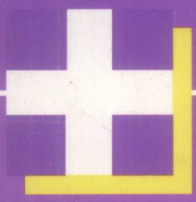
The Management of Manufacturing

Models and Analysis

Edward J. Anderson



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Preface

The management of production and operations is of vital importance for any business. There is an increasing recognition that, no matter how good a firm is at marketing, business strategy, financial controls, human resource management, or product design, if it fails to be effective at the operations level then it will not be able to compete successfully. It is not surprising, therefore, that production and operations management is a central area of study for management and business studies students. The purpose of this book is to give a thorough treatment of a part of this subject. Our theme is the flow of material through the manufacturing process. We wish to understand the complex interactions that take place within manufacturing systems: the greater our understanding the more effectively we will be able to design, plan and control the production process.

This is a book which considers a variety of different problems in production management and techniques for their solution, and it would be easy to categorize it as a problem solving manual, in which the reader looks up the appropriate answer for the problem which he or she faces. It would be wrong, however, to think of this as a 'How to do it' book; my aim has been to write a book which could be described as 'How to think about it'. The situations and problems that we shall consider are really abstractions from, or models of, real life; they are free of the complexities which tend to obscure what is going on in real factories. The rich variety of these models provides us with an invaluable set of patterns against which to measure the operations world, as well as a number of different perspectives to use in looking at production problems.

Organization and selection of material

Part I sets the scene for what follows. We discuss different types of manufacturing system, and different approaches to the control of manufacturing, in order to provide a backcloth for the detailed discussion and

analysis which appears later. The major part of the book is concerned with the two interrelated areas of *scheduling* and *inventory* – the control of processing and the control of materials. Our aim is to give a balanced and up-to-date account of these topics, concentrating on understanding the fundamentals. Much of this material is applicable to service industries as well as to manufacturing, so that the title might have been 'Operations Management'. On the other hand we will emphasize the real problems faced by production managers in manufacturing industry, and this is the area from which the illustrations and examples are drawn.

The selection of material for this book is different from that of the majority of production and operations management texts. Partly this arises out of my feeling that the vital area of 'quality' is better treated separately. There are already a number of excellent texts on this topic and I believe that its inclusion here would have meant a more superficial treatment of the areas on which I would like to concentrate, and would inevitably have made this book far too unwieldy. There are also a number of more minor topics which are not covered. For example I have not included material on job design and work measurements, which are as much a part of the human resources area as part of operations management (and should, I believe, be as much the responsibility of those doing the job as the management team); nor do I discuss facility location, which is important for logistics and distribution, but is a secondary topic for operations management. On the other hand there are many topics which are discussed in more depth than is usual in operations management texts. These include the management of inventory in multi-stage systems; advanced material on operations scheduling, including scheduling problems in flexible manufacturing systems; and (in a supplement) some of the important ideas in combinatorial optimization. I hope that the end result is a book which will have something new to say even to those familiar with this field, as well as being useful to students.

Use of this textbook for teaching

The book is appropriate for courses taught at a variety of different levels. Most of the material has been used in one form or another in courses I have given to third year undergraduates studying Manufacturing Engineering and Management Studies. A preliminary version of the book has been used for a Masters level course on Operations Management, and parts of it have also been used in courses to MBA students.

Throughout the text there are boxes which are of three types: *Application* boxes, which describe the application of the ideas discussed in the text (often concentrating on a single company); *Example* boxes, giving simple problem situations, the solutions to which are worked out in detail; and *Extra* boxes, containing a variety of additional information. At the end of each chapter

there are discussion questions and problems as well as suggestions for further reading. At the end of the book is a Glossary of the terms used.

When appropriate we use some elementary mathematics: this is restricted to basic algebra, some elementary calculus and simple ideas from probability and statistics. The book is organized in such a way that the reader with little mathematical expertise will have no difficulty in skipping certain analytical sections, which are marked as 'Technical excursions'. There are four supplements dealing with topics which are relatively self-contained and lie outside the main thrust of the development. Some of the material in these supplements is at a more advanced mathematical level.

Acknowledgements

Over the five years it has taken to complete this book a great many people have contributed in various ways. I am especially grateful to those students of mine who have kindly commented on various drafts. I would also like to thank my wife, Margery, for her support.

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