

Production Management

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Production Management

Fourth Edition of
Factory and Production Management

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Preface to the fourth edition

'As all experienced factory managers know, there are but two simple devices necessary to run a factory—a crystal ball and a magic wand. In the absence of these, the present volume is offered to those engaged in that peculiar form of juggling known as factory management, in the hope that it will indicate some areas of knowledge which it may be of use to study. The text is not encyclopaedic nor is it intended to be a training manual for any of the specialist disciplines: illumination is intended to be general, rather than intense.'

The above paragraph opened the previous three editions and as a statement of purpose it will serve to introduce this, the fourth edition, now re-titled *Production Management*.

This edition has the same conceptual structure as that of the third edition; a structure the author and his colleagues have found to be extremely useful in presenting a subject to students, and in analyzing real-life production management problems. Essentially the book is divided into six sections, followed by a series of appendices. The first section locates the production unit within the whole organization, provides a useful conceptual framework for analyzing production management and discusses some of the problems of planning and control of a production unit. Sections 2, 3, 4, 5 and 6 deal with the concept of the five 'P's' of the production management function; namely, the Product, the Plant, the Processes, the Programmes and the People.

It may be felt that this conceptualized division is arbitrary, and of course this is so. The complexity of the production management function is so great that *any* division is arbitrary. However, both in teaching, consultancy and research the author has found the discipline of considering any problem against each of the five 'P's' extremely valuable.

The economics of publishing are such that every attempt has been made to avoid increasing the overall length of the book. However, the increase in knowledge means that additional material has had to be presented, so the author has regretfully had to delete some material which appears in earlier editions of the book. These deletions largely comprise tables of figures, which have become dated, and are therefore of fleeting value as the life of the book is extended. Chapter 2 of the last edition has been removed altogether. This dealt with the 'choice of the product' and, while useful, it appeared from discussions with users of the book to be slightly inappropriate within a book on production management.

Some re-shaping of the text has taken place in an attempt to present the material in a more logical order. Thus, for example, the chapter on group technology has been moved to become the second of two chapters on types of production. Other material has been similarly moved and it is hoped that readers will find the new shape of the book more effective and useful. Considerable revision of some chapters has taken place, notably the chapters on maintenance, types of production, control of quality and production control in general.

One of the most time-consuming chores of the author is to ensure that the appendix, *Representative examination questions*, does truly represent the up-to-date situation. With each edition the author has decided that he will discard this section, but on enquiring from users of the book he finds that teachers find this section extremely valuable. Accordingly the section is retained and even slightly enlarged, but again, those familiar with earlier editions will discover that some questions have appeared throughout the whole life of the book. Good questions, like good jokes, never die and no excuse, therefore, is offered for presenting questions which first appeared in the early 50s. The total number of questions now appearing in this section is just over 400. Some of the more detailed material within the previous edition has been collected into appendices and the number of appendices has therefore increased. Readers can decide for themselves whether they need to refer to these detailed subjects or not as they use the book.

Since the first publication of this book twenty years ago, there has been a startling growth in the application of quantitative techniques to production management, and this, allied to the expansion in microcomputers, is likely to have a significant effect on the production manager's job. Many readers have asked that the present volume should be 'very much more quantitative'. The author considered this request very carefully since he had great sympathy with it. It appeared, however, that to add anything significant in the quantitative area would greatly increase the length of the book and thus would then make it less readily available to the general reader. Accordingly the author and his erstwhile colleague Dr P. F. Bestwick have written a book entitled *Quantitative Production Management* which, though not necessarily a companion volume to this book, produces the quantitative material which some readers feel lacking in the present text. In doing so, a book virtually of the same length as the present text has been published, reinforcing the author's view that to provide a comprehensive treatment in depth of both qualitative and quantitative aspects of production management would generate a cumbersome and unwieldy text. Accordingly, readers who wish for substantial quantitative treatments are recommended to examine *Quantitative Production Management* by Bestwick and Lockyer (Pitman Books). Of course all readers of this preface will realize that that advice is quite objective and unbiased!

When the present book was first published it was possible to identify with some precision the examinations whose syllabuses had helped determine the form of the volume. The enormous increase in the teaching of 'management', in various forms and in diverse establishments, now makes

this quite impossible. As previously, the text covers most of the 'production' work in the Diploma in Management Studies, together with parts of the examinations of various professional bodies, including the Institution of Production Engineers, the Institute of Cost and Management Accountants, and the Institute of Chartered Accountants in England and Wales (Diploma in Management Information). Undergraduates taking 'management' or 'administration' in their degree studies and M.Sc., M.Tech. or MBA students who are taking 'conversion' type administration courses will also find much helpful material in the present text. No serious student, however, whether seeking for success in examinations, or at employment, should confine his reading to any single book, and attention is again directed to the suggestions for further reading which appear at the end of most chapters.

My thanks are due to my wife for her help and forbearance and to my good friend Jack Prichard for his many helpful comments. I would also like to thank my friends and colleagues at the Polytechnic of Central London and at the Universities of Technology at Bradford and Loughborough. Further, I have been most fortunate in that readers have been concerned enough to write to me pointing out where the book required amplification and/or amendment; to these and all other persons who have been of such assistance my most heartfelt thanks. Any mistakes in the book clearly I am privileged to claim as my own.

Keith Lockyer
January 1983

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Section I Perspective

1. *The production function within the corporation*
2. *Planning and control*
3. *Budgets and budgetary control*

1 The production function within the corporation

Introduction

Organizations of whatever kind are viable only if they provide satisfaction to the consumer, and this simple criterion is the only general condition for the continued existence of an organization. Such a statement, of course, raises as many questions as it produces solutions, and it is not appropriate within the present text to try to investigate all of these. Two things, however, do need to be clarified:

1. The satisfaction may be in terms of a physical product, a service or a system.
2. The consumer may be either outside or inside the organization: he may be a customer for the product or a user of the system.

Broadly, therefore, all organizations can be considered to be made up from two sub-systems, one of which determines need, and transfers that which satisfies the need to the consumer, and the other produces that which is to be transferred. Within commercial organizations these two sub-systems are commonly referred to as the marketing and production, or operations, functions and these two functions can be identified in all organizations. Furthermore, it is on the relationship between these two functions that the success—that is the survival—of the organization depends. The closer together they approach the greater the likelihood of success and it is interesting to realize that at the beginning of every organization, the marketing and production functions are usually carried out by one and the same person. A separation between these two functions or a reduction in their interaction increases the likelihood of disaster (Fig. 1.1).

For simplicity in the present text, the word 'production' will be used synonymously with 'operations' and the word 'product' will be taken to subsume a physical item, a service or a system. Thus a bank, which has to transfer money from one location to another, has a production, or operations function which is conceptually identical with the machine shop where material has to be transferred from one state to another. It is also important to realize that the problems of manufacturing in, say, the machine-tool industry, are structurally identical with many of the problems of the service industries. Loading jobs on to a set of machines is not significantly different from providing passenger seats on a range of aeroplanes. The replenishment of stock in a factory has many of the

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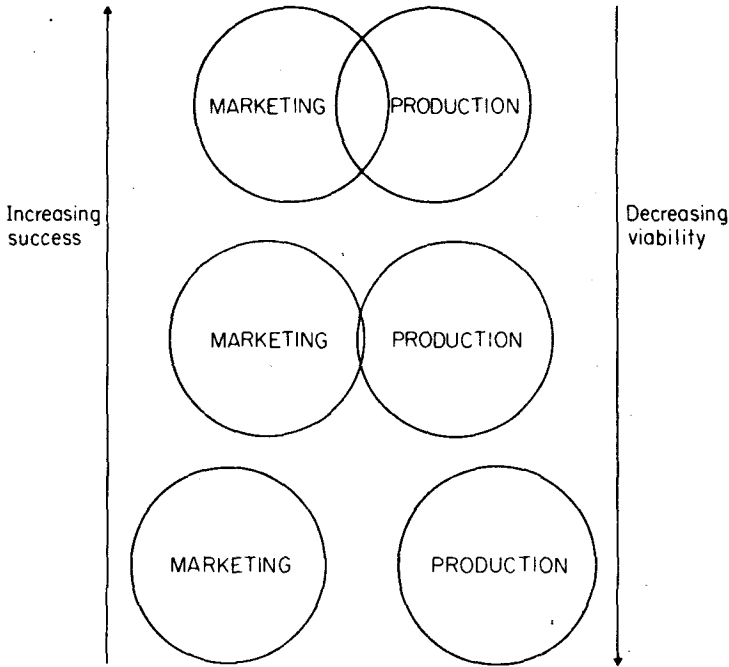


Fig. 1.1 The effects of separating the marketing and production functions

characteristics of the problems of replenishing staff in a service unit. This coincidence of structure between tasks within apparently disparate organizations enables a useful study of production management to be made.

Production engineering?

It is important always to realize that production management is not the same as production engineering, although there are considerable areas of common interest. Broadly, the production engineer is concerned with the *design* of physical equipment while the production manager is concerned with the *organization* of the use of the equipment and other resources, e.g. men, materials and money. Equally it is important to realize that a knowledge of engineering, of any sort, is not a necessary requirement for a production manager.

Production management: a conceptual framework

Of all managerial tasks the production management function is the least easy to define since it incorporates so many diverse tasks that are

interdependent. To divide it up, therefore, is to destroy it, but without such division it is impossible to discuss the work of the production manager in anything but the most general terms. This problem of the whole and the parts is well known to the logicians, but nevertheless it is proposed here to consider the production management function under five separate headings. The division is arbitrary but has been found to provide a useful conceptual framework for consideration of the work of the production manager.

1. The product

The product is the most obvious embodiment of the interface between marketing and production, and it is not sufficient that the consumer requires the product; the organization must be capable of producing it. Agreement, therefore, must be reached between all the business functions on such matters as—

- performance
- aesthetics
- quality and reliability
- quantity
- selling price or production costs
- delivery dates

In reaching agreement on the above, cognizance must be taken of external factors, such as the needs of the market and the existing culture, the legal constraints, and the environmental demands. At the same time there are a number of internal considerations which must be examined: for example, the compatibility of a new product with the existing production systems, facilities and traditions, and whether a new product will excessively increase the variety of activities being undertaken within the organization. Variety, like entropy, tends to increase and as it does so it brings with it disorder and confusion. The temptation to increase variety is extremely great and while it must not be resisted 'at all costs' the decision to increase it must be a *conscious* one. It is not possible for the production manager alone to operate a variety control policy: this must be an essential part of the corporate strategy of the organization.

2. The plant

To make the product, plant of some kind both in terms of buildings and equipment is required. This plant, which accounts for the bulk of the fixed assets of the organization, must match the needs of the product, of the market, of the operator and of the organization, and it must continue to do so for as long as the consumer need can be foreseen. The production manager, therefore, will be concerned with questions such as—

- future possible demands
- design and layout of buildings
- performance and reliability of equipment

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maintenance of performance
safety of installation and operation
social responsibility

These must be considered in conjunction with the financial, fiscal and political/cultural constraints imposed by the environment within which production is to be carried out.

3. The processes

The decision on product manufacture is made by bringing together the technical and organizational needs of the product and the organization and the people within the organization. It is extremely rare to discover that there is only one way to make something, and the ingenuity of man needs to be constrained if variety of methods is not to increase. At the same time it is sensible to try to engage the skills, knowledge and intellect of those who are going to carry out the processes. If it were possible to harness the goodwill and good sense of *all* levels of employees many organizations could be both more pleasant and more wealth-producing than they are today. The attitude 'we don't pay you to think but to do as you are told' may not be expressed in words, but it is often made painfully clear in behaviour.

In deciding upon a process it is necessary to examine such factors as—

available capacity
available skills
type of production
layout of plant and equipment
safety
maintenance requirements
costs to be achieved

4. The programmes

Timetables setting down the deliveries of finished products are the other visible expression of the production/marketing interface, not merely setting down delivery but also effectively determining cash-flow, that prime controller of organizational viability. If programmes are not appropriately agreed, then programming becomes '... the art of reconciling irresponsible promises with inadequate resources'.

Delivery timetables generate timetables for—

purchasing
manufacturing
maintenance
cash
storage
transport

Although the problems of timetabling are simple to state, their resolution