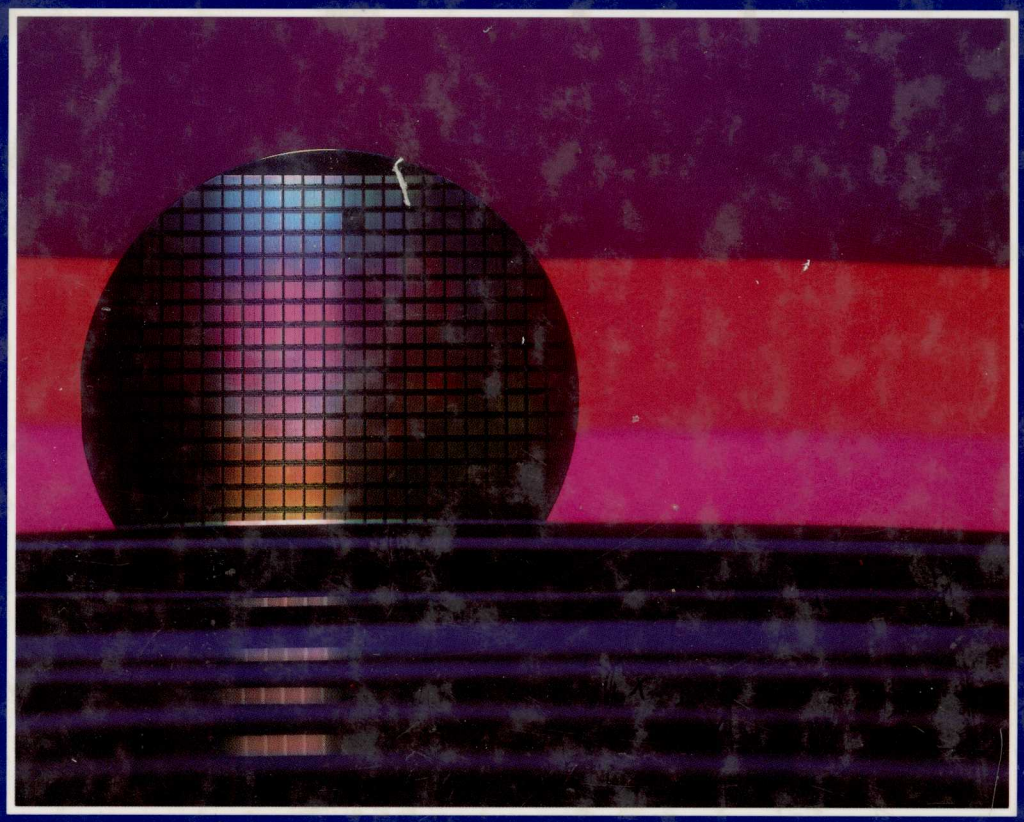
Operations Management

Concepts, Methods, and Strategies



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Second Edition

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Operations Management

CONCEPTS, METHODS, AND STRATEGIES

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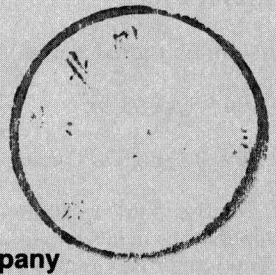

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Preface

Our approach to writing *Operations Management: Concepts, Methods, and Strategies* is based on four related ideas. First, an organization should be viewed as a system of interrelated functions such as accounting, marketing, finance, and operations. To have a full understanding of organizations and operations, managers must see the impact that operations has on other parts of the organization and vice versa. Second, decisions made by operations managers can have a major impact on an organization's competitive performance and students should understand the importance of operations in an organization's strategy. Third, all students in an introductory operations management course, regardless of their individual majors, should be brought up to the cutting edge of operations management as it is practiced by today's successful organizations. And fourth, quantitative methods should be integrated into the conceptual material and presented as tools for solving specific problems.

These ideas, which were the foundation of the first edition, are carried forward in the second edition because we still believe that putting these ideas into practice is vitally important to improving organizational performance in the growing and highly competitive international marketplace. The strong response to the first edition and highly favorable comments made by reviewers of the second edition support this belief.

Within this framework, many enhancements have been made in the second edition. Coverage of forecasting concepts and techniques has been expanded and forecasting is now presented in a separate chapter. There is also expanded coverage of facility location and project management, both of which now appear in separate chapters. Current topics like quality functional deployment, synchronous manufacturing, teamwork approach to product and process design (sometimes call concurrent engineering or interactive product and process design), and design for manufacturing and assembly have been added. In fact, every chapter has been carefully reviewed and updated with current material.

Responding to changes in the external environment, the second edition has increased coverage of the international dimension and examines the impact that global markets can have on the organization and, more specifically, on operations. We have also increased coverage of service operations, a growing part of the U.S. and world economies. In line with the AACSB's emphasis on ethics, coverage of ethical issues has been included where appropriate.

Intended Audience

We have written this text for use in the introductory course in operations management for undergraduates and MBA students. The text is designed so that students in any business-related major will find it relevant. Thus, prior training in management science is not required to read and understand the text. However, it is assumed that students have had an introductory course in statistics.

Special Topics

This text covers the standard operations management topics. However, we have gone beyond that standard fare and included new chapters and some new topics

in standard chapters. For instance, in Chapter 2 we discuss the use of operations to gain competitive advantage and also present new ideas about technology and computer-integrated manufacturing. In addition, the concepts of using operations to gain a competitive advantage and computer-based technological advancements are integrated throughout the text. This enables readers to relate these concepts to day-to-day operating decisions. In discussing new product development in Chapter 4, we view it as a team effort that should include marketing, engineering, operations, finance, accounting, and management information systems. This illustrates a major theme of the text, which is understanding that an organization is a system of interrelated parts, and that operations is one part of that organization. Operations must interact effectively with other functional areas if the organization is to achieve its objectives. Chapter 5, on capacity, emphasizes the impact that bottlenecks have on system capacity and illustrates how to determine the bottleneck. Chapters 11 and 12 are thoroughly up-to-date in their discussion of material requirements planning, just-in-time operations, and synchronous manufacturing. Chapter 15 provides a more thorough coverage of purchasing concepts than usually found because material costs are often the most significant cost factor in any operation. Chapter 17 emphasizes the latest concepts of quality management, including total quality control and quality functional deployment. In our Chapter 18 discussion of technology, we include the often overlooked human aspects of improving operations through automation. Chapter 19 breaks new ground by discussing information systems for managing and controlling operations.

Integration of Services and Manufacturing

Operations exist in a variety of organizations. Thus, we have been careful to include numerous examples and problems from both service and manufacturing operations. While striving to point out how service and manufacturing operations are different, we have also avoided covering them as totally separate topics. The result, we believe, achieves a reasonable balance between the two.

Computer Applications and Automation

In today's rapidly changing environment, computer applications and automation have an important role in operations. Thus, we have devoted a significant part of this book to discussion of those topics as they relate to both services and manufacturers. The automation topics presented include automated guided vehicles, automated storage and retrieval systems, robotics, cellular manufacturing, and flexible manufacturing systems. The computerization topics discussed include computer-aided design and manufacturing, computer-aided process planning, computer-integrated manufacturing, computer numerical control, data base, MRP, decision support systems and expert systems.

The Role of Quantitative Methods

We understand the important role that quantitative methods, both statistics and management science, have in operations. That is why these topics have been carefully woven throughout the text so their application can follow logically from, and be close to, the discussion of managerial issues. The result is that students are motivated to learn quantitative techniques because the managerial applications are readily apparent.

Because these quantitative methods are integrated throughout the text, instead of being presented as separate chapters, we have listed below the chapters in which each method appears.

Subject	Chapter
Acceptance Sampling for Quality Management	17
Aggregate Planning	10
Assembly Line Balancing	8
Cost-Volume-Profit Model	7
Project Scheduling	14
Decision Trees	5
Distribution Requirements Planning	11
Forecasting	3
Job Shop Layout	8
Learning Curves	9
Linear Programming for Aggregate Planning	Supplement to Chapter 10
Lot Sizing Models	16
Make versus Buy Decisions	15
Material Requirements Planning	11
Modeling, An Introduction	3
Safety Stock Determination	16
Scheduling of Production	13
Simulation of Waiting Lines and Machine Failure	Supplement to Chapter 13
Statistical Process Control	17
Transportation Method	6
Waiting Line Models	Supplement to Chapter 13

Chapter Features

Many pedagogical features have been incorporated into this text as a means of achieving our overall objectives. These features include:

Learning Objectives. A list of performance-based Learning Objectives is provided at the beginning of each chapter so that students will know what will be expected of them after completing the chapter.

Operations in Action Boxes. This feature begins, and is found throughout, each chapter. It is designed to provide students with examples of current problems and issues found in operations and to illustrate how they are being solved by actual companies such as General Motors, Florida Power and Light, Harley-Davidson, and Federal Express. Our intent is to tie together concepts and techniques discussed in this text with the practice of business and industry.

Gaining Strategic Advantage Boxes. There is one of these in each chapter. Its purpose is to supplement the Operations in Action boxes by focusing on how today's successful organizations use operations to gain an advantage over their competitors. Each is tied to the concepts or techniques discussed within the chapter in which it appears.

Integrating the System Boxes. They describe the interactions between two areas or subsystems within the same operations department, or between two different functional areas of an organization. Their purpose is to reinforce the theme of this text by stressing the integrative nature of this field and to highlight the importance of operations to other functional areas.

Examples. In order to help students understand the more quantitative material we have provided frequent numerical examples throughout the book.

Summary. Each chapter ends with a summary of key points that reflect the learning objectives listed at the beginning of the chapter.

Career Profile. Because most students in an introductory course have little, if any, idea of the jobs available in operations management, we have provided a career profile at the end of each chapter. This material highlights a *real person* whose job is related to topics discussed in the chapter. The career profile describes each person's background, the career path he or she has followed, what they do now, and the next career step for them.

Solved Problems. In addition to the extensive examples located throughout each chapter, we have provided solved problems at the end of the chapters. These should serve as a model for students working the homework problems on their own.

Questions. Each chapter concludes with an extensive set of review and discussion questions.

Problems. We have also provided a large number of numerical practice problems. Those problems that are especially appropriate for computer solution have been flagged with a special microcomputer logo, although they can also be solved by hand. Solutions to these problems using the STORM software are available in the instructor's manual.

Data Sets for Computer Solution. To give students a feel for the real-world problems that can only be solved on a computer, we have provided separate problems with larger and/or more complex data sets. Solutions to these problems using the STORM software are available in the instructor's manual.

Mini-Cases. Each chapter includes mini-cases. These are more extensive problem situations that either rely more on subjective judgement or require considerable calculations. These may be assigned as extensive homework problems or used as the basis for class discussions.

Selected Bibliography. Each chapter contains a list of books and articles that are related to the topics discussed in the chapter. These can be used by readers who want to know more about a topic.

Glossary. Key terms have been highlighted in bold type throughout the book. However, these terms, along with their definitions, are also arranged alphabetically at the end of the text.

Summary of Formulas. To help students find a formula even though they may not recall in which chapter that formula appeared, we have provided a summary of formulas. These formulas, arranged alphabetically, appear at the end of the text.

Supporting Material

Instructors' Manual. The Instructor's Manual, prepared by the text authors, includes teaching suggestions as well as answers and solutions to all end of chapter questions, problems, mini-cases, and data sets for computer solution.

Computer Software. There are two options for those who wish to have computer software application as a part of the learning experience. *STORM Personal Version 2.0* software written by Emmons, Flowers, Khot, and Mathur can be used with the text. In certain chapters, problems identified with a micro-computer logo and the data sets for computer solution can be solved using the STORM software. Diskettes are available. These diskettes contain the data for these problems in a format that is readable by the STORM software and a solution to each of these problems. In the appropriate chapter in the instructors manual, a hard-copy solution to each problem using STORM can be found.

For faculty who prefer a spreadsheet approach, *Structuring and Solving Operations Management Problems Using Lotus 1–2–3, Second Edition* by Zimmerman and Zimmerman can be selected. Many of the problems in our text are solved in the Zimmerman and Zimmerman book. More details including a list of problems that can be solved with the Zimmerman and Zimmerman software can be found near the end of the instructor's manual. It is highly likely that alternatives to STORM and the Zimmerman and Zimmerman software can be used, but we have verified that these packages will work.

Test Bank. The test bank, developed by M. Jill Austin of Middle Tennessee State University, has been completely revised. It contains over 1,000 questions (with answers) and is also available on West's Computerized Testing Program, WEST-EST. The questions are a mixture of multiple choice, problems, and essay.

Video "Plant Tours". Throughout the text we have stressed the fact that real companies are using the techniques and concepts presented. However, since one picture is worth a thousand words, and because most students do not have an opportunity to experience operations first-hand, we have assembled a video "plant tour." Available free of charge to qualified adopter, this ½" VHS tape consists of nearly 20 segments produced by such companies as Allen-Bradley, Longview Fibre, U.S. Postal Service, Mercury Marine, John Deere, USA Today, Federal Express, General Motors, and Harley-Davidson. These video plant tours take students right inside a company's operations to see how operations management techniques and concepts are applied. Through a specially prepared set of instructor notes, these video clips are tied directly to appropriate chapters of the text by discussion questions and key points.

Transparency Masters. A separate set of transparency masters is available for most exhibits in the text as well as for other important concepts. There are well over 300 transparency masters in the set.

Study Guide. A Study Guide, developed by M. Jill Austin of Middle Tennessee State University, can be purchased by the students. It includes an overview of the chapter's concepts as well as sample problems and sample questions with correct answers.

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Inland Steel Corporation
Hewlett Packard
Honeywell Space and Strategic Avionics Division
International Business Machines Corporation
Kawasaki Motors Manufacturing
Longview Fibre Company
McDonnell Douglas Corporation
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CONCEPTS, METHODS, AND STRATEGIES

Chapter 1

Introduction to Operations Management

CHAPTER OUTLINE

Contents in Brief

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