# Managing Business Process Flows

Third Edition

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PRINCIPLES OF OPERATIONS MANAGEMENT


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# PREFACE

In this book, we present a novel approach to studying the core concepts in operations, which is one of the three major functional fields in business management, along with finance and marketing. We view the task, and the raison d'être, of operations management as structuring (designing), managing, and improving organizational *processes* and use the process view as the unifying paradigm to study operations. We address manufacturing as well as service operations in make-to-stock as well as make-to-order environments.

We employ a structured data-driven approach to discuss the core operations management concepts in three steps:

- Model and understand a business process and its flows.
- Study causal relationships between the process structure and operational and financial performance metrics.
- Formulate implications for managerial actions by filtering out managerial "levers" (process drivers) and their impact on operational and financial measures of process performance.

## NEW TO THIS EDITION

The first edition of this book was published in 1999 and reflected our experiences from teaching the core Operations Management course at the Kellogg School of Management of Northwestern University. The second edition, published in 2006, improved exposition and clarified the link between theory and practice. While this third edition retains the general process-view paradigm, we have striven to sharpen the development of the ideas in each chapter, illustrate with contemporary examples from practice, and eliminated some content to make room for some new content, such as:

- Opening vignettes and real-life examples of how the theory can be applied in practice have been made current. In addition, exposition of material in the chapters has been further improved with technical derivations details and other tangential ideas relegated to chapter appendices.
- Chapter 4 has been completely revised, with an emphasis on measurement, analysis of critical path, and management approaches to leadtime improvements. Technical analysis has been shifted to appendices.
- Chapter 5 has been substantially revised with emphasis on effective capacity and bottleneck management, on the effects of product mix on capacity, and on reduction of capacity waste.
- Chapter 6 now includes discussion of quantity discount policies. Discussions of periodic review policies have been added to Chapters 6 and 7.
- Chapter 8 has undergone a complete revision and reorganization to improve flow of concepts; we have also added some discussion on priority processing.
- Chapter 9 has more details on control charts, includes fraction defective chart, recent applications, discussion of integrated design, and total quality management.
- Answers to selected exercises from Chapters 3 to 9 appear at the end of the book.
- The end-of-chapter and end-of-book features have been updated.

Finally, we have removed iGrafx simulation (both the software and the associated sample models) from this edition.

## OVERVIEW

Our objective is to show how managers can design and manage process structure and process drivers to improve the performance of any business process. The book consists of four parts.

In Part I, "Process Management and Strategy," we introduce the basic concepts of business processes and management strategy. Processes are the core technologies of any organization to design, produce and deliver products and services that satisfy external and internal customer needs. Processes involve transforming inputs into outputs by means of capital and labor resources that carry out a set of interrelated activities. The existence of trade-offs in process competencies implies that world-class operations must align their competencies with the desired product attributes and overall competitive priorities as formulated by the competitive strategy.

In Part II, "Process Flow Metrics," we examine key process measures, their interrelationships, and managerial levers for controlling them. In particular, process flow time, flow rate or throughput, and inventory are three fundamental operational measures that affect the financial measures of process performance. Flow time can be improved by restructuring and shortening the time-critical path of activities; throughput can be improved by increasing the bottleneck capacity, and inventory can be decreased by reducing the batch sizes, streamlining the process, or reducing variability. Yet, throughout this part, the focus is on the average values, ignoring for now the impact of variability in process performance.

In Part III, "Process Flow Variability," we study the effect of variability in flows and processing on the process performance and the managerial levers to plan for and control it. Safety inventory is used to maintain the availability of inputs and outputs in spite of variability in inflows and demands in the make-to-stock environment. Safety capacity is used to minimize waiting times due to variability in inflows and processing times in the make-to-order environment. Safety time is used to provide a reliable estimate of the response time to serve a customer. Finally, feedback control is used to monitor and respond to variability in process performance dynamically over time.

In Part IV, "Process Integration," we conclude with principles of synchronization of flows of materials and information through a network of processes most economically. The ideal is to eliminate waste in the form of excess costs, defects, delays, and inventories. Instead of responding to the economies of scale and variability in flows, the long-term approach is to eliminate the need for such responses by making processes lean, flexible, and predictable. It requires continual exposure and elimination of sources of inefficiency, rigidity, and variability and use of information technology to integrate various subprocesses. The goal is to design and control the process for continuous flows without waits, inventories, and defects. We close with the different philosophies of process improvement toward achieving this goal.

In Appendix I, we give a summary of the "levers" to manage business processes. We hope that this checklist will be useful to the practitioner. We assume that our readers have knowledge of some basic concepts in probability and statistics; for completeness, we summarize these as background material in Appendix II.

## INSTRUCTOR RESOURCES

- ***Instructor Resource Center:*** The Instructor Resource Center contains the electronic files for the test bank, PowerPoint slides, and the Solutions Manual. (www.pearsonhighered.com/anupindi).

- ***Register, Redeem, Login:*** At www.pearsonhighered.com/irc, instructors can access a variety of print, media, and presentation resources that are available with this text in downloadable, digital format. For most texts, resources are also available for course management platforms such as Blackboard, WebCT, and Course Compass.
- ***Need help?*** Our dedicated technical support team is ready to assist instructors with questions about the media supplements that accompany this text. Visit http://247.pearsoned.com/ for answers to frequently asked questions and toll-free user support phone numbers. The supplements are available to adopting instructors. Detailed descriptions are provided on the Instructor Resource Center.

### Instructor's Solutions Manual

The Instructor's Solutions Manual, updated by the authors, is available to adopters as a download from the Instructor Resource Center.

### Test Item File

The test item file, updated by the authors, is available to adopters as a downloaded from the Instructor Resource Center.

### PowerPoint Presentations

The PowerPoint presentations, updated by the authors, are available to adopters as a downloaded from the Instructor Resource Center.

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