

TENTH EDITION



PRINCIPLES OF Operations Management

SUSTAINABILITY AND SUPPLY CHAIN MANAGEMENT

JAY
HEIZER

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MUNSON

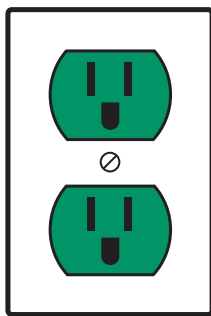
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PRINCIPLES OF OPERATIONS MANAGEMENT

Sustainability and Supply Chain Management

TENTH EDITION

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Sustainability and Supply Chain Management

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To Karen Heizer Herrmann, all a sister could ever be

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To Donna, Charlie, and Jesse

B.R.

**To Kim, Christopher, and Mark Munson for their unwavering support,
and to Bentonville High School teachers Velma Reed and Cheryl Gregory,
who instilled in me the importance of detail and a love of learning**

C.M.

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CHUCK MUNSON

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Preface

Welcome to your operations management (OM) course. In this book, we present a state-of-the-art view of the operations function. Operations is an exciting area of management that has a profound effect on productivity. Indeed, few other activities have as much impact on the quality of our lives. The goal of this text is to present a broad introduction to the field of operations in a realistic, practical manner. Even if you are not planning on a career in the operations area, you will likely be working with people in operations. Therefore, having a solid understanding of the role of operations in an organization will be of substantial benefit to you. This book 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 attend a concert or major sports event; purchase a bag of Frito-Lay potato chips; buy a meal at an Olive Garden or a Hard Rock Cafe; place an order through [Amazon.com](https://www.amazon.com); board a flight on Alaska Airlines; or enter a hospital for medical care. More than one and a half million readers of our earlier editions seem to have endorsed this premise.

We welcome comments by email from our North American readers and from students using the International edition, the Indian edition, the Arabic edition, and our editions in Portuguese, Spanish, Turkish, Indonesian, and Chinese. Hopefully, you will find this material useful, interesting, and even exciting.

New to This Edition

We've made significant revisions to this edition, and want to share some of the changes with you.

Four New *Video Case Studies* Featuring Alaska Airlines

In this edition, we take you behind the scenes of Alaska Airlines, consistently rated as one of the top carriers in the country. This fascinating organization opened its doors—and planes—so we could examine leading edge OM in the airlines industry. We observe: the quality program at Alaska Air (Chapter 6); the process analysis behind the airline's 20-minute baggage retrieval guarantee (Chapter 7); how Alaska empowers its employees (Chapter 10); and the airline's use of Lean, 5s, kaizen, and Gemba walks (Chapter 16).

Our prior editions focused on integrated *Video Case Studies* for the Orlando Magic basketball team, Frito-Lay, Darden Restaurants, Hard Rock Cafe, Arnold Palmer Hospital, Wheeled Coach Ambulances, and Regal Marine. These *Video Case Studies* appear in this edition as well, along with the five new ones for Alaska Airlines. All of our videos are created by the authors, with the outstanding coauthorship of Beverly Amer at Northern Arizona University, to explicitly match with text content and terminology.

Alaska Airlines: 20-Minute Baggage Process—Guaranteed!

Video Case 

Alaska Airlines is unique among the nine major U.S. carriers not only for its extensive flight coverage of remote towns throughout Alaska (it also covers the U.S., Hawaii, and Mexico from its primary hub in Seattle). It is also one of the smallest independent airlines, with 10,300 employees, including 3,000 flight attendants and 1,500 pilots. What makes it really unique, though, is its ability to build state-of-the-art processes, using the latest technology, that yield high customer satisfaction. Indeed, J. D. Power and Associates has ranked Alaska Airlines highest in North America for seven years in a row for customer satisfaction.

Alaska Airlines was the first to sell tickets via the Internet, first to offer Web check-in and print boarding passes online, and first with kiosk check-in. As Wayne Newton, Director of System Operation Control, states, “We are passionate about our processes. If it’s not measured, it’s not managed.”

One of the processes Alaska is most proud of is its baggage handling system. Passengers can check in at kiosks, tag their own bags with bar code stickers, and deliver them to a customer service agent at the carousel, which carries the bags through the vast underground system that eventually delivers the bags to a baggage handler. En route, each bag passes through TSA automated screening and is manually opened or inspected if it appears suspicious. With the help of bar code readers, conveyor belts automatically sort and transfer bags to their location (called a “pier”) at the tarmac level. A baggage handler then loads the bags onto a cart and takes it to



Creating Your Own Excel Spreadsheets

We continue to provide two free decision support software programs, Excel OM for Windows and Mac and POM for Windows, to help you and your students solve homework problems and case studies. These excellent packages are found in [MyOMLab](#) and at our text’s Student Download Page.

Many instructors also encourage students to develop their own Excel spreadsheet models to tackle OM issues. With this edition, we provide numerous examples at chapter end on how to do so. “Creating Your Own Excel Spreadsheets” examples now appear in Chapters 1, 2, 4, 8, 12 (2 examples), and 13, Supplement 6, and Supplement 7. We hope these nine samples will help expand students’ spreadsheet capabilities.

Using Software for Productivity Analysis

This section presents three ways to solve productivity problems with computer software. First, you can create your own Excel spreadsheets to conduct productivity analysis. Second, you can use the Excel OM software that comes with this text. Third, POM for Windows is another program that is available with this text.

CREATING YOUR OWN EXCEL SPREADSHEETS

Program 1.1 illustrates how to build an Excel spreadsheet for the data in Example 2.

	A	B	C	D	E
1	Collins Title Insurance Ltd.				
2	Productivity Increase Computations	Enter the values for the old system in column B and the new system in Column C			
3					
4	Parameters	Old System	New System		
5	Length of Workday (hours)	8	8		
6	Number of Workers	4	4		
7	Labor Hours per Day	32	32		=C5*C6
8	Payroll Cost per Day	\$640	\$640		
9	Overhead Expenses	\$400	\$800		
10	Output (Titles per Day)	8	14		
11		=B10/B7		Productivity = Output/Input	
12					
13	Solutions	Old System	New System	% Increase	
14	Labor Productivity (Titles per Labor-Hour)	0.25	0.4375	75.00%	
15	Multifactor Productivity (Titles per Dollar)	0.0077	0.0097	26.39%	
16		=C10/(C8+C9)		=C14-B14/B14	
Actions					
Copy C7 to B7, Copy B14 to C14, Copy C15 to B15, and Copy D14 to D15					
Create a row for each of the inputs used for the productivity measure. Put the output in the last row.					

Program 1.1

✕ USING EXCEL OM

Excel OM is an Excel “add-in” with 24 Operations Management decision support “Templates.” To access the templates, double-click on the *Excel OM* tab at the top of the page, then in the menu bar choose the appropriate chapter (in this case Chapter 1), from either the “Chapter” or “Alphabetic” tab on the left. Each of Excel OM’s 24 modules includes instructions for that particular module. The instructions can be turned on or off via the “instruction” tab in the menu bar.

P USING POM FOR WINDOWS

POM for Windows is decision support software that includes 24 Operations Management modules. The modules are accessed by double-clicking on *Module* in the menu bar, and then double-clicking on the appropriate (in this case *Productivity*) item. Instructions are provided for each module just below the menu bar.