Production / Operations Management

Stevenson

Production/Operations Management

William J. Stevenson
College of Business
Rochester Institute of Technology

1982

RICHARD D. IRWIN, INC. Homewood, Illinois 60430

ISBN 0-256-02528-2
Library of Congress Catalog Card No. 81–82434
Printed in the United States of America

5 6 7 8 9 0 H 9 8 7 6 5 4

Preface

There has recently been a large influx of operations management textbooks on the market. Since most books cover pretty much the same topics, I think it is encumbent upon each author to justify his or her entry into this market.

To be sure, the majority of operations books are designed to satisfy the AACSB requirements for production, including manufacturing and service, international operations, and quantitative analysis. And this one is no exception. However, books on operations management differ—sometimes considerably—in writing style, depth of coverage, use of illustrations, problem material, organization, and interest. Selection of a textbook is essentially determined by how closely the book matches the needs of the user. The following list outlines the main features of this book:

1. Each chapter begins with an outline of topics covered and a set of learning objectives.
2. Concepts and techniques are presented in such a way that they are both interesting and fairly easy to grasp.
3. This book offers more examples, solved problems, and end-of-chapter problems than most other books. Students seem to benefit greatly from being able to review the solved problems.
4. The answers to most problems are given—but not solutions.
5. Materials and problems have been thoroughly class-tested and revised accordingly.
6. Many chapters have a short reading or a case suitable either for class discussion or for homework assignments.
7. There is a great deal of flexibility permitted in terms of depth and order of coverage of topics.
8. Manufacturing and service are integrated rather than separated.
9. Forecasting is covered early in the text (Chapter 3).
10. Productivity and quality assurance are emphasized.

The text contains more material than one could normally hope to cover in a one-semester course. Rather than relying on the author's personal bias, each instructor can choose those topics most suited to his or her own proclivities. Those who prefer quantitative emphasis, for example, will be quite comfortable with the abundance of student problems. Those who prefer a more qualitative

approach will welcome the fact that some of the more quantitative material is placed in chapter supplements or in *optional material* sections. Moreover, some of the chapter problems are less quantitative than others, and the cases and readings tend to be qualitative. Obviously, there are many possibilities between these two extremes.

I have gained a great deal in writing this book. I was fortunate to have an excellent board of reviewers who contributed significantly to the final product. I want to thank these professors for the time and thoughtfulness they gave: Suresh Chand, Purdue University; Stephen Goodman, Florida State University; Chan Hahn, Bowling Green State University; Dennis McLeavey, University of Rhode Island; Jugoslav Milutinovich, Temple University; Richard Newman, Indiana University Northwest; Hilbert Schultz, University of Wisconsin, Oshkosh; Edward Thode, New Mexico State University; Mathew Tuite, Northwestern University; Walter Warrick, Drake University; Paul Van Ness, Rochester Institute of Technology; and Eitan Zemel, Northwestern University. I also want to thank Professor Robert Fetter for his comments and encouragement. Many students also offered comments and suggestions, and many others are to be commended for suffering through revisions of problems and solutions, and text material. Paul Alfano did a great job of checking answers and solved problems for accuracy. I am grateful, too, to the many individuals at Richard D. Irwin, Inc., who contributed their time and skills in transforming a stack of typed pages into a handsome book. Among them were editor Bob Bryan, production manager Bette Ittersagen, and production editor Susan Trentacosti.

William J. Stevenson

Note to the student

The material in this text is part of the core knowledge in your education. Consequently, you will derive considerable benefit from your study of operations management, *regardless of your major.* Practically speaking, production and operations is a course in *management.*

After reading each chapter or supplement in the text, attending related classroom lectures and completing assigned questions and problems, you should be able to do each of the following:

1. *Identify the key features* of that material.
2. *Define and use terminology.*
3. *Solve typical problems.*
4. *Recognize applications* of the concepts and techniques covered.
5. *Discuss the assumptions and limitations* which underlie each model or technique covered.

You will encounter a number of sections marked *optional.* Check with your instructor to determine whether or not to study them.

This book places an emphasis on problem solving. There are many examples throughout the text illustrating solutions. In addition, at the end of most chapters and supplements you will find a group of solved problems. The examples within the chapter itself serve to illustrate concepts and techniques. Too much detail at those points would be detrimental to learning. However, later on, when you begin to solve the end-of-chapter problems, you will find the *solved problems* quite helpful. Moreover, those solved problems usually illustrate more and different details than the problems within the chapter.

I suggest the following approach for studying and problem solving:

1. Look over the chapter outline and learning objectives.
2. Read the chapter summary.
3. Read the chapter and reread the summary.
4. Look over and try to answer the discussion and review questions.
5. Solve the problems, referring to the solved problems and chapter examples as needed.

Note that the answers to many problems are given at the end of the book. Try to solve each problem before turning to the answer. Remember—tests don't usually come with answers.

Good luck!

Contents

Production/Operations Management

part I

Introduction

Chapter 1 outlines the nature and scope of operations management. In that chapter you will learn that operations is one of the three main functions of most organizations, along with marketing and finance; what the function of operations involves; some of the different ways operations systems are classified; and what some of the current issues in operations management are. You will also read about a topic which is causing great concern throughout the world: *productivity.*

Chapter 2 focuses on decision making, with emphasis on operations decisions. The use of graphical linear programming as a decision tool is described.

chapter

1

After completing this chapter, you should be able to:

1. Define the term *operations management* and give examples.
2. Identify the three major functional areas of organizations and briefly describe how they interrelate.
3. Describe the operations function and the nature of the operations manager's job.
4. Differentiate between design and operation of production systems.
5. Discuss productivity in terms of what it is, why it is important, who is primarily responsible for it, and ways of increasing it.
6. Compare and contrast service and manufacturing.
7. Identify some of the current issues in operations management.

Production and operations management

INTRODUCTION

This book is about production and operations management. To many people, the term *production* conjures up images of factories, machines, and assembly lines. Interestingly enough, the field of production management in the past focused almost exclusively on manufacturing management. Heavy emphasis was placed on methods and techniques which dealt with operating a factory. In recent years the scope of production management has broadened considerably. Currently, production concepts and techniques are being applied to a wide range of activities and situations which have little or nothing to do with factories or manufacturing. Among them are health care, food service, recreation, banking, hotel management, retail sales, education, transportation, and government operations. Because of this broadened scope, the field has taken on the name *operations management,* which more closely reflects the diverse nature of activities to which its concepts and techniques are applied.

Operations management is responsible for the management of productive systems; that is, it is responsible for systems which either create goods or provide services (or both). As an example of an operations management system, consider a luxury cruise ship. Most of the activities performed by the captain and crew during a cruise or in preparation for the cruise fall within the realm of operations management.

Among those activities are running the ship, managing food service, providing medical services, supervision and training of the crew, overseeing activities of passengers, and housekeeping. Navigation, maintenance, and general repairs are required to keep the ship on course and in good operating condition. Food and beverages must be ordered, meals must be prepared and served in an appetizing manner, and eating areas must be kept clean. Medical supplies must be on hand and personnel sufficiently prepared to handle a wide range of illnesses and emergencies. Motivation, training, productivity, job assignments, and personal appearance of crew members are important. Passengers must be assigned to cabins, activities must be scheduled, trips ashore at ports-of-call must be arranged,

and other needs must be attended to in order to maintain satisfactory customer relations. Of course, there are other activities involved in operating a luxury ship, but this gives you some idea of the nature and scope of operations management.

The goal of this book is to present a broad conceptual framework for the management of the operations function in business and government organizations. This first chapter lays the groundwork for the remainder of the book. It begins with a brief description of the various functions of business organizations and their relationships to each other. The operations function is then described in somewhat more detail, outlining the activities generally found under the heading of operations management. Next, the concept of productivity is discussed, and the role that operations management plays in affecting and improving productivity is outlined. Methods of classifying production systems are described, with particular attention devoted to the similarities and differences between manufacturing and service systems. The chapter ends with an outline of the major issues in operations management today.

FUNCTIONS WITHIN BUSINESS ORGANIZATIONS

There are three primary functions which exist in most business organizations: operations, finance, and marketing (Figure 1–1). In addition, there are a number of supporting functions which exist in many organizations, such as personnel, accounting, engineering, and so on. Obviously, the presence of these functions and the emphasis placed on each one depend on the type of business a firm is engaged in. Thus, nonmanufacturing firms would be less apt

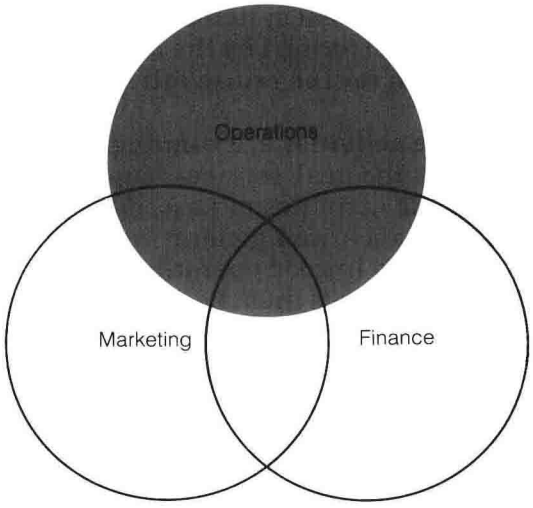

FIGURE 1–1
The three major functions of business organizations overlap