FOURTH EDITION

THE MANAGEMENT OF OPERATIONS: A CONCEPTUAL EMPHASIS

JACK R. MEREDITH

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THE MANAGEMENT OF OPERATIONS

A CONCEPTUAL EMPHASIS

MEREDITH

University of Cincinnati

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About the Author

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 and has held positions with Ampex, Hewlett-Packard, TRW, and Douglas Aircraft Company.

Currently, Professor of Production/Operations Management and Director of Operations Management and Information Systems at the University of Cincinnati, Professor Meredith is also founding past editor of *The Operations Management Review* and past associate editor for the *Journal of Operations Management.* He is the author of *Fundamentals of Management Science* (with E. Turban), *Project Management: A Managerial Approach* (with S. J. Mantel, Jr.), and *The Hospital Game.* Professor Meredith's research interests are in research methodology, manufacturing strategy, and the management of factory automation.

PREFACE

While marketing ploys and financial takeovers continue to dominate the headlines of our newspapers and magazines, the real global battles of competitiveness are occurring in the area of operations. More than any other function—accounting, finance, information systems, or even marketing—operations provides the opportunity for firms to capture and dominate worldwide markets through higher quality, faster response, better performance, and lower cost. Foreign firms discovered this fact many years ago, and some domestic firms are now realizing it as well. The purpose of the production/operations management course in business programs is to communicate this fact to the students who will be the future managers of our firms and organizations. And the purpose of this text is to help teach our students in a clear and straightforward manner how operations can become a competitive weapon when properly managed.

CHANGES IN THE NEW EDITION OF THE TEXT

To achieve such an important goal, this edition has been extensively revised as follows.

Simplification for Emphasis on Basics

Since our field is so dynamic, with many new issues appearing on a regular basis, our texts have grown by leaps and bounds over the last few years and now are typically in the range of a thousand pages. The emphasis in this edition has been on honing the material back to the *basic* concepts that every business student in every major should know; hence the new subtitle "A Conceptual Emphasis" for this edition of the text. So, instead of a mass of undifferentiated detail that students feel compelled to memorize, only the *critical* concepts are presented, but in a thorough and streamlined manner.

Each chapter covers only a very few (typically three) concepts, one per section, which the students can more easily understand and remember. To emphasize these concepts, the chapter outlines are limited to the conceptual material and ignore the end-of-chapter materials. If the students know just these basic concepts, they will then understand how operations can be a competitive weapon in every kind of organization. To further check the students' understanding, these key concepts are summarized at the end of the chapter.

The chapters remain independent, as in earlier editions, for ease in rearranging the order of selection by the instructor. However, the chapters have been reorganized in a smooth-flowing, chronological manner, which most professors prefer for teaching.

In line with the emphasis on the basic concepts, extraneous material has been eliminated, shifted, or deemphasized. For example, supplemental quantitative techniques that are frequently learned in a quantitative methods course

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(linear programming, decision trees, etc.) have been shifted to appendices in the back of the text. Other quantitative techniques appropriate to the basic concepts are included with the concepts to which they apply, along with solved problems to further illustrate the concepts and techniques. They are not uniformly distributed throughout the text for artificial "balance."

A few other infrequently taught topics (e.g., purchasing, work measurement) have also been shifted to appendices in the back of the text. Similarly, to reduce the extent of end-of-chapter material, the rarely consulted bibliographies are now at the end of the text, as are the application source references.

New Themes

Throughout the text, some new themes have been introduced. One of these is the increasing importance of global aspects of operations. This theme is so important it is dealt with directly in Chapter 2, as well as reiterated throughout the book. Issues of competitiveness, currency exchange impacts, and operations strategy are all tied in with the issue of global competition.

Relating to the issue of global competitiveness, the importance of technology in operations is also stressed as a theme throughout the book. The "appropriate" application of technology, rather than technology for technology's sake, is the message here, and various forms and applications of technology are described.

Another increasingly important theme is ethics. Ethical aspects are noted as appropriate within the chapters, but the main opportunity to get into this topic is in the questions at the end of each chapter where ethical aspects of the basic concepts are noted and difficult questions posed.

A continuing theme of operations concerns services, particularly since most of the students in this course will have careers in service rather than manufacturing organizations. As in previous editions, the consideration of services is contained within the generic treatment and extensive service examples throughout the book. However, when appropriate, some special discussion of service aspects of particular concepts is also included.

Finally, an important new theme of this text is the attention paid to the majors taking this course from other disciplines. Throughout the text, and specifically at the end of every section, the importance of each concept for other majors is identified. Not every concept involves every other discipline, but almost every concept involves at least one other discipline besides operations. Sometimes it is engineering, or marketing. But most often it concerns two or three other business disciplines such as finance, accounting, and human resources.

Topical Issues

A range of new topics has been added to the text, and some existing topics have been reorganized:

- *International competitiveness:* An entire new chapter has been devoted to this topic and includes issues of productivity and its measures, quality, customization, and fast response.
- *Strategy:* This chapter now includes Hill's concept of order winners and losers, international strategy comparisons, focus, levels and types of strategies, and comparisons of operations strategies with other functional strategies.

- *Output/process design:* More description is included on the engineering aspects for products and the service matrix and blueprinting for services.
- *Capacity:* This includes the topics of bottlenecks, economies of scope, and measures of capacity.
- *Location:* The primary new topic here is a description of the maquiladoras of northern Mexico.
- *Process design and layout:* The new process of cellular manufacturing has been added to these chapters.
- *Job design:* This chapter has been reorganized for a more integrated presentation.
- *Aggregate planning:* The material here has been elaborated with two extensive examples, one in services and one in manufacturing. The material on master scheduling has been significantly expanded, and now also includes an example.
- *MRP:* Three service examples have been added to this chapter, and the DRP section has been expanded.
- *Scheduling:* A section on the theory of constraints has been added as well as a section on the increasingly common practice of overbooking services.
- *JIT:* This chapter is completely new.
- *Project management:* This chapter, also new, offers a better-integrated development of the material.
- *Quality management:* A discussion of some of the newer quality approaches such as Taguchi methods, QFD/house of quality, and the Malcolm Baldridge award is given in this chapter.
- *Reliability and maintenance:* This material is now combined and offered as a supplemental chapter to the quality control chapter.

LEARNING AIDS

This edition includes a number of devices to help students understand the basic concepts.

Applications in Operations

Although there is considerable detailed discussion of each of the concepts, examples are often the best way to communicate to students. Therefore, each chapter starts with an actual example of an organization that uses one of the concepts in the chapter to become more competitive. The other concepts in the chapter are also illustrated with one or more application examples to help communicate the value, or details, of the specific concept.

FYI

To further help the students in discriminating between what is crucial or basic information on each concept and what is supporting or explanatory detail, there is a brief section behind the chapter title page/opener called "FYI" (for your information). These sections are meant to help "coach" the students in learning the concepts, discriminating between basic and supplementary detail, knowing

what to master, and even understanding the instructor's perspective on the topic.

On The Job . . .

To facilitate the conceptual understanding for nonoperations majors, each of the concepts stresses the interrelationships between operations and other relevant functions. Then, at the end of each section, a special subsection called "On The Job . . ." summarizes the relevant interrelations with these other functions. And in the end-of-chapter review and discussion questions, special questions are posed to these majors to force them to relate operations to their functional speciality and vice-versa.

In-Text Eye Catchers

To help focus attention on particularly important, or perhaps unfamiliar material, marginal notes are selectively placed throughout the conceptual discussion. Similarly, all key terms are colored and bold-faced throughout the text to catch the student's eye. To draw further attention to these terms, which typically accompany critical conceptual material, a large checkmark icon is placed in the margin.

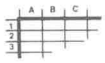
Solved Problems

Where quantitative techniques are introduced, a solved problem is immediately offered to illustrate to the student how this technique is applied to this concept. When the technique is amenable to computerized software, the problem is solved again in the back of the chapter by the especially user-friendly software package that accompanies this text, called OMIS (Operations Management Information System) by Mohsen Attaran.

End-of-Chapter Material

The materials at the end of each chapter include the concept summaries, a list of the key terms in the text, a large number of questions to be used for in-depth and tangential class discussions, and, when appropriate, problems (answers to the even-numbered problems are given in the back of the text). The problems in the back of the chapter are also marked with icons to identify those amenable to computerized solution.

This icon indicates problems that can be solved using the Problem-solving student software, described below.



This icon indicates problems that can be solved using the spreadsheet templates, described below.

End-of-Text Material

As noted earlier, quantitative materials that would normally be taught in another course and some less frequently taught materials are included in appendi-

ces at the end of the text. These appendices also include a brief tutorial on probability and statistics and a few relevant statistical tables. Applications sourcenotes as well as chapter bibliographies are also collected here. Finally, the answers (not the solutions) to the even-numbered problems are identified here as well.

SUPPLEMENTS

A range of supplements accompany this text.

- *Instructor's Resource Guide:* Comprehensive instructor's resource features chapter overviews, teaching suggestions, answers to the questions, additional case assignments and solutions, solutions to text problems, and transparency masters.
- *Testbank:* Approximately 1500 multiple-choice and true/false test questions.
- *Microtest:* A full-featured computerized testing software package for IBM computers, this is an easy-to-use, fully supported test-creation program. This powerful package allows you to choose test questions from the Testbank, print the completed tests out for use in your classroom, and save the tests for later use or modification.
- *Video:* Corporate training videos include cases dealing with quality control, service operations, and plant tours (approximately one hour in length).
- *Problem-Solving Student Software:* OMIS, Operations Management Information System, prepared by Mohsen Attaran is available packaged with the text. For more information please contact your Wiley representative.
- *Spreasheet Templates (ISBN-85582-0):* These Lotus 1-2-3™ templates can be used to solve many of the larger problems discussed in the text. For more information, please contact your Wiley representative.

LIST OF REVIEWERS

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Jack R. Meredith

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