



Interfaces

Publication details, including instructions for authors and subscription information:
<http://pubsonline.informs.org>

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To cite this article:

(1996) Book Reviews. *Interfaces* 26(1):133-150. <https://doi.org/10.1287/inte.26.1.133>

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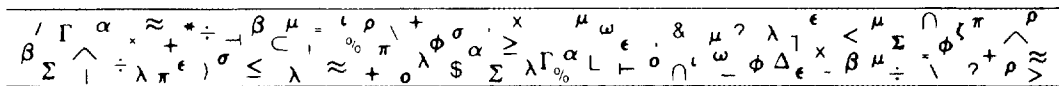
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Book Reviews

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The range of books reviewed is wide, covering theory and applications in operations research, statistics, econometrics, mathematics, computers, and information systems (no software is reviewed). In addition, we include books in other fields that emphasize technical applications. Publishers who wish to have their books and proceedings reviewed should send them to Professor Benjamin Lev, School of Management, The University of Michigan-Dearborn, 4901 Evergreen Road, Dearborn, Michigan 48128-1491, BLev@FOB-F1.UMICH.EDU. We list the books and proceedings received; not all books received can be reviewed because space and time are limited. Those who would like to review books are urged to send me their names, addresses, and specific areas of expertise. We commission all reviews and do not accept unsolicited book reviews. Readers are encouraged to suggest books that might be reviewed or to ask publishers to send me copies of such books.

MORECROFT, JOHN D. W. and STERMAN, JOHN D., eds. 1994, *Modeling for Learning Organizations*, Systems Dynamics Series, Productivity Press, Portland, Oregon, xxii + 400 pp., \$45.00.

If Hollywood were to make a movie of this book, it might be entitled *The Fifth Discipline, Part VI: Revenge of the Modeler*. Morecroft and Sterman have expertly crafted a collection of 18 papers that not only spans the subject area but does so with the coherence of a well-told story.

The collection is dominated by Peter Sange, both volumetrically (contributing to three of the papers) and intellectually. The fundamental issue addressed by *Modeling for Learning Organizations* derives from *The Fifth Discipline* [Sange 1990]: How do or should learning organizations learn? The answer—by modeling—belies the complexity of achieving that end.

How do you take confident, pragmatic work-a-day managers who have minimal use for abstract thinking and little training

in it and teach them enough vocabulary, syntax, and creative problem solving that they can become modelers? At the same time, how do you develop their faculties for self-criticism and analysis to build on that modeling ability and not get shunted down a side path of merely validating the current organizational environment and philosophy? Finally, how do you concurrently develop these capabilities and faculties individually and collectively within a team whose members compete for status and position?

These are the questions Morecroft and Sterman address, albeit not in this exact sequence. In the first section of the book, the authors lay the argument for modeling (and the use of models and simulations) along lines that seem to a modeler to be classical and straightforward. They make this argument with academic tone and perhaps lack the fervor and scope to sell the idea to the practicing manager, relying too much on the groundwork laid in *The Fifth Discipline*. The second and third sections are based on case studies and deal with building models of business situations and the learning process from building and using models. In the fourth section, the authors deal with computer tools for turning models into simulations, primarily at the design philosophy level.

Admittedly, all of these tools are based on systems dynamics, which is to be expected in a book that is part of a systems dynamics series, largely written by faculty and associates of the Sloan School and keynoted by Jay Forrester. Despite this, the message transmitted is not fundamentally tied to systems dynamics; other modeling approaches are applicable. Happily other

commercial and public-domain computer aided modeling tools are available.

This is not a how-to book nor is it a textbook. It is an expansion of a special issue of a journal, and it has that format and tone. Nonetheless, I believe the community owes a debt of gratitude to the editors and publishers for putting this collection within easy reach.

The problems addressed in this collection are not really new, but the solutions are. Most assuredly, it is timely. If you are part of an organization that is striving to become a learning organization, don't buy a copy—buy several copies and pass them around.

Reference

Senge, Peter M. 1990, *The Fifth Discipline, the Art and Practice of the Learning Organization*, Doubleday/Currency, New York.

Bruce W. Fowler

Advanced Systems Concepts Office, US Army Missile Command, Redstone Arsenal, Alabama

GOODMAN, RICHARD A. AND LAWLESS, MICHAEL W. 1994, *Technology and Strategy: Conceptual Models and Diagnostics*, Oxford University Press, New York, 291 pp., \$35.00.

Its content and price make this book useful as a supplementary text in a graduate course on corporate strategy or technology management. Its excellent tables and figures—especially the technology maps and the summaries and technologies of market strategies—make it valuable as a reference work also. The technology-mapping discussion includes some fascinating history, including Hippocrates' (400 BC) use of chemotherapy to fight tumors. However, the authors ignore the outstand-

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ing Japanese expertise in technology mapping. Some of the well-known maps from Sony or the Nomura Research Institute would have been a natural addition. The useful, long bibliographies at the end of each chapter are collated and presented again at the end of the book. However, too many of these references are out of date. In some sections, for example, on page 24, the authors address US competitiveness in global markets but cite only publications that predate the Japanese export surge of the 1970s and 1980s. One of the most critically important chapters, "External acquisition of technology," has too few references, and these are dated.

The authors make admirable use of material from multiple disciplines, including manufacturing, venture finance, and the history of technology. However, I found the resulting text to be difficult going; it is couched in the jargon of academic strategy studies, with a surfeit of double talk and platitudes. Researchers in technology management and commercialization studies whose academic orientation is closer to operations research and marketing may be put off by this language. They will be frustrated by passages that serve only to justify addressing technology within the study of strategy or to shore up strategy as an academic pursuit. They may be additionally frustrated by the conceptual emphasis and lack of operational guidelines, and the seemingly ambivalent attitude toward technology. More concrete examples would illustrate, motivate, and validate. The book is repetitious. Marketers will find the discussion of product attributes on page 94 (here called parameters) somewhat naive. These shortcomings are all the more unfor-

tunate as the authors show, in the few fully developed cases included in the book, that they have a truly impressive understanding of the issues and alternatives facing the technological firm. The problem is in the expression.

Teachers that need a more concise exposition with more real-world examples might consider the McGrath, Anthony, and Shapiro's [1992] book on product development, with its very succinct chapter on technology management. The innovation audit that Goodman and Lawless introduce in chapter 8 seems a potentially valuable notion. But they ramble, and I would suggest that a student simply skip it. They offer some more details about how to do the audit in chapter 9; however, the questions they suggest for use in the audit are hard to understand, and indeed they do not indicate whether the questionnaires have been tested, or how to particularize them for individual firms and projects. In chapter 10, they provide some audit examples, interesting as cases but unenlightening as to how and to whom the questionnaire was administered. Chapter 13 on TQM is not well integrated with the remainder of the book and seems to contain nothing new. Chapter 14, "Technology management techniques," is misnamed, and consists only of a summary of technology forecasting techniques, which will be useful for the student. My technology-sourcing consultant, a business development manager at Dell Computer, was dissatisfied with chapter 17, "External acquisition of technology." He identified several unconvincing or unsupported arguments. I think of strategy as the creative matching of a firm's core competencies with its cost

structure and that of its industry, anticipating the co-evolution of cost structures and competencies. Goodman and Lawless's analyses are static, although they make a few nods to classical product-life-cycle theory. Their orientation to adaptive rationality (Figure 14-1 is a good descriptive aid to understanding and more efficient action) seems to preclude break-the-mold types of managerial creativity. For example, the usual rule that entry should be denied to new competitors was broken by Intel when it licensed its microprocessor to its biggest customer, IBM.

Reference

McGrath, M. E., Anthony, M. T.; and Shapiro, A. R. 1992, *Product Development: Success Through Product and Cycle-Time Excellence*, Butterworth-Heinemann, Boston, Massachusetts.

Fred Phillips

Oregon Graduate Institute of Science and Technology, PO Box 91000, Portland, Oregon 97291

SAUER, CHRIS 1993, *Why Information Systems Fail: A Case Study Approach*, Alfred Waller Ltd., Publishers, Oxfordshire, Great Britain, 369 pp., \$29.95.

Why Information Systems Fail is a book that attempts to establish conceptual and theoretical explanations of information systems (IS) failures. Sauer sets an ambitious goal of developing a model consisting of triangular relationships between a system, system supporters, and project organizations. He argues throughout the book of the importance of technical, managerial, and behavioral reasons for a system's failure. The model foundations rest on IS as innovations and the problem of managing support for innovation, and Sauer ad-

vances the notion that development of IS is typically complex, and complex systems are prone to fail.

The book is divided into four parts:

- (1) In the first three chapters, Sauer deals with basic concepts of system failure and points out that the available literature of system failure is inadequate. In chapter 4, he gives a quick review of organization theory literature and borrows heavily from concepts that help support the model building of system failure.
- (2) In the second part (the best part of the book), he covers the construction and elaboration of the triangular relationships of the systems failure model. In a separate section (chapter 5), he provides an overview of the model. Chapter 6 covers an analysis of information systems. He shows how the innovation process can be analyzed in terms of the project organization's problem solving and why failures should occasionally be expected and tolerated. In chapter 7, Sauer analyzes characteristics that influence decisions to support a system that might affect its success or failure. Decision making and organizational performance, the author argues, can be analyzed using such factors as the cognitive limits of the decision maker, the organizational structure, its history, the technical process, the environment, and politics.
- (3) In the third part of the book, Sauer includes four chapters and uses case histories, mostly of mainframe-based systems developed in the 1970s, to illustrate the model of systems' failure and its shortcomings. Some of the book's drawbacks are evident in this section. The case histories, which are described at a considerable length and with great detail, are a bit out-

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dated. Particularly, given the rapid technological advances in both hardware and software, the case cited is somewhat irrelevant to current IS concerns. However, this does not mean one cannot gain a historical perspective on earlier eras of systems' failures and associated problems by reading this book.

(4) The last part of the book consists of summaries and conclusions for both scholars and practitioners of IS.

The book is suitable for IS scholars, practitioners, and students who want to understand the social, economic, behavioral, and political aspects of IS and why these systems sometimes fail.

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MEDHI, JYOTIPRASAD 1994, *Stochastic Processes*, second edition, John Wiley and Sons, 598 pp. \$39.95.

This book is another addition to the list of stochastic process textbooks entering the market. In spite of the large number of books on stochastic processes, there is still room for a variety of introductory and intermediate level texts. As the author hints in the preface to this second edition, as a result of making considerable additions and alterations, he has increased the number of the pages from about 400 pages to around 600 pages. He has also made changes in subjects covered, exercises, references, and examples.

Chapters 1 and 2 are devoted to probability theory and the notations used for stochastic processes. Medhi continues with the topic of Markov chains and provides

enough examples to clarify the discussions, definitions, and theorems. He devotes a lot of attention to Markov chains and Markov chains with discrete and continuous state spaces. He continues with a discussion of renewal processes and theory in chapter 6. The following chapter covers the topic of Markov and semi-Markov processes. He discusses stationary processes and time series in chapter 8 and branching processes in chapter 9.

Medhi discusses queuing and reliability in chapter 10, covering the general concept of queuing theory and the network of the Markovian queuing system; non-Markovian queuing models; queues with vacations; reliability; systems reliability; Markovian models in reliability theory; and opened and closed Jackson networks. At the end of the book are four appendices. Appendix A contains a summary of some of the basic mathematical results. Answers to exercises are listed in appendix B while abbreviations are given in appendix C. Appendix D contains the table of Laplace transforms, probability distribution functions, and performance measures of queuing models.

The book is very interesting and covers many examples, theorems, and definitions. Numerical examples for each topic discussed enhance the quality of the book. Each chapter includes a list of references and problems for solution.

People with limited knowledge of Markov chains, Markov processes, renewal processes, and queuing theory would find the book very interesting and a good choice as an introductory book. As prerequisites for using the book, readers would need courses in probability, statistics, and ad-

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vanced calculus. On the other hand, the book would be appropriate for a graduate-level course. The book is suitable for all researchers concerned with stochastic processes in such various fields as operations research, industrial engineering, management science, statistics, and computer sciences.

The book is well organized and well written, and in addition, it is a good teaching tool. I believe it can compete well with its counterparts (for example, Hoel, Port, and Stone [1972] and Stewart [1994]) both on the basis of the topics covered and its price. While the book is published in India, it is distributed by six distributors of John Wiley and Sons.

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- Yahia Zare
*Connecticut Mutual Life, MS 106, 140
Garden Street, Hartford, Connecticut 06154*

GROVER, VARUN AND KETTINGER, WILLIAM J., eds. 1995, *Business Process Change: Reengineering Concepts, Methods, and Technologies*, Idea Group Publishing, Harrisburg, Pennsylvania, 685 pp., \$84.95.

Few contemporary concepts for orchestrating organizational change have received more attention in popular and academic literature than business process redesign (BPR or reengineering). Unfortunately, the majority of articles on this topic have tended to focus on definitional issues or general case studies of organizations

that have effectively rethought and then radically redesigned business processes.

This state of affairs has created a reengineering paradox for many forward thinking managers: they are enthusiastic about the potential benefits BPR can render but lack proven or even well-articulated approaches for actually undertaking the effort. As aptly noted by Thomas Davenport in the introductory chapter of this book, the theoretical and practical underpinnings of process management have existed for many years in the form of scientific management, total quality, and sociotechnical models of transformation. It is the integration of these principles and the emergence of powerful information technologies that fuel the modern engines of radical process redesign and revolutionary organizational improvement. The research articles that constitute the chapters of this book are drawn from well-grounded disciplines and methodologies and reflect an effort to answer the how? when? where? and what? of BPR. The book represents a significant advance in transforming reengineering from a concept to a useful program of action for modern managers.

The book is in five sections. The first contains a general overview that provides a series of definitional frameworks for process change (Grover, Teng, and Fiedler), the role of information management in BPR (Marchand and Stanford), general BPR approaches and their organizational context (Cule), and sociocognitive dynamics and their influence on BPR (Klempa). Interestingly, these chapters are very diverse in terms of their theoretical foundations and practical implications thus providing multiple lenses from which to view

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BPR and its associated organizational, interpersonal, and technological dynamics.

The second section is devoted to information technology (IT). These chapters focus on the integration of IT in BPR through strategy formulation and implementation (Galliers), the facilitation of BPR through client/server technologies (O'Hara and Watson), the use of strategic planning in identifying BPR through client/server technologies (O'Hara and Watson), the use of strategic planning in identifying processes to reengineer (Lederer and Sethi), and alternative reengineering strategies (Ponce-de-Leon, Rai, and Melcher). Although each of these chapters contains useful insights for both managers and researchers, only O'Hara and Watson substantially address the enabling qualities of IT in organizational transformation. Additional articles to frame specific classes of technologies and their uses across varying classes processes might have been included in this section.

Section three addresses BPR methods. This is a very strong section of the book and includes chapters outlining a life-cycle-based BPR methodology (Kettinger, Guha, and Teng), a suite of methods and tools for BPR (Mayer, Benjamin, Caraway, and Painter), the use of business rules as a device for reengineering (Appleton), the use of role activity diagrams in process modeling (Huckvale and Ould), event-driven modeling (Denna, Jaspersen, and Perry), a return on process approach to valuing improvement activities (Kanevsky and Housel), and a dynamic modeling approach to business engineering (Van Meel, Bots, and Sol). Managers as well as systems designers will find these chapters ex-

tremely useful in identifying and understanding established and emerging methodologies for reengineering initiatives.

Section five focuses on the ever-important issue of implementation. The topics addressed include the dynamics between IT and BPR (Mitchell and Zmud), the creation of customer value through BPR (Roth, Julian, and Malhotra), the prototypical roles attitudes play in BPR (Melone), the politics surrounding process-change efforts (Smith and Willcocks), private sector success factors in BPR implementation (Gulledge, Hill, and Sibley), and patterns of communication associated with BPR (Parnisto). While each of these chapters adds value in terms of understanding implementation, Mitchell and Zmud and Melone are especially insightful in guiding managerial efforts and focusing future research designs.

The final section of the book addresses the role of the information systems function in BPR efforts. Chapters outlining the role of the IS professional (Markus and Robey), the reengineering of the IS function (Smith, McKeen, and Nelson), the redesign of the IS development process (Sabherwal), and the impact of BPR on the IS function (Zeibig) contain unique insights into issues that are becoming increasingly important to top IS managers who find themselves spearheading reengineering efforts. In sum, this book provides a substantial overview of tools, techniques, and managerial strategies that are applicable to senior managers, middle managers, and systems developers. In addition, the authors rigorously frame the general concept of BPR, thereby enabling interested researchers to better understand this contem-

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porary change process and formulate more meaningful studies.

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ARNOLD, KENNETH L. 1994, *The Manager's Guide to ISO 9000*, The Free Press, New York, 377 pp., \$35.00.

Starting in 1992, companies in the integrated European Community have required their suppliers to be audited and registered under the ISO 9000 series standards. For this reason, companies must be certified for doing business in Europe. The benefits of registration go beyond sales. It helps improve systems and increase productivity and quality.

Arnold provides an excellent guide for those who want to begin the process of implementation. First, he emphasizes developing a system to maintain product consistency, and second, he elaborates on a mechanism to improve product quality. The book is appropriate for making an internal audit, and a skilled consultant or assessor and personnel from the company who read the book can conduct an audit effectively.

The structure of all chapters is the same: after a brief introduction, the author transcribes elements listed in the standards ISO 9001 and 9004, explains their intent and the requirements, comments on changes for the 1994 version of the standards, and gives an implementation strategy. This pedagogical feature increases readability and helps persons to begin the process of implementing the ISO 9000 series in the company.

The standards are generic. For this reason, implementation requires planning, management, and a focus on the results of using the quality system. I agree with Arnold regarding the value of forward-thinking approaches in preparing a quality system document, because they give managers the opportunity to organize the existing processes in an organization. The author constantly reminds the reader that the book, although a guide, is not mandatory, and this is a necessary caution during implementation. Arnold presents a road map to a three-phased implementation, based on a baseline of zero for the company. It is an excellent approach directed to the program rather than to the documentation.

Every company has processes whereby it manufactures products, provides services to customers, and stores materials or products. Many of these activities are already documented to some extent. Arnold affirms that manuals are not mandatory, only written procedures. Strictly speaking, this vision seems to be correct such written procedures contribute to a perception of "quality" even without physical proof that the organization achieves quality. Beyond obtaining recognition from a certification organization, the best thing about implementing the ISO 9000 series is documenting all the processes to obtain "memories," the basis for decision making—although the ISO standards do not tell one how to document the quality system.

Arnold could have emphasized the human relationships involved in implementing the standards and how to cope with problems. The guides for implementation seem easy to follow, but it also takes time to convince people that the unknown fu-

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ture is better than the existing situation. Many times, implementation of a quality assurance program, or even a true manufacturing system, fails, because managers do not pay enough attention to human behavior, the most important aspect in attaining quality.

Several points could be improved. On page 76, the author uses terms in discussing analytical verification that are familiar to reliability engineers, but not necessarily to managers. Moreover, regarding statistical techniques, one should be cautious about affirming that the predictability of variation looks like a bell curve. Several experiments behave in a different way.

The book is very practical, and the last chapter contains answers to 30 common questions about ISO 9000. In addition, Arnold cites the cost of certifying a company and provides a good example of the difference eliminating 15 percent of non-conformance makes in the final profit. Books in the field of quality do not usually stress the costs and savings associated with continuous improvement.

The resources a firm needs to prepare for registration are complete knowledge of quality systems, a working knowledge of the applicable ISO 9000 standard, an understanding of the assessment process, good interpersonal skills, and assessment experience. Arnold provides an excellent survey of the ISO 9000 and gives a broad picture of what the standards can do for a company and what it can expect during the implementation process. The book is excellent for educating and motivating managers.

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BAZARAA, MOKHTAR S.; SHERALI, HANIF D.; and SHETTY, C. M. 1993, *Nonlinear Programming: Theory and Algorithms*, Second edition, John Wiley and Sons, New York, 638 pp., \$86.95.

This is an excellent book dealing with the problem of optimizing an objective function subject to equality and inequality constraints where some of the functions involved are nonlinear. The book is the second edition of a well-established text and consists of 11 chapters, two appendices, a subject index, and a bibliography. After an introductory chapter, the authors present three well-organized parts dealing with convex analysis, optimality conditions and duality, and algorithms and their convergence.

The introduction (chapter 1), acquaints the reader with nonlinear programming formulations via a series of examples from diverse areas of application that include optimal control, facility location, structural and mechanical design, electrical networks, water resource management, and stochastic resource allocation.

Part 1 of the book (chapters 2 and 3) presents material on convex sets and convex functions and their generalizations. The material covered in chapter 2 includes convex hulls, Weierstrass' theorem, separation and support of sets, convex cones and polarity, polyhedral sets, extreme points, and extreme directions. Chapter 3 deals with subgradients of convex functions, minima and maxima of convex functions, and generalized convexity notions such as strict and strong quasiconvexity and pseu-

doconvexity.

Part 2 of the book (chapters 4 to 6) deals with optimality conditions and duality. In chapter 4, the reader is first introduced to classical optimality conditions, including the Fritz-John and Karush-Kuhn-Tucker conditions. Then, in chapter 5, using the notion of cones, the authors present different constraint qualifications (Abadie, Slater, linear independence, Cottle, Zangwill, Kuhn-Tucker). Finally, in chapter 6, they derive weak and strong duality theorems and study properties of the Lagrangian dual, leading naturally to cutting plane approaches for solving the dual problem.

In part 3 of the book (chapters 7 to 11), the authors address the development of algorithms for the numerical solution of nonlinear programs. In chapter 7, they view algorithms as point-to-set maps and prove the main convergence theorem using the concept of a closed mapping. In chapter 8, they study unconstrained optimization and include such standard techniques as line search and trust region methods, conjugate gradient methods, and subgradient methods. In chapter 9, they discuss approaches to converting nonlinear programs with equality and inequality constraints into equivalent unconstrained problems or into problems with simple constraints, so that the methods of chapter 8 can be used. They present penalty and barrier methods as well as a polynomial-time algorithm for linear programming based on a barrier function. Chapter 10 is a compendium of feasible direction methods. The discussion includes the method of Zoutendijk, successive linear and quadratic programming, the gradient projection

method of Rosen, the reduced gradient method of Wolfe, and the convex-simplex method of Zangwill. Finally, in chapter 11, they deal with problems that arise frequently in applications: the linear complementary problem, and quadratic, separable, fractional, and geometric programming problems. Although almost all algorithms in part 3 rely on the theoretical foundations of part 2, most algorithms can be understood independently from each other.

Following part 3 are two appendices. The first contains an overview of vectors, matrices, and real analysis, while the second contains a summary of convexity theory, optimality conditions, and duality. In an algorithms-oriented course, students can study the appendix in lieu of parts 1 and 2 of the book. Finally, the authors provide an extensive 50-page bibliography with more than 1,200 entries.

What is really missing from this book is a short introduction to the field of global optimization, to which the scientific and research community seems to be paying increased attention in recent years. The authors provide only some pointers to the literature on nonconvex quadratic programming. Material similar to that presented in Horst [1990] would be very useful in this context. However, with the exception of the book by McCormick [1983] which covers global optimization to a small extent, no other general nonlinear programming text covers this topic. Less important, yet noticeable, is the omission from the book of any discussion pertaining to Benders decomposition, which is very popular among the stochastic optimization community. Except for the book by Lasdon [1970], none of the other nonlinear programming text-

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books treat this topic. The absence of discussions of global optimization and Benders decomposition and a few typos in the main text and bibliography constitute my only criticisms.

On the other hand, the authors are to be commended for providing us with an excellent text. Throughout the book, they provide marvelous geometrical interpretations (especially in chapters 5 and 6) and several illuminating examples for beginners, as well as theoretical details for advanced readers. One of the things I liked best about this book is that it puts in perspective the interrelationships of constraint qualifications (chapter 5). An additional appealing instructional feature of the book is that each chapter begins with an outline and terminates with extensive exercises. Another appealing aspect of the book is the inclusion of a "Notes and references" section at the end of each chapter. There, the authors provide a wealth of historical information as well as pointers to more advanced works in the literature. Yet another major strength of the book is the vast number of topics it covers. Because of this, it is an excellent reference source, and it also allows instructors to choose from among a wide variety of topics when preparing a nonlinear programming course.

In comparison to its first edition [Bazaraa and Shetty 1979], this edition includes several additions and changes. First of all, the KKT optimality conditions—which were referred to as the KT conditions in the first edition—are now correctly attributed to Karush in addition to Kuhn and Tucker. Geometric programming—a method frequently used by engineers—has been added in chapter 11. The authors have also

done an excellent job in updating chapters 8 to 10, which include the description of the bulk of the algorithms presented in this book. These updates were required because of the many developments made during the past 25 years in the areas of Newton-like methods, augmented Lagrangians, and barrier function methods. They had also added the popular successive linear programming and successive quadratic programming methods to Chapter 10. Finally, they have added approximately 475 new references, making the bibliography current.

Compared to other textbooks [Avriel 1976; Fletcher 1980, 1981, 1987; Gill, Murray, and Wright 1989; Luenburger 1984], this book contains a more comprehensive and up-to-date coverage of nonlinear programming. No other book is a better reference. Only the book by Minoux [1986] spans a comparable spectrum of topics, but it is intended to be a reference rather than a textbook and contains no examples or exercises. Parts of Gill, Murray, and Wright [1989] could be used in an algorithms-oriented course to fill needs for practical discussions since Bazaraa, Sherali, and Shetty do not cover these extensively.

In conclusion, this book has a remarkable pedagogical appeal and is well organized and self-contained. The authors present a wealth of material concerning theory and algorithms of nonlinear optimization. Despite the vast amount of material they cover, the authors present fundamental insight and examples, as well as proofs and theoretical results. The book is therefore valuable to engineers, scientists, and mathematicians. I unreservedly recommend it for adoption to lecturers preparing

a course on nonlinear programming and to researchers studying optimization, especially at the advanced level.

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ASKIN, R. G. and STANDRIDGE, C. R. 1993, *Modeling and Analysis of Manufacturing Systems*, John Wiley and Sons, New York, 461 pp., \$58.50.

Recognizing that modeling and manufacturing systems are often taught separately, Askin and Standridge state in the preface that their goal is to provide a text-

book for an integrated and focused course on modeling of manufacturing systems. They have succeeded admirably.

One of the best things about the book is the ubiquitous discussions on the art of modeling. In every chapter, there are (the necessary) reminders that the real world is messy and dynamic and that a good model is one that captures the right features at the right level of detail.

The authors present their view of manufacturing, as encapsulated in their "Principles of manufacturing systems" and offer a general discussion on modeling issues in chapter one. Part 2 (chapters 2 through 7) and part 3 (chapters 8 through 10) cover the models for analyzing the major components of a manufacturing system. In chapter 2, the authors describe various models used in assembly line balancing, both for single-product and mixed lines. In chapter 3, they cover transfer lines, introducing probabilistic analysis of machine failures and models for buffer location. In chapter 4, on job shop scheduling, they discuss the difficulties—theoretical and practical—of this problem and present several common (list-processing) dispatch rules. In chapter 5, they describe the components of flexible manufacturing systems and present some heuristics for system design and loading. In chapter 6, they discuss the general philosophy of group technology and include several clustering techniques for group formation. In chapter 7, they cover models and methods for facility layout and location. In chapter 8, they present some models for machine setup and sequencing. In chapter 9, they describe the basic equipment used in material-handling systems and present several models for their design

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and loading. In chapter 10, they provide an overview of the types of warehouse-storage and retrieval systems and discuss some design issues. In part 4 (chapters 11 through 13), Askin and Standridge focus more on modeling techniques. In chapter 11, they provide some theoretical results on queuing networks, and in chapter 12, they discuss the use of simulation. In the last chapter the authors describe two case studies and walk the reader through an entire analysis. Throughout the book, each chapter is fairly self-contained and would be useful as a reference on its particular topic.

The selection of topics covered in this book is different from that in most operations management textbooks; it does not include inventory management, forecasting, or quality control, perhaps because its focus is on planning. Also unlike other textbooks on OM planning and control, this book does not contain chapters on material requirements planning, just-in-time, and master production scheduling. Instead, the authors discuss planning and scheduling issues throughout the book in the context of the different systems they present.

Students using this book as a text will appreciate the copious exercises included in every chapter. For each model presented in the book, the authors give an example showing how the corresponding solution procedure is applied. While they do not discuss up-to-the-minute results, they include the basic results in each topic covered and provide ample reference to more sophisticated models.

The book is best suited for upper-level undergraduates or master's students in industrial engineering. Having worked

through this book, the student should have a good overview of manufacturing systems, be sensitized to the pitfalls in modeling, be able to construct simple models, and know where to learn about more complicated models. In short, the student should be well prepared to tackle an analysis of a real system, perhaps for a class project or internship.

In summary, the book provides a good overview of the latest developments in manufacturing systems, and it is one of the few books that delve into, and successfully convey, the myriad of issues involved in modeling and analyzing these systems. The authors should be commended for a job well done.

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ANDREWS, DORINE C. and STALICK, SUSAN, K. 1994, *Business Reengineering: The Survival Guide*, Yourdon Press, Englewood Cliffs, New Jersey, 308 pp., \$24.95.

This book simply and concisely introduces readers to the new concept of reengineering, giving a framework and tools to people who have been charged with making changes. The authors claim that the radical change in "how people work—changing business policies and controls, systems and technology, organizational relationships and business practices" will work in such a way that "reengineering will never have to be done again."

When any organization suffers a significant change of dimensions, it needs to modify its basic structure. In a situation of disorder, an organization's first reaction is to mend, an effort that fails most of the

time. The next step is to reduce its structures and personnel (downsizing). However, the important action is to rethink the organization, because to continue activities not part of the current goals is to waste time, effort, and money. Rethinking a company can lead to increased performance and quality.

In nine chapters, the authors cover the whole process of reengineering from beginning to end, describing characteristics of a successful journey implementing reengineering. The how-to format of the book is well suited for introducing reengineering to the uninitiated. There is a danger, however, that some practitioners will not use the tools correctly. The authors explain some tools inadequately, and they provide no orientation about how to select and implement the correct methods.

Although well written, the sections lack depth. The authors presume that people who have no prior knowledge can understand the book, which is not true. They need additional background information. The book is like a beacon, instead of a road map. That is, it points out the direction, but it doesn't provide the basic concepts for traveling on the path. Moreover, analytically trained readers may feel uncomfortable with the authors' qualitative analysis.

The authors use some concepts from systems analysis in a non-traditional way, for example, their definition of a data flow diagram. They try to merge the definitions of systems analysis and quality, and some conflicting definitions may confuse the uninitiated reader. On page 124, for example, the authors omit the important work *sequential* in defining a state transition dia-

gram. On page 126, the decision tables define but do not identify the rules for complex decisions.

In chapter 6, the authors use some terminology that seems a bit rude for dealing with people whose jobs are at stake, for example, "force to confront their biases and assumptions." I don't think it is an easy task to implement a reengineering policy. The employees need to know, on the other hand, that we are not forcing them. We need to show them that the unknown future will be better than today to facilitate behavior change.

Andrews and Stalick use the acronym "CASE" in a different way than Pressman [1992]. In chapter 8, the authors offer definitions of standard deviation and regression analysis that are completely unorthodox. In addition, they need better explanations for some of their examples, for example, the paragraph heading "Facilitate like Attila the Hun" on page 170, which leads the reader to think that the method is a bit barbaric.

Every organization wants to stay in business, and changes in corporate culture are necessary from time to time. The authors correctly emphasize that creating a common knowledge base and view of the problem and its solution (page 32) is a guiding principle during the first phase of implementation. However, readers must overcome years of business school teaching and previous life experience before they can put the new paradigms into effect, as the authors would like.

Many organizations tend to overlook the area of jobs and salaries as they reengineer. In the past, education and leadership determined the level of salaries. With reen-

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gineering, salaries must be coordinated with the level of decision making of each professional and not the work the person does.

As their final stage and continuation of reengineering, Andrews and Stalick advise the "continuous process environment" described by Juran and Gryna [1988]. Their comparison of "continuous process improvement" and "business reengineering" is excellent. Moreover, the appendices contain fine material for initiating the process of reengineering a company.

This well-written, entertaining book should be of value to anyone interested in reengineering, and it gives the broad picture of what reengineering can do for a company and what it can expect during the change process.

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KALASHNIKOV, VLADIMIR V. 1994, *Mathematical Methods in Queuing Theory*, Kluwer Academic Publishers, Dordrecht, The Netherlands, 377 pp., \$136.00.

Queuing theory was developed to provide models to predict the behavior of systems that attempt to provide service for randomly arising demands. Researchers addressed the question of optimal operations, optimal designs, and approximate modeling. The exact solution techniques

using clever mathematical models have become secondary to model building. This is because most real-world problems do not correspond exactly to a mathematical model. Since a great many of the developments in queuing theory are not practical, the applications of queuing theory are limited.

As the author clearly states, his aim is to give readers insight into the mathematical methods that can be used in queuing theory and to present examples of solving problems with the help of these methods. With this objective, Kalashnikov begins the book by describing the most important examples of queuing along with Kendall's notations and algebraic descriptions of the queuing models. He continues with a description of the necessary facts from probability theory and the theory of analytical functions. Knowledgeable readers can skip this chapter of the book and proceed to such topics as the flow of homogeneous customers and Poisson flow. He devotes a lot of attention to Poisson flows and their relations to the so called order statistics. He studies recurrent flows extensively. He discusses Markov chains and provides numerous examples after giving sufficient background through definitions and theorems and providing the criterion of accessibility and nonaccessability. He covers the topics of crossing and coupling of the renewal processes extensively and discusses a Monte-Carlo algorithm suitable for simulation modeling to estimate crossing times in detail.

The author continues by reviewing the regenerative processes and comparing them with one another. He discusses Markov chains as regenerative processes.

He discusses such topics as imbedded Markov chains, the $GI/GI/1/\infty$ model, finite time continuity, and uniform-in-time continuity within the framework of discrete-time Markov queuing models. He continues by discussing backward and forward Kolmogorov equations, birth-and-death processes, Erlang's phases, Hyper-Erlang distribution, and PH-distributions. He cites Jackson's queuing network as an example of a Markov chain that is not a birth-and-death process.

Kalashnikov provides various examples for describing queues with supplementary variables. He devotes most of a section to the topic of aggregative models. He discusses in detail the piecewise-linear aggregate, canonical aggregate, aggregative models, and queues as aggregative models. He continues with a discussion of the topic of regeneration in continuous time queuing processes. In the final chapter of the book, Kalashnikov deals with first occurrence events, covering such subjects as piecewise-linear processes, semi-Markov process, estimates in terms of test functions, and regenerative processes, and gives some example problems.

The book is very solid and includes numerous definitions, theorems, and examples. The author gives clear examples to illustrate important points and demonstrates the mathematical development of queuing problems. The exciting part of the book is that the author provides example problems for each subject and often bases the discussion upon such problems and derives the mathematics behind them. He gives enough of a description of the problem to provoke new viewpoints and new discussions. Each chapter ends with problems for

solution and comments that are probably very useful to the readers.

Probably readers with limited knowledge of queuing theory will have to use more elementary books as reference. I believe, however that this book will be very useful to those who have some knowledge of queuing theory, Markov chains, and regenerative processes. It would be an excellent choice for a graduate course, if other materials were provided for review.

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HOEBEKE, LUC 1994, *Making Work Systems Better*, John Wiley and Sons, New York, 190 pp., \$45.00.

In this book, Luc Hoebeke, an electronic engineer converted to organization theory (*works systems* in his terms) presents the results of his reflections as company consultant concerning the particular characteristics of human activities and of diverse aspects of business strategy.

Hoebeke sees work systems as ensembles of activities and relations between the people that carry out those activities. His reflections on the interrelations between the different actors can be used to understand the system better (and to act better). According to Hoebeke, to discover the organizational problems of a system, one first needs to define the nature of the business ("a prison could be a system to implement the punishment of the courts, to rehabilitate, to educate, or for keeping asocial people out of normal society"; the approach must correspond to the objective).

To help the reader to identify the work

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system in which he or she is working, Hoebke defines a framework with regard to time, the time needed to realize the results of the activities deployed. He divides into three strata each of the four domains he considers: the added-value domain (a time span of one day to two years); the innovation domain (one to 10 years); the value-systems domain (five to 50 years); and the spiritual domain (more than 20 years). According to this classification, the output of the work systems in a higher domain creates conditions for the underlying domain, although it is not strictly true that does work within the lowest domain and thinkers within the highest.

Given this classification of domains (although it can occasionally be ambiguous), in each chapter Hoebke develops his ideas concerning how the activity must be approached within each domain. He analyzes in each stratum of each domain the following: the generic transformation process, the basic strategic dilemma, control information, audit information, and development activities. For each one, he presents the key idea. (Some of these ideas are as elementary as the importance of attending trade fairs, which he discusses in talking about the stratum of one to two years within the added-value domain.) For each domain, he dedicates a section to applications and interventions, relating such diverse experiences as the origin and functioning of the Mondragón cooperatives and the changes that have come about in Eastern Europe.

One of the most positive aspects of the book is the abundance of examples that accompany nearly every definition and reflection. By using examples; Hoebke

makes the book more entertaining; otherwise it might have become too bogged down in theory.

In conclusion, I want to say that the book, rather than being aimed at managers who look for practical solutions to managerial problems (as the title could lead us to believe), is aimed at students of organization theory or simply at people who like to reflect and analyze how the organizations that surround them function.

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