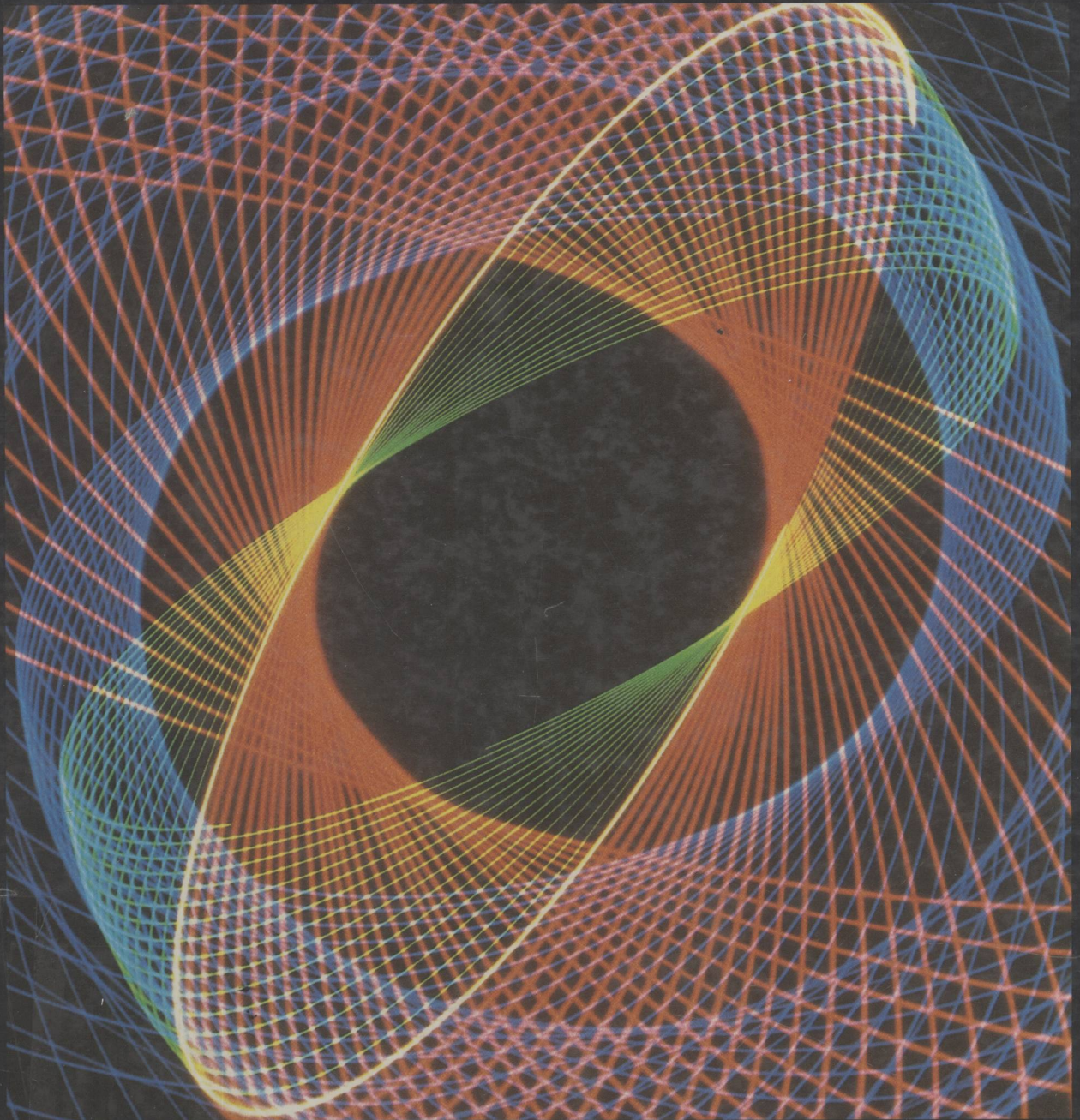

THE MANAGEMENT OF OPERATIONS

**MEREDITH
GIBBS**
2nd EDITION



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JACK R. MEREDITH

University of Cincinnati

THOMAS E. GIBBS

Mentor Systems

**THE
MANAGEMENT
OF
OPERATIONS**

2nd EDITION



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THE MANAGEMENT OF OPERATIONS

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**WILEY SERIES IN
PRODUCTION/OPERATIONS
MANAGEMENT**

TO CAROL AND JUDI



ABOUT THE AUTHORS

JACK MEREDITH received his undergraduate degrees in engineering and mathematics from Oregon State University. He obtained his MBA and his Ph.D. in business administration from the University of California, Berkeley, with a major in production management. He has held positions with Ampex, Hewlett-Packard, TRW, and Douglas Aircraft Company and possesses extensive service sector experience through grants, consulting, research, and executive seminars.

Currently Associate Professor of Production/Operations Management and Director of Operations Management at the University of Cincinnati, he is also editor of *The Operations Management Review* and a reviewer for the *Journal of Operations Management*, *Decision Sciences*, *Management Science*, *American Journal of Public Health*, and *Operations Research*. He has written articles for *Operations Research*, *Management Science*, *Computers and Industrial Engineering*, *Health Care Systems*, and *American Journal of Public Health* and is the author of *Fundamentals of Management Science* (with E. Turban) and *The Hospital Game*. Professor Meredith's research interests include new technology/computer applications to production and managerial control systems. He is a member of TIMS, AIDS, AIIE, APICS and a Vice-President of the new Operations Management Association (OMA).

THOMAS E. GIBBS is President of Mentor Systems, a computer/software company specializing in minicomputer applications. He has served as Assistant Professor of Accounting at the University of Kentucky, as Assistant Professor of Health Care Administration at Florida International University, and as Adjunct Professor of Public Administration in the NOVA University "Fly a Prof" Program.

He received his Ph.D. from the University of Cincinnati. He has consulted with numerous small businesses, governmental units, and health care organizations regarding information system development, computer selection, and software design. He has also served as Editor of *MAS Communication*, the newsletter of the Management Advisory Services Section of the American Accounting Association, and Chairman of the Section. He is the author of more than 30 articles, some of which have appeared in *The Journal of Systems Management*, *The Accounting Review*, and *The Internal Auditor*.



PREFACE

A tremendous amount of change has occurred in the field of "operations" since the first edition of this book was published in 1980.

- Productivity has become a major focus of attention.
- Quality has become recognized as being imperative to compete successfully.
- Worldwide competition in foreign markets, and even the domestic marketplace, has intensified almost into a war.
- Automated manufacturing techniques such as computerized information systems, robotics, computer-aided-manufacturing (CAM), and automatic-storage/retrieval systems (AS/RS) have become widely familiar.
- Computers, both mini and personal (micro) size, have invaded organizations and homes alike.

All of these developments relate directly to the area of operations. The operations manager's responsibility is knowing how to economically produce a desired product or service and get it to the recipient when it is needed—whether the recipient is a customer, a patient, a client, a passenger, or a student. Operations is concerned with how to produce—economically, competitively, with quality, with new technology, and with results. This is the subject of this book.

In conjunction with the increased external focus on the operations function in organizations, there have been a significant number of developments within the field of operations itself. First, there are the new journals in the field: the *Journal of Operations Management*, the *Operations Management Review*, and the *International Journal of Operations and Production Management*. Then, in 1981 the Operations Management Association (OMA) was founded to join her sister societies in the functional areas of business: FMA (finance) and AMA (marketing).

Meanwhile, the increasing pressure of the American Assembly of Collegiate Schools of Business (AACSB) on colleges to recognize the importance of the operations function and include this material in their curricula created as great an academic awareness of the operations function as has developed in industry. Demand for operations management fac-

ulty in relation to the supply is currently twice that of accounting and is paralleled only by the demand for computer/information systems faculty.

This shortage of operations faculty has been a major focus of the revision of this text. In many schools the "production" or "operations" course is necessarily taught by an instructor whose major field is allied but does not lie directly in the operations area, such as general management or management science. In other schools, teaching assistants must, of necessity, carry a greater burden of the instructional load than for other courses. The instructor's manual for this text was written particularly with these situations in mind. In addition, the text itself has been revised to clarify the basic structure and conceptual foundations of the field, not only to help students new to the area but also to aid instructors from allied fields.

The main characteristics of this book reflect the concerns expressed above.

1. *A Generic Framework.* We still find that very few texts provide a "generic" perspective for viewing the operations of every kind of organization in terms of an integrated, logical structure. We have thus maintained the well-received generic view of operations that was developed in the first edition. For example, the terms "organization" and "recipient" are used in place of the more limiting "company" and "customer," respectively. Specificity is attained through numerous examples: farms, hospitals, banks, libraries, factories, schools, funeral homes, insurance firms, and fire departments.

2. *A Design Approach.* In this edition we have kept the planning focus we had previously but simplified it from the first edition to stress the *strategic* role of operations. In many contemporary texts the operations function is viewed by definition as a low-level managerial activity. We feel that operations has a critical strategic role to play in organizations and approach the entire field from this point of view. The four parts of the book reflect this perspective.

- Part I: Strategic Operations
- Part II: Tactical Operations
- Part III: Detailed Operations
- Part IV: Operations Control

We believe that, in addition to helping the student understand *why* the operations are designed as they are, as well as *how* they are designed, this approach is superior to others in giving a more *integrated* view of the organization and is thus inherently more generic.

3. *A Functional Orientation.* We focus on the operations functions under discussion and not on the quantitative or behavioral techniques that are available to aid in addressing and analyzing those functions. More complex solution methodologies, such as Monte Carlo simulation and solution approaches to linear programming, are placed in chapter appendices, though the topics are discussed where appropriate in the chapters. Also included in chapter appendices, when appropriate, are discussions of the interface with other business areas such as finance and personnel.

4. *An Introductory Level.* The stress in the book is on the basic concepts of operations. Realistic examples, current illustrations, detailed explanations, and even, on occasion, relevant cartoons are used to help convey these concepts. Learning aids are employed, additionally, to further enhance the learning process. In this edition, for example, the *Key Learning Points* in the chapter summary are tied one-to-one to the *Learning Objectives* at the beginning of each chapter.

Key Terms listed at the end of each chapter are set in boldface in the text. These terms, plus additional comments, are highlighted in the margin notes throughout the chapters. *Review Questions* at the chapter end help the student check whether he or she noted the critical points. And *Discussion Questions* probe conceptual tangents and deeper issues raised by the chapter discussion. In many chapters some highly relevant *Readings* are included to dem-

onstrate the timeliness and practical significance of the topics.

Of particular importance are the end-of-chapter *Problems*, which facilitate the grasp of the chapter topics. On average, the number of problems has been increased 150 percent in this edition and two levels are identified. First, there are *Practice Problems* that are straightforward applications of the material in the text. There are usually both "number" and "word" problems from which to choose, and the problem types follow the same order as the chapter development. Then there are *More Complex Problems*, which combine data or methodologies, extend the chapter discussion into new realms, require solutions in reverse, or are just plain hard.

Cases are also included to help the student understand the application of concepts. Theory is thing; application is often something else, as students typically learn on their first job. These *cases* are meant to ease that transition and to give a realistic perspective to students' learning. Last, there is a simple workbook available to accompany this text and provide the student with guidance about how and what to study.

We particularly thank those who contributed so greatly to this revision—Allen Kartchner, Matthew Liberatore, Leonidas Charalambides, Jill Ann Kammeyer, John Ettie, and Henry Owen, III—as well as those who helped guide the development of the first edition—Elwood Buffa, Samuel Seward, Michael Maggard, Edward Heard, Steve Bolander, James Cox, and especially our ever-available critic, counselor, and sounding board, Carol Meredith.

JACK R. MEREDITH
THOMAS E. GIBBS

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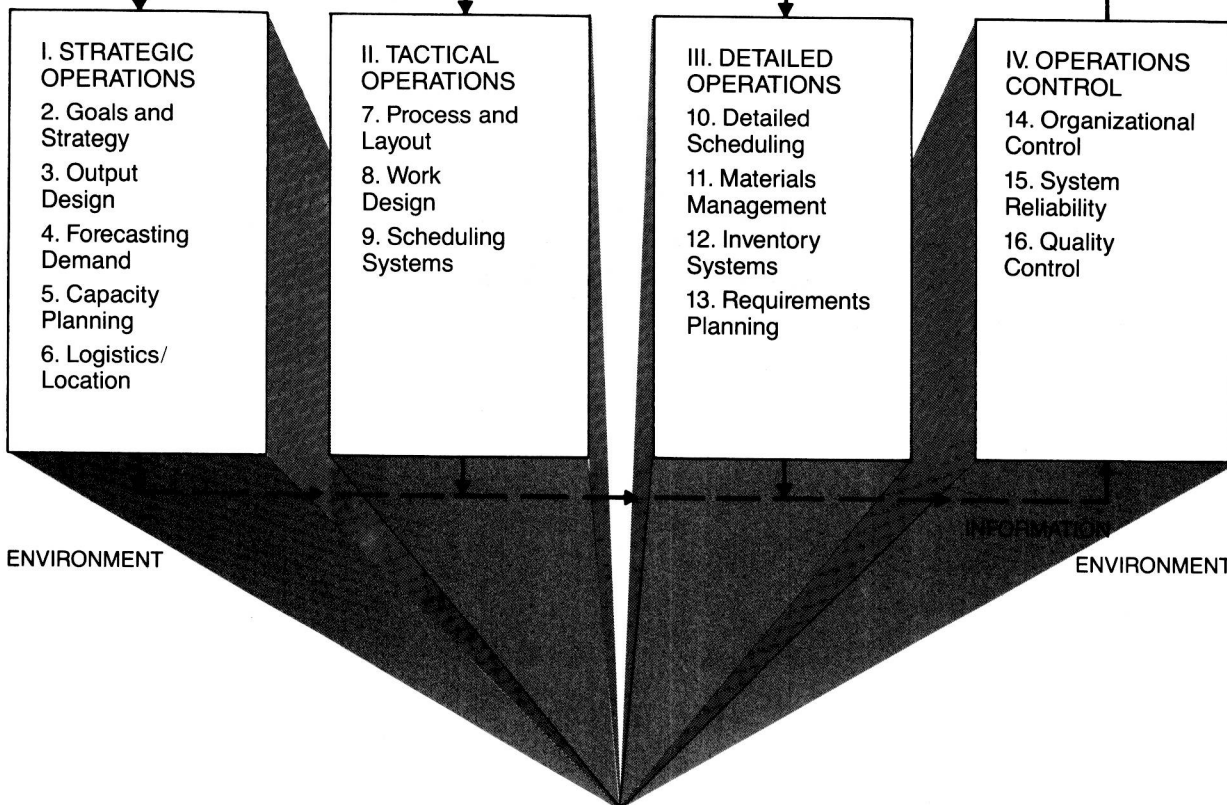
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THE MANAGEMENT OF OPERATIONS

ENVIRONMENT

ENVIRONMENT

ACTIONS FEEDBACK



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 - Products and Services
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- 1.2 THE DESIGN APPROACH TO OPERATIONS
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LEARNING OBJECTIVES

By the completion of this chapter the student should

- Know what process the operations function entails.
- Be aware of the importance of operations to organizations.
- Understand the major ways in which value is added to entities.
- Better appreciate the distinction between products and services.
- Realize the significance and role of the transformation process in the operations system.
- Comprehend the distinction between the common descriptive approach to operations and this text's design approach.
- Appreciate the purpose of organizations for man and the need for, and nature of, management.
- Understand the monitoring and feedback control process.
- Have a feel for the long and detailed history of operations management and its role in contemporary society.
- Be aware of the growth of services in our economy.
- Better understand the interfaces and differences between operations and other allied business and nonbusiness areas, and be familiar with the types of operations job titles.
- Be especially familiar with the conceptual scheme we will follow in the text.