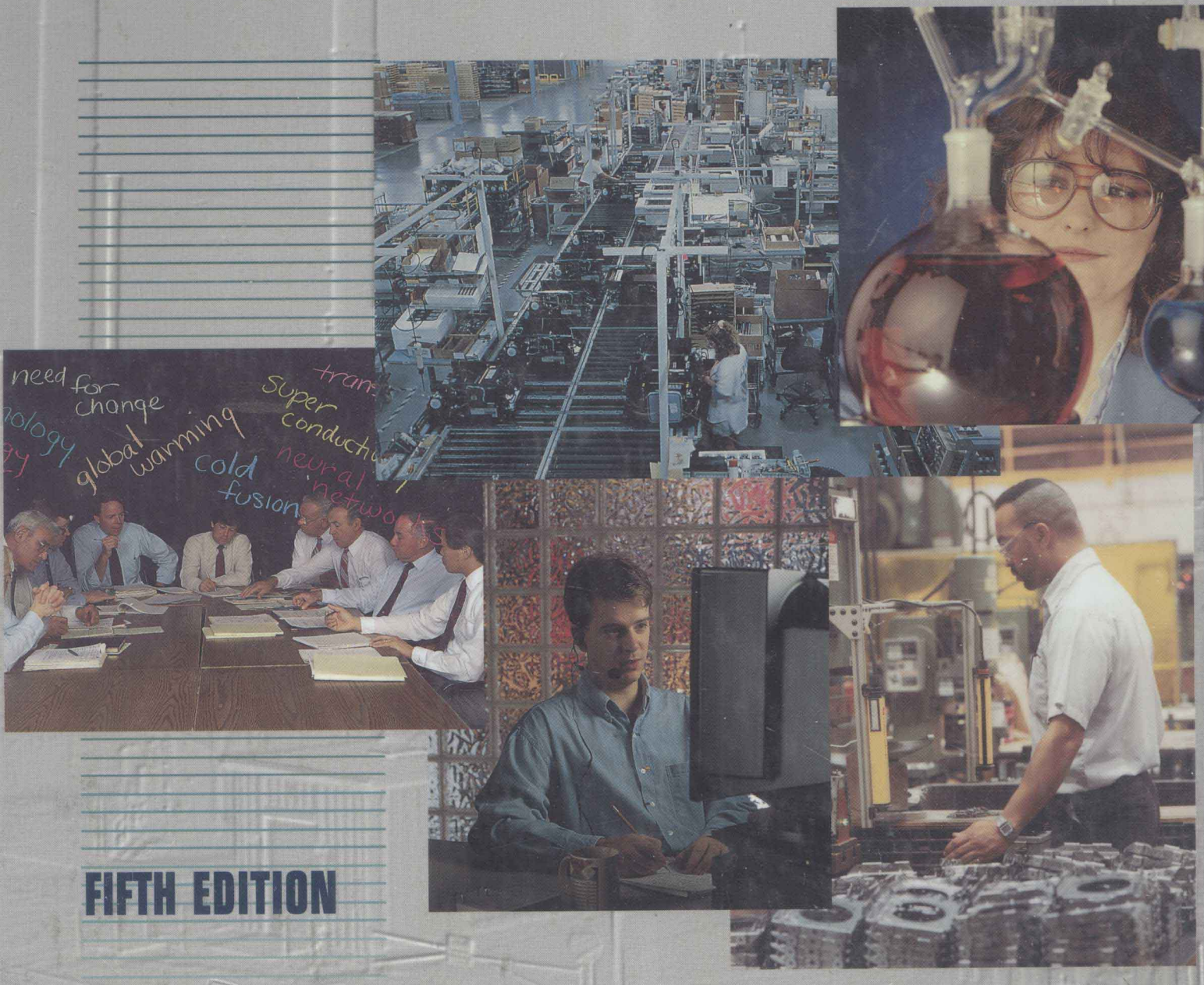
PRODUCTION/OPERATIONS MANAGEMENT

QUALITY, PERFORMANCE, AND VALUE



FIFTH EDITION

JAMES R. EVANS

Production/ Operations Management

Quality, Performance, and Value

Fifth Edition

James R. Evans
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To Beverly, Kristin, and Lauren

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Preface

The purpose of *Production/Operations Management: Quality, Performance, and Value,* Fifth Edition, is to provide students of business administration with a sound understanding of the concepts, techniques, and applications of contemporary production and operations management (P/OM). As we approach the next century, our country's need for improvements in quality and productivity has never been so great. Our international competitiveness and survival in the global marketplace depend upon our ability to make these improvements—and that requires that students in all functional areas of business acquire a body of basic knowledge and appreciations that can be applied in their future jobs. This philosophy is the basis of this book.

Production/Operations Management combines the managerial issues of P/OM with technical tools and quantitative applications. Practical applications in actual manufacturing and service organizations are described throughout the book and in the innovative end-of-chapter "P/OM in Practice" feature.

Changes in Fifth Edition

In preparing this edition, the author was influenced greatly by recent experience as an examiner for the Malcolm Baldrige National Quality Award. The Baldrige criteria represent a philosophy of managing operations built upon the foundation of total quality principles. The 1995 revised criteria, in particular, make it clear that the pursuit of quality, performance, and value is a basic business philosophy. This belief underlies the definition of P/OM given in Chapter 1: *The purpose of operations management is to deliver ever improving value for customers through the continuous improvement of overall company performance and capabilities.* The core concepts underlying the Baldrige criteria provide a natural framework for viewing the field of production and operations management, and thus are integrated strongly throughout this edition, though without an explicit focus on the Baldrige award itself. As a result of this new orientation, several major changes have been made in the organization and content of this edition, which are reflected in the new title. All chapters have been streamlined, updated, and revised where appropriate with new explanatory material, new "P/OM in Practice" cases, and new real-world examples, designated as "Applied P/OM" features. Several new chapter have been written as well. In addition, a pizza restaurant scenario has been added throughout the book to illustrate and explain P/OM concepts in a simple setting that would be very familiar to students.

Organization

The book's content is logically organization into five parts and a set of supplementary quantitative-methods chapters:

Part I: Foundation of P/OM. The first five chapters provide foundation material on basic concepts and issues in P/OM: the concept of customer value, managing for quality and high performance, the role of P/OM in strategic planning, the importance of measurement of operations' processes and results, and the operations manager's role in human resources.

Part II: Strategic Issues in Operations. Chapters 6 through 8 focus on strategic product design and development, forecasting and capacity planning, and facility location and distribution system design.

Part III: Designing and Managing Production Processes. Chapters 9 through 12 deal with the issues of process technology and design, workplace design and layout, process management, and statistical quality control.

Part IV: Managing Materials. This section includes an introduction to materials and inventory management, quantitative decision models for inventory management, and lean production—emphasizing JIT and constraint management.

Part V: Planning and Scheduling. This part consists primarily of operational activities: aggregate planning and master scheduling, material requirements planning, operations scheduling, production-activity control, and project planning and management.

Supplementary Chapters. Discussions of quantitative methods appear in the five supple-

mentary chapters at the back of the book. This gives the instructor flexibility in selecting and sequencing quantitative material in the course design.

In addition, tables useful in many quantitative computations, a comprehensive glossary of key terms, and solutions to selected problems are found at the end of the book.

Content

To reflect the new emphasis of this edition, several new chapters have been written and others have been reorganized or substantially revised. When appropriate, each chapter has been updated to reflect new and current trends in P/OM. Also, each chapter with quantitative material now has a section of "Solved Problems" to help the student better understand these techniques. End-of-chapter questions are broken into two sections: (1) "Review Questions" test the student's basic understanding of concepts introduced in the chapter, and (2) "Discussion Questions" invite the student to apply the concepts to his or her own experiences or pose thought-provoking issues that have no stock answers. These provide a rich source of classroom discussion.

The key changes in individual chapters are described below.

- *Chapter 1: Introduction to Production and Operations Management.* This chapter lays a new foundation for the importance of P/OM in today's global competitive environment, focusing on the major themes that have characterized P/OM in the past half-century. Collectively, these form the basis for what may be called "total quality management": a focus on customer value through lean and efficient production efforts. Management-science methods are introduced in the appendix to this chapter.
- *Chapter 2: Managing for Quality and High Performance.* This chapter, which focuses on productivity/quality management principles, has been substantially revised to include more contemporary views of quality management, particularly those that form the basis for the Malcolm Baldrige National Quality Award. Also included is a description of ISO 9000 and a comparison of it with the Baldrige criteria.
- *Chapter 3: P/OM and Strategic Planning.* This chapter has been substantially revised to focus on key issues of strategy that relate to competitive advantage and the role that quality and manufacturing play in strategic planning. Also included is a new section on strategy formulation and deployment as practiced by today's leading companies.
- *Chapter 4: Measuring Operations Performance.* This is a new chapter that addresses the scope of performance measurement in operations, including suppliers, product and service quality, business support services, and company operational results. Productivity and cost-of-quality measurement are integrated into this discussion. A section on managing quality and performance data focuses on reliability, accessibility, and analysis of data.
- *Chapter 5: Work Design and Human Resource Management.* This chapter consolidates and expands upon materials found in other chapters in the previous edition. It focuses on human resource management issues that are relevant to operations managers, particularly concepts of empowerment and teamwork, and the design of high-performance work systems.
- *Chapter 6: Product Design and Development.* This chapter includes a heavier focus on quality within the product-design function. New or expanded topics include quality-function deployment, robust design, teamwork, and service/product design.
- *Chapter 7: Forecasting and Capacity Planning.* Forecasting is now tied more closely to capacity planning. This chapter provides an introduction to forecasting needs and approaches; the appendix (formerly a supplementary chapter) discusses quantitative forecasting techniques in depth.
- *Chapter 8: Facility Location and Distribution System Design.* A new section on push and pull distribution systems has been included in this chapter.
- *Chapter 9: Process Technology and Design.* Several chapters from the previous edition dealing with process technology, design, and work methods have been reorganized to provide a better focus and foundation for process management. In addition, the role of automation has been toned down. This chapter introduces process technol-

ogy and automation, its strategic importance, and key issues in designing production processes.

- *Chapter 10: Workplace Design and Facility Layout.* Layout and workplace design have been brought together in this new chapter, establishing better ties between macro- and micro- design issues.
- *Chapter 11: Process Management.* This a new chapter that addresses fundamental issues of quality control and process improvement. It logically follows issues of process and workplace design, introducing techniques for defect prevention, total productive maintenance, and continuous improvement.
- *Chapter 12: Statistical Quality Control.* This chapter, which was at the end of the previous edition, has been moved up to reflect the growing importance of quality as well as to support the principles of process management introduced in Chapter 11. A new section on c- and u-charts has been included and acceptance sampling has been de-emphasized.
- *Chapter 13: Materials and Inventory Management.* New discussions on supplier partnerships and the use of information technology for materials management have been added. The production lot-size model has been moved to Chapter 14, and service levels and demand uncertainty have been included in this chapter to better integrate EOQ (economic order quantity) models and applications.
- *Chapter 14: Decision Models for Inventory Management.* This chapter now follows "Materials and Inventory Management," providing a more logical organization of topics than before.
- *Chapter 15: Lean Production: Just-in-Time and Synchronous Manufacturing.* This chapter has been substantially revised to provide a more contemporary focus on JIT and its essential elements and a new treatment of constraint management. Both JIT and constraint management are cast within the context of lean production.
- *Chapter 16: Aggregate Production Planning and Master Scheduling.* The transportation model for aggregate planning, which was dropped from the previous edition, has been returned to accommodate the wishes of several reviewers.
- *Chapter 17: Material Requirements Planning.* The MRP time-phasing matrix now includes a row for "planned order receipts" and the discussion of the contrasts among JIT, MRP, and constraint management has been simplified.
- *Chapter 18: Operations Scheduling and Production-Activity Control.* This chapter has been reorganized around principles of finite capacity scheduling to better reflect current practice. A section on constraint-based scheduling (drum-buffer-rope) has been added.
- *Chapter 19: Project Planning and Management.* Sections on cost estimating and budgeting and budget control have been added.
- *Supplementary Chapters.* A section describing the simplex method for linear programming has been added to the linear programming supplement.

Spreadsheets

Recognizing the growing use of spreadsheets in business, Microsoft Excel applications are used wherever appropriate. All named spreadsheet files can be made available to professors and students. Problems that refer directly to these templates are designated with the symbol:  .

Flexibility

Production/Operations Management, provides the instructor with substantial flexibility in selecting topics to meet specific course needs. For example, instructors who wish to focus on the broad managerial issues of P/OM (particularly if their students have had prior exposure to management-science techniques) with less emphasis on quantitative approaches might use this one-quarter course outline:

- Introduction to P/OM (Chapter 1)
- Managing for Quality and High Performance (Chapter 2)
- P/OM and Strategic Planning (Chapter 3)
- Measuring Operations Performance (Chapter 4)
- Work Design and Human Resource Management (Chapter 5)
- Product Design and Development (Chapter 6)

- Technology and design issues (selected sections from Chapters 9 and 10)
- Process Management (Chapter 11)
- Materials and Inventory Management (Chapter 12)
- Lean Production and Synchronous Manufacturing (Chapter 15)

On the other hand, instructors who desire more emphasis on quantitative techniques and management-science applications in P/OM might use this one-quarter course outline:

- Introduction to P/OM (Chapter 1)
- Managing for Quality and High Performance (Chapter 2)
- Measuring Operations Performance (Chapter 4)
- Selected supplementary chapters on management science
- Forecasting and Capacity Planning (Chapter 7)
- Facility Location and Distribution System Design (Chapter 8)
- Technology and design issues (selected sections from Chapters 9 and 12)
- Inventory-management issues and models (selected sections from Chapters 13 and 14)

Selected sections from:

- Aggregate Production Planning and Master Scheduling (Chapter 16)
- Material Requirements Planning (Chapter 17)
- Operations Scheduling and Production-Activity Control (Chapter 18)
- Project Planning, Scheduling, and Control (Chapter 19)

One-semester courses can expand in either direction, depending on the instructor's orientation and the students' knowledge and experience. It is probably impossible to cover adequately all material in the book in one semester.

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James R. Evans
Cincinnati, Ohio

Contents in Brief

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