

Operations Management

Continuous Improvement

Fifth Edition



Richard J. Schonberger

Edward M. Knod, Jr.

F I F T I

T I O N

OPERATIONS MANAGEMENT

Continuous Improvement

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The cover photo is the sign on a Japanese paint shop. Kanban, from the Japanese, means "card" or "visible record." An ancient meaning of kanban is shop sign. The colorful artistic sign conveys simple, accurate information about a shop's product or service to the passing shopper. A kanban card in operations management tells what and how much to provide to the customer.

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Every member of every organization serves somebody else: the customer at the next process. We earn our pay and much of our job-related satisfaction from serving that customer well, with consistently high and ever-improving quality. Effective operations management (OM) aims squarely at this customer-serving objective.

Achieving the objective requires engaging, coordinating, and continually upgrading the operating resources of the organization: data, equipment, tools, space, materials, and especially people. Effective OM harnesses the talents of front-line employees, technicians, experts, supervisors, and upper-level managers. Their individual skills—as designers, schedulers, equipment operators, planners, and so on—are important, but that is not enough. Individuals can get fixated on their narrow role, to the neglect of the whole product or service and its user, the final customer.

Therefore, in this text, we emphasize people operating in teams for improved delivery of goods and services to customers. The full power of this approach requires team membership that crosses organizational and company boundaries, heavy reliance on process data and data analysis, and local responsibility for results.

These themes—customer-focused, team-driven, data-based continuous improvement—are centerpieces of the worldwide total quality management (TQM) movement. While some companies are well along the TQM path, others are not. Therefore, we must present both conventional and TQM-enhanced concepts. At the same time, we make an effort to note which conventional OM concepts still work well, which do not, and why.

Part of continuous improvement is preventing things from going wrong, which greatly simplifies operations management. Unexpected stoppages, delays, and slowdowns are avoided, making planning easier and cutting out corrective actions that disruptively ripple through the organization. The simplification theme, found throughout the book, cuts both ways: Simplify to reduce mistakes. Reduce mistakes to make work life simpler.

This should not imply that OM is itself simple and easy to master. Even in small organizations, managing operations is complex because it involves coordination of diverse resources, processes, suppliers, and customer demands.

The relevance of operations management to you may be quite direct. If you are an employee—or even a volunteer in a service capacity—as well as a student, you are an operations manager. You have some responsibility for planning and controlling your operation. At the very least, these studies should give you ideas on how to improve an operation and your role in it.

We owe special thanks to a select group of experts who reviewed our manuscript and whose astute advice was mostly incorporated. They include: S. Keith Adams, Iowa State

Operations Management is intended as an introductory textbook, suitable for majors or nonmajors, undergraduate or graduate. In addition, practicing operations managers and associates may find it useful as a general guidebook and basic reference.

With other supplementary study materials or readings, this book could serve as a TQM textbook. Seven chapters—1, 2, 3, 4, 7, 8, and 18—provide a strong TQM foundation. Additional TQM-oriented topics may be found in parts of Chapters 9, 10, 11, 15, 16, and 17.

University; Karen Brown, Seattle University; James J. Browne, New York University; James P. Gilbert, University of Georgia; James R. Gross, University of Wisconsin, (Oshkosh); Ray M. Haynes, California Polytechnic State University; John J. Lawrence, The University of Idaho; and Victor E. Sower, Sam Houston State University.

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Richard J. Schonberger
Edward M. Knod, Jr.

When you study operations management, or OM, keep in mind that there are two separate ideas about what we mean by the word operations. First, and generally, operations refers to harnessing resources to provide a service or produce something. As such, operations belong to no specific part of an organization; they are part of every kind of organized activity and touch your life as customer or provider of those operations.

Within this first context, the relevance of operations management to you is quite direct. Whether as an employee—even a volunteer in a service capacity—or as a student, you are an operations manager. You have some responsibility for planning and controlling the things you do and for the results of those activities. At the very least, your OM studies should give you ideas on how to improve your operation and others connected to it.

The second and narrower meaning refers to operations as one or more departments or functional areas within organizations. Historically, operations areas have housed value-adding activities where certain resources are transformed into goods and services. Within this context, your study of OM will provide insights on the interdependencies between operations and other areas—marketing, accounting, product design, human resources, and information systems. These insights are valuable even to people on the lowest rungs of the organizational ladder; they can make or break a career for those aspiring to climb up the ladder. Chapter 18 elaborates on these matters of possible personal interest to you and your career.

In your study of OM, you'll need to keep both meanings in focus. Beyond the impact on yourself, however, there is a bigger picture to consider. Effective OM blends the interests of customer, employee, and manager, along with those of the public, stockholders, and other stakeholders. Diverse resources, changing technologies, and hard-to-predict demands add to the challenge. Human ingenuity, diligence, and the right management tools, are required to blend all the interests properly.

Your OM studies, therefore, will involve a certain amount of complexity and an array of management tools and techniques. These have their soft side (guidelines, procedures, and flowcharts), and their hard side (formulas and management science models).

As you study each succeeding chapter, you will repeatedly encounter some of the core topics—quality, quick response, cellular organization of people and facilities, and so on. These topics are multifaceted. Poorly managed organizations often make the deadly mistake of trying to manage quality, for example, out of a single department using a far too limited set of concepts and tools.

Special features designed to provide relevance, interest, and help in your studies include:

- Margin notes that highlight a major point, define a term, or add an insight.
- Key-word listings at the end of each chapter, collected into a glossary at the end of the book.
- Boxed presentations of real-life applications.
- Photos of successful implementations.
- Examples illustrating complex concepts and calculations.
- End-of-chapter solved problems.
- An appendix containing more complete answers to selected problems and exercises.
- Contrast boxes comparing conventional concepts with newer ideas.
- Special margin notes in every chapter to connect a point back to the principles of operations management from Chapter 1.
- A large, thorough index.
- A study guide covering key topics.

Good luck in your OM studies. Please let your instructor know what you like and don't like about the fifth edition. We value your opinion, passed on to us through the instructor. Continuous improvement is our objective, too.

R. J. S.
E. M. K.

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INTRODUCTION TO OPERATIONS MANAGEMENT

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The operating end of a business is where services are provided and products are made, where most of the firm's money is spent and earned, and where most of the people work. How best to manage the factors of operations is the central issue of this book. The following two-chapter introduction provides an overview and details the key issues.

Chapter 1 sets forth the theme of the book: Teaming up in the cause of continually improving service to customers is a strategically important, overriding goal of operations management. The chapter provides a set of principles that will help operations associates accomplish this never-ending goal. Chapter 2 focuses on achieving a serious commitment to continuous improvement of quality—customers' number one concern—as part of the fabric of operations management.