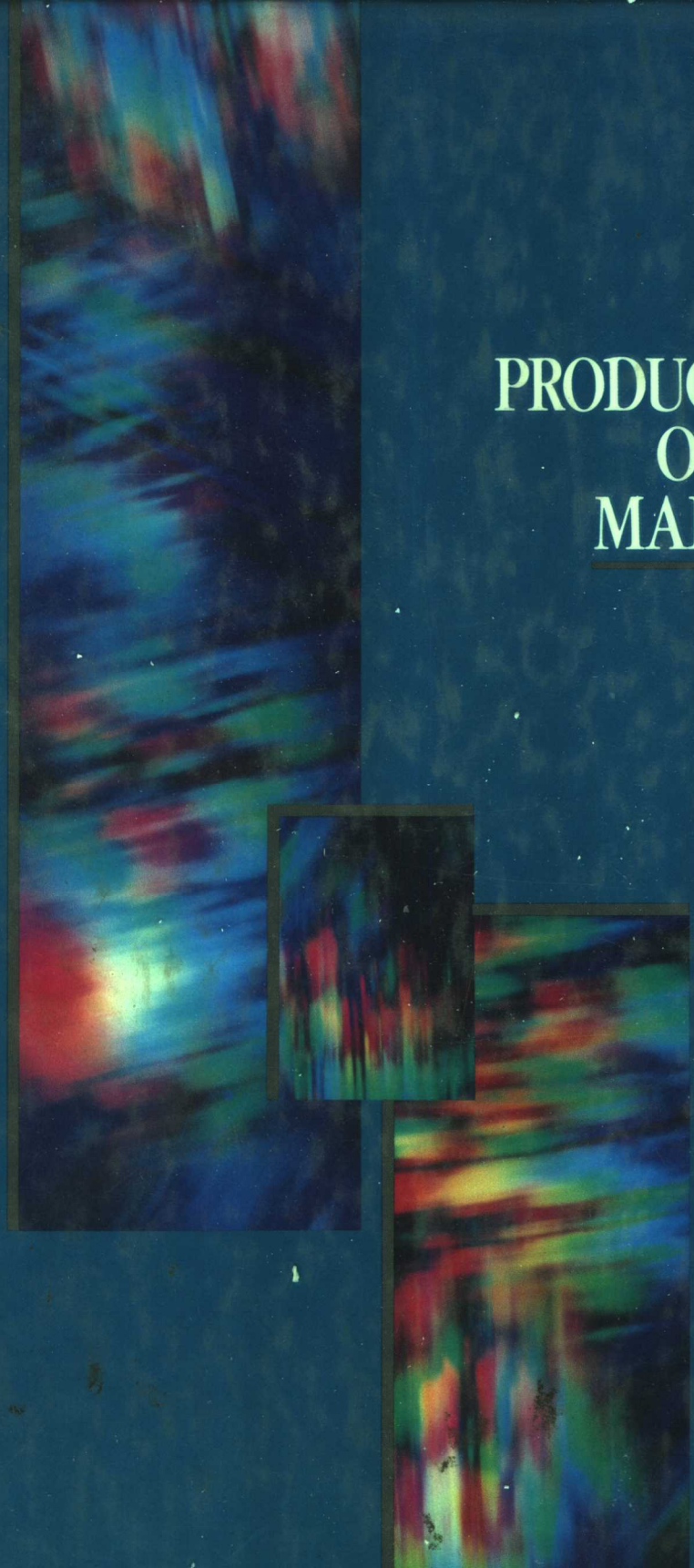

PRODUCTION AND OPERATIONS MANAGEMENT

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PREFACE

Production and operations management is one of the most exciting and dynamic areas of business today. Tremendous growth and changes are occurring in the field every day, but the basic concepts and principles are still important.

This text is designed to teach production and operations management on an introductory level. It provides a greater depth of coverage in important areas such as material requirements planning, layout, and forecasting than other texts, yet still maintains a broad perspective. Published in conjunction with the American Production and Inventory Control Society (APICS), it will appeal to instructors in an academic environment as well as to those wishing to provide materials for students seeking APICS certification.

Production and Operations Management examines the concepts, principles, and techniques of production and operations management within a framework of four interrelated characteristics: the time period in which objectives are to be achieved, the resources managed, the major areas affected by the decision, and the management function involved. The text is organized in a logical manner, from long-range planning through medium- and short-range planning to execution, integrating various functional areas of business as they relate to operations management. The systems approach is a core concept throughout the text.

The text allows maximum flexibility of instruction. It is ideal for introductory academic programs of one or two semesters or quarters. Chapters 1–3, 5, 6, 9, 11, 14, 15 and 18-20 can also be used for a one-quarter undergraduate introduction. The book is also suitable for programs conducted by APICS chapters and other practitioner societies.

OVERVIEW

PART I INTRODUCTION defines operations management and emphasizes its relationship to productivity and overall quality of life, as well as the applicability of operations management to manufacturing and service organizations. It answers questions such as: Why study operations management? What do operations managers do? What kind of decisions do they make? What are the differences between manufacturing and service organizations in regards to operations management?

Parts II through V are organized according to long-, medium-, and short-range planning. The text recognizes that decisions are being made in all time frames concurrently with execution and control. It also recognizes that some activities, such as forecasting, take place with regard to more than one

time horizon. We feel that studying operations management in relation to planning horizons, execution, and control aids students in understanding the objectives, constraints, and principles of specific decisions by making them aware that these boundaries are not absolute.

Each chapter in Parts II through V contains a description of the decision situations, related management objectives, applicable models, decision techniques and procedures, and information system requirements.

PART II LONG-RANGE PLANNING introduces a general planning model of the firm, then focuses a series of capacity, location, and process questions that the operations manager must address and ultimately answer in the long, medium, and short range. The planning decisions of the operations manager then are specifically integrated with the criteria for evaluating effectiveness of execution and control. Various qualitative and quantitative methods are used to evaluate location alternatives, and the traditional and emerging process design approaches are analyzed in detail.

We have included these topics in Part II because, for the most part, they involve decisions that do take a long time to implement and are in fact usually strategic in nature. The long-range plan establishes the major definitions of the product or service, the location, and the method of producing. These commitments can not be changed except at great expense and in the long range (a time period that varies tremendously by industry).

PART III MEDIUM-RANGE PLANNING discusses a variety of critical intermediate decisions. Here some minor adjustments of the product or service are possible; however, redefinitions of the output inconsistent with the long-range plan will again be extremely costly. In the medium range, the operations manager develops the information system to provide a much greater amount of very specific detail pertaining to values of the product, materials, purchases, and human resources, and to the general scheduling of resources for efficiency.

Forecasts are made for events in the distant future (2 to 10 years hence), in the next 12 months, and sometimes in the next few hours, although the methods used may differ for these different situations. Forecasting of customer demand and the aggregate planning of capacity utilization are integrated into an initial "rough cut" schedule, which after numerous reviews becomes a reasonably firm master production schedule. Simultaneously, the layout of the facility and the specific employee functions within that facility are evaluated for organization and efficiency. Layouts may be revised on notice of a day or two, for example, in a storeroom; but most require considerable time for full implementation. We have included the above topics under medium-range planning because most take place 3 to 18 months prior to execution.

PART IV SHORT-RANGE PLANNING focuses on those decisions that immediately precede execution. Most of the short-range planning in the operations

management function involves scheduling. Materials and capacity must be scheduled using inventory management and material requirements planning techniques. Additionally, human resources and specific jobs must be scheduled through capacity management methods. The fundamental plans and methods are established in the medium- and long-range plans. Short-range scheduling is the final evaluation of the production process prior to execution to ensure that the plan will work and that it efficiently uses resources.

PART V EXECUTION AND CONTROL deals with operations management functions that coincide with the production of the operation's output, including the control of inputs and the distribution of output. The operations manager must simultaneously execute a schedule to produce a good or service and control that process to ensure quality, timing, and delivery specifications.

PART VI POLICY AND STRATEGY provides a broad overview of the field with emphasis on current developments. Most new students of operations management grasp and understand policy issues better after covering the basic functions of operations management. Although elements of JIT and TQC are integrated into earlier chapters, we include them in this section because their success requires an organizational commitment and broad changes in policy affecting many areas of the firm.

PART VII TECHNICAL SUPPLEMENTS contains chapters on financial analysis, mathematical programming, simulation, and waiting line theory. They constitute a core of basic technical background material for the rest of the book. These chapters may be covered at any time or they may be used as reference chapters as needed.

FEATURES

Each chapter begins with chapter objectives and a chapter outline, and ends with extensive questions and problems and a list of references. Many of the other features of the text are listed below.

Integration of the principal dimensions of operations management. These include the time period affected, the resource managed, the decision area affected, and the management function.

The time-line orientation. Provides a long-range to short-range planning to execution perspective of operations management.

Service emphasis. Recognizes the rapid growth of services in the economy with several chapters and sections dedicated to service-related topics. Specifically, Chapter 2 differentiates manufacturing and service operations, and chapters 4, 14, 15, 16, 17, 19, and 24 have sections devoted to service-related approaches. Additionally, service industry applications of concepts are discussed throughout the text.

The systems approach. Systems are discussed in Chapter 1 and integrated throughout the book. The information systems requirements of the operations manager are addressed for each topic.

APICS-approved material. The material is specifically consistent with the APICS terminology and doctrine, and the text extensively draws from the rich backdrop of APICS literature. The authors are APICS certified, two at the fellow level.

Currency of topics. Separate chapters are dedicated to MRP, and to JIT, TQC, and OPT. Additionally, CIM is extensively discussed in Chapters 5, 19, and 20. More importantly, all chapters treat the material with emphasis toward these current topics and directions of operations management.

Technical depth. Chapters on technical subjects, such as layout (9), forecasting (6), MRP (12), location (4), work design (10), statistical quality control (18), and independent inventory control (11), among others, have more depth than similar treatments in most other texts.

Extensive and varied end-of-chapter exercises.

The instructor's manual. Contains answers to all end-of-chapter questions and problems. Problem solutions are in large type to facilitate their use as transparency masters. The manual also contains transparency masters of many of the figures in the text.

The Decision Assistant software for the IBM PC. Contains tools to solve many of the end-of-chapter problems and allows students to explore the implications of varying problem parameters.

The Test Bank. Approximately 750 multiple-choice questions. Also available in MicroSWAT II format, South-Western's automated testing package for the IBM PC and compatibles.

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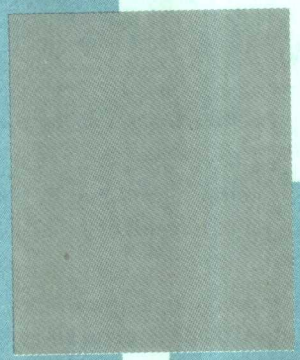

CHAPTER 1
OPERATIONS MANAGEMENT— A PROFESSIONAL PERSPECTIVE

OBJECTIVES

After completing this chapter, you should be able to

- Give examples of some operations management positions
- Define operations management and describe the functions performed by operations managers
- Indicate and illustrate the diverse influences that have contributed to the field of operations management
- Define a system, explain how organizations may be viewed as systems, and describe how the systems approach might be applied by operations managers
- Define productivity in general and give examples of specific productivity measures; explain how operations management affects productivity and how measures of productivity can be used to evaluate operations management
- Discuss the operations manager's contribution to the organization, the community, and the economy

OUTLINE

INTRODUCTION

This book examines the concepts, principles, and techniques of operations management, a major functional area of business. An operations manager is concerned with actually operating a business as opposed to financing it or marketing its products. Of course, these functions often overlap, but the focus of this book is on the decisions and actions needed to operate an organization—that is, the functions necessary to produce and deliver the goods and services the organization provides to its clients or customers.

Most of the principles, concepts, and techniques to be examined apply to a variety of products, including manufactured goods, nonmanufactured goods, and a broad array of services. Many students just beginning this course will be more familiar with the operations of service industries, having been customers, than with manufacturing operations. Traditionally, however, operations management has focused primarily on the production of manufactured goods. In recent years the production and delivery of services has assumed an increasingly important role in the economy and become a major priority for operations managers. Throughout this text operations management is applied to both manufacturing and service production, although some concepts are more applicable to one than the other. Chapter 2 highlights some of the special concerns of service operations.

Operations management decisions can be examined within the framework of the following four interrelated characteristics or dimensions:

1. The time period in which the objectives are to be achieved
2. The resources being managed
3. The major operations management areas affected by the decision
4. The basic management function involved

The elements of these characteristics are given in Table 1–1. The interrelationships of these elements are apparent. For example, decisions concerning any resource can affect capacity; planning and control can be performed for all resources and with regard to all areas. Some elements, such as the manage-

Table 1–1 Dimensions of Operations Management Decisions

Time period affected	Resource managed	Area affected	Management function
Long-range Medium-range Short-range Present	Facilities Equipment Materials Labor Information Capital Energy	Capacity Materials Quality Process Personnel	Planning Execution Control Organization Staffing