
and to Howard G. Kornacki, the teacher who taught
me to love math

—BR

To Suzanne, Alexandra, and Kathleen

—PG



About the Authors

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Preface

Welcome to your operations management (OM) course and to the second Canadian edition of this textbook. This text presents a state-of-the-art view of the activities of the operations function from a Canadian perspective. Operations is an exciting and dynamic area of management which has a profound effect on the productivity of both services and manufacturing. Indeed, few other activities have so much impact on the quality of your life. The goal of this book is to present a broad introduction to the field of operations in a realistic, meaningful, and practical manner. OM includes a blend of subject areas, including accounting, industrial engineering, management, management science, and statistics. Whether you are pursuing a career in the operations field or not, you will likely be working with people in operations. Therefore, having a solid understanding of the role of operations in an organization is of substantial benefit to you. This text will also help you understand how OM affects society and your life. Certainly, you will better understand what goes on behind the scenes when you buy a coffee at Tim Hortons, take a flight from Edmonton to Vancouver, place an order with Amazon.ca, or enter a Canadian hospital for medical care.

Although many readers of this book are not OM majors, students studying marketing, finance, accounting, and MIS will hopefully find the material both interesting and useful as they develop a fundamental working knowledge of the operations side of the firm.

ABOUT THE SECOND CANADIAN EDITION

The goal of this Second Canadian Edition is to retain the features and strengths that have made this book so successful over the years while bringing a new Canadian perspective to the text. Readers will find examples of Canadian companies and success stories woven throughout the book with cases drawn from the manufacturing and service industry taken from both the private and public sectors. The text describes many Canadian locations and uses Canadian data when available. Readers can follow the story of the construction of a hockey arena as a recurring case study that touches upon many aspects of OM in a familiar setting. It is also important to acknowledge the global nature of today's business environment. Operations management is a discipline that encompasses both the local and the international, with global considerations affecting everything from location strategies to scheduling and transportation. This second Canadian edition therefore retains many of the best and most familiar U.S. and international examples.

Enhanced Coverage of Sustainability in the Supply Chain Among the many updates and revisions in this edition, some key enhancements include changes to Chapter 5, which now expands on the concept of sustainability in the supply chain while discussing the design of goods and services. This theme has been woven throughout the book in various contexts.

Supply Chain Analytics Chapter 11 has been revised in order to discuss supply chain analytics. This chapter now provides a number of useful tools for the reader.

Sales and Operations Planning Chapter 13 has been updated with a discussion of sales and operations planning. This extends the earlier edition's description of aggregate planning.

A partial listing of Canadian examples in the book includes:

Magna International (Chapter 1)	Canadian gun registry (Chapter 3)
Porter Airlines (Chapter 2)	Atomic Energy of Canada Limited (Chapter 3)
Bell Canada (Chapter 2)	StackTeck Inc. (Chapter 5)
Mr. Lube (Chapter 2)	Department of National Defence (Chapter 6)
EllisDon (Chapter 3)	Maple Leaf Foods (Chapter 6)

Fredericton International Airport Authority Inc. (Chapter 7 Supplement)	Canadian Tire (Chapter 12)
Tim Hortons (Chapter 8)	Air Canada (Chapter 15)
Loblaw Companies Limited (Chapter 9)	Bombardier (Chapter 16)
Canadian hospital management (Chapter 10)	Ontario Power Generation (Chapter 17)
WestJet (Chapter 10)	Belairdirect (Module D)
Supply Chain Management Inc. (Chapter 11)	Toronto General Hospital (Module F)

SPECIAL LEARNING FEATURES

The second Canadian edition has also retained many of the hallmark features of *Operations Management* that help new students better engage with the material and develop a deeper understanding of the critical aspects of OM.

Integrated Video Case Studies The book features a number of integrated *Video Case Studies* that take you behind the scenes of various organizations and show you how concepts presented in this textbook are applied in real life. Topics such as statistical quality control, green manufacturing and sustainability, inventory management, maintenance, and overall OM strategy are covered in a series of 8- to 14-minute videos focusing on Frito-Lay, Darden Restaurants, Hard Rock Cafe, Arnold Palmer Hospital, Wheeled Coach Ambulance, and Regal Marine.

Rapid Reviews Every chapter concludes with a two-page *Rapid Review* that provides a detailed yet concise summary of the main points and equations in the chapter and helps students prepare for homework, exams, and lectures by capturing the essence of the material. Each *Rapid Review* also includes a self-test, with questions linked to the learning objectives in that chapter. Key terms introduced in the chapter are part of the *Rapid Review*.

Integration of Ethics throughout the Book The second Canadian edition continues to provide broad coverage of ethics as an OM consideration. The topic is discussed in most chapters and near the end of each chapter, a special *Ethical Dilemma* appears that can be used for classroom discussion or homework.

Author Comments You will find *Author Comments* in the margins throughout the text. This feature points out why a section, a figure, or a table is so important. The comments are intended to be motivational to students, as well as educational.

Additional Homework Problems This text features the most homework and practice problems of any text in this discipline. Red dots next to each problem indicate the level of difficulty with one dot being least difficult and three dots most difficult. Many of the problems have been modified and updated to reflect the changes made to the second Canadian edition. The problems can also be practised online through MyOMLab. Solutions to all the problems appear in the Instructor's Solutions Manual.

MyOMLab is an online homework and assessment tool designed to help students practise operations management problems, improve their understanding of course concepts, and give instructors feedback on student performance. This online product expands the student's learning experience with out-of-class quizzes that are automatically graded, and tutorials that guide students through the problem solving process. This online homework and assessment tool keeps students up to date, and frees instructors to use class time more creatively. MyOMLab has a wealth of resources that assist students in preparing for class, working on assignments, and achieving the learning goals for each chapter.

MyOMLab lets you teach your course your way. Use MyOMLab as an out-of-the-box resource for students who need extra help, or take full advantage of its advanced customization options.

MyOMLab

INSTRUCTOR RESOURCES

All of the instructor resources are password protected and available for download from the Pearson online catalogue at <http://catalogue.pearsoned.ca>.

Instructor's Resource Manual The Instructor's Resource Manual contains many useful resources, including course outlines, video notes, learning techniques, online exercises and sample answers, case analysis ideas, additional teaching resources, and faculty notes.

Instructor's Solutions Manual The Instructor's Solutions Manual contains answers to all of the discussion questions, *Ethical Dilemmas*, active models, and cases in the text, as well as worked-out solutions to all the end-of-chapter problems.

PowerPoint™ Presentations An extensive set of PowerPoint™ presentations is available for each chapter.

TestGen and Test Item File For your convenience, our test bank is available in two formats. TestGen is a computerized test bank containing a broad variety of true/false, multiple choice, fill-in-the-blank, short answer, and more complex problem questions. Questions can be searched and identified by question type or level of difficulty. Each question has been checked for accuracy and is available in the latest version of TestGen software. This software package allows instructors to custom design, save, and generate classroom tests. The test program permits instructors to edit, add, or delete questions from the test bank; edit existing graphics and create new ones; analyze test results; and organize a database of tests and student results. This software allows for greater flexibility and ease of use. It provides many options for organizing and displaying tests, along with search and sort features. The same questions can also be found in a Test Item File available in Word format.

Video Package This book is accompanied by the “On Location Video Series,” a set of 39 videos hosted by Jay Heizer and Barry Render. Video cases include companies such as Frito Lay, Hard Rock Cafe, Red Lobster, and Regal Marine.

Also included are “Solved Problems” videos, comprising over 60 clips with Jay Heizer and Barry Render walking the viewer through stepped out problems.

Technology Specialists Pearson's technology specialists work with faculty and campus course designers to ensure that Pearson technology products, assessment tools, and online course materials are tailored to meet your specific needs. This highly qualified team is dedicated to helping schools take full advantage of a wide range of educational resources, by assisting in the integration of a variety of instructional materials and media formats. Your local Pearson Education sales representative can provide you with more details on this service program.

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