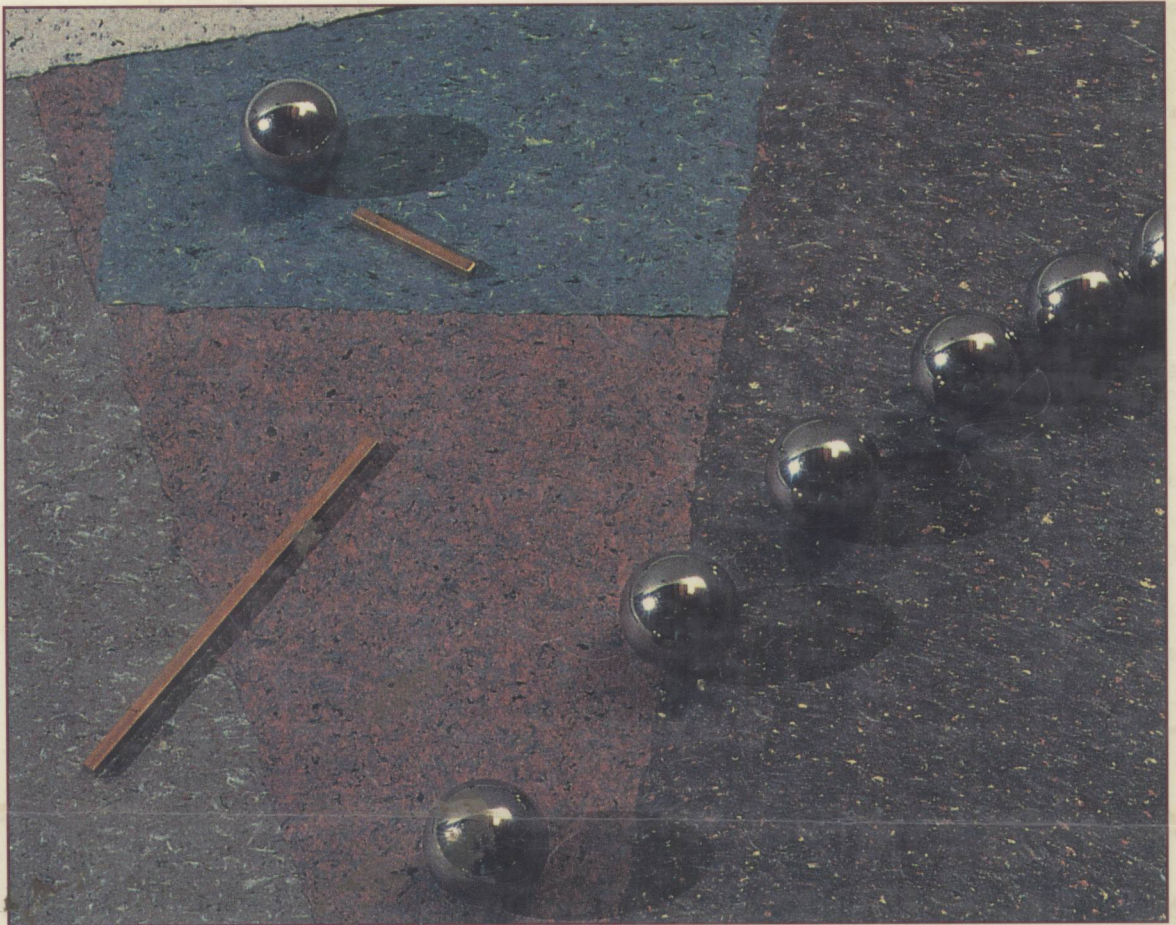


FUNDAMENTALS OF OPERATIONS MANAGEMENT



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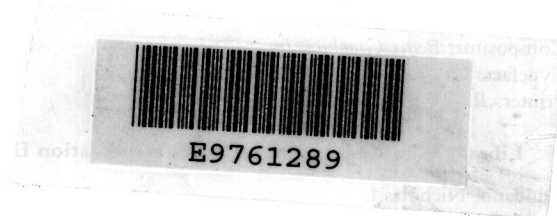
FUNDAMENTALS OF OPERATIONS MANAGEMENT

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FUNDAMENTALS OF OPERATIONS MANAGEMENT

To our wives
Nina and Harriet
and to our children
Don, Kara, and Mark
Laurie, Andy, Glenn, and Rob

Preface for the Student

(By a student)

The study of Operations Management is in large part the study of how the world around us functions. If you are waiting in line at a restaurant, deciding on how much food to purchase at the supermarket, or scheduling your own study time, the basic principles of OM give insights into how these day-to-day activities are carried out. If you have ever wondered why something is done the way it is, there is probably a good “OM reason” to be found in this book to help explain it. The reason you can see the concepts and techniques all around is because they are so heavily used by organizations of all kinds, be they manufacturing firms making “things” or firms providing intangibles. OM brings together the areas of marketing, engineering, accounting, finance, and general management to the study of problems of running an organization.

This book gets across the basics of OM with some of the most up-to-date information available. Since the world is constantly changing, the way OM is studied and practiced is changing as well. Dr. Aquilano and Dr. Chase have presented the practical side of such state-of-the-art concepts and issues as total quality management, service operations management, Just-in-Time production systems, and synchronous manufacturing.

As you study the areas of OM, take time out to look around you and see where the ideas could be applied. By noting applications of OM as they appear in the news and in your daily life, you’ll enhance your understanding of the material, and, if you’re like me, you’ll enjoy the subject much more.

Joseph Pope

*Student, College of Business
and Public Administration
University of Arizona*

Preface

Never before has the field of production and operations management been as important as it is right now. The loss of U.S. manufacturing markets to foreign competition is staggering. First it was steel, then autos, then electronics, then small appliances, and the list goes on. Now the United States is also losing the battle in services. Even if the manufacturing sector was lost, the United States had believed it could retain superiority in services which would become the new building base providing jobs to maintain a high standard of living. This is not happening. Among financial institutions, for example, the United States does not have a firm in the world's top ten—not even close! Citibank, the nation's largest financial institution, places number 33 worldwide. In terms of per capita income, the United States is now sixth, falling behind Norway, Sweden, and Finland. The United States is becoming a “hollow” country by purchasing and subcontracting manufacturing and services from foreign producers. Some experts have argued that a nation cannot retain economic and world power superiority without its own industrial base.

As authors, we present this bit of gloom to encourage both faculty and students to take a greater interest in the future of this country and in the means to reverse what may seem to be the inevitable. Operations management is extremely important in this effort because operations management is the core of this entire process of managing resources and converting them efficiently into desirable goods and services.

This textbook presents the best and latest in current operations management practice. We, as authors, have drawn upon much of the material in our other book *Production and Operations Management* and have added new material. We reduced the level of quantitative treatment and are combining the latest practice with theory.

There have been major changes in manufacturing and services recently. Terms such as Just-in-Time and computer-integrated manufacturing have become household words. We discuss these and also cover synchronous production, service management, service quality, and flexible manufacturing systems. In the field of quality, we've gone beyond the usual quality control considerations and entered the Baldrige phase of the quality movement which views quality as an organizational measure and not just a product measure.

We've targeted this book for an audience of students and faculty who need a good and current book in the field. We pride ourselves in being active devel-

opers of concepts and in being able to present the material at a suitable level. We welcome your comments and suggestions.

Teaching aids available for this text include:

- *Study Guide*, by Aquilano and Agrawal.
- *Instructor's Manual and Transparency Masters*.
- *Test Bank and CompuTest*, by Delurgio, Foster, Aquilano, and Chase.
- *Lotus Spreadsheets*, by Aquilano and Pope.

Acknowledgments

Since we have included much of the material in our *Production and Operations Management* text, naturally all of the reviewers of that text rightfully need to be recognized. We would like to specifically thank the reviewers who participated in evaluating and making suggestions for this text. These include: D. Keith Denton, Southwest Missouri State University; Frank G. Forst, Loyola University of Chicago; Charles W. Lackey, Jr., University of Texas at El Paso; Ann Maruchek, University of North Carolina—Chapel Hill; Roger Shoenfeldt, Murray State University; and V Sridharan, Clemson University.

Additionally we would like to thank Joe Pope of the University of Arizona for his help both on the text and in the *Lotus Spreadsheets* for the Student Guide. We would also like to thank Jim Minatel, Susan Trentacosti, Dick Hercher and the rest of the Richard D. Irwin staff for Irwin's usual very high level of assistance.

Nicholas J. Aquilano
Richard B. Chase

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FUNDAMENTALS OF OPERATIONS MANAGEMENT

Chapter 1

Introduction and Overview

EPIGRAPH

The mechanics of running a business are really not very complicated, when you get down to essentials. You have to make some stuff and sell it to somebody for more than it cost you. That's about all that there's to it, except for a few million details.

John L. McCaffrey, "What Corporation Presidents Think about at Night."

CHAPTER OUTLINE

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KEY TERMS

Five P's of Operations Management
Transformation Process
Scientific Management
Just-in-Time (JIT)
Total Quality Control (TQC)
Computer-Integrated Manufacturing (CIM)