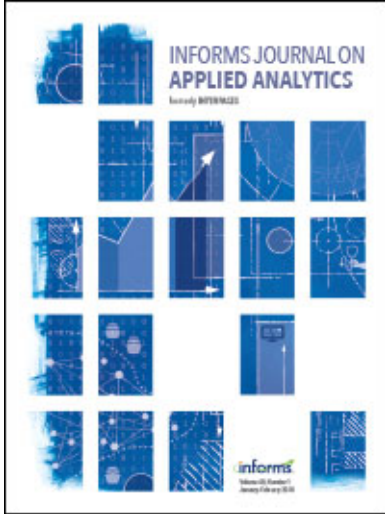




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Book Reviews

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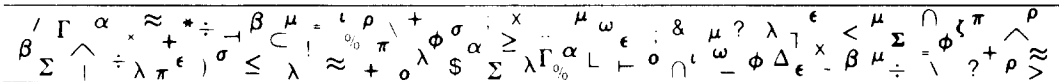


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Book Reviews

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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. In addition, we include books in other fields that emphasize technical applications. 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 the editor their names, addresses, and specific areas of expertise. The editor commissions all reviews and does not accept unsolicited book reviews. Readers are encouraged to suggest books that might be reviewed or to ask publishers to send copies of such books to the editor.

MAGEE, JOHN F.; COPACINO, WILLIAM C.; AND ROSENFELD, DONALD B. 1985, *Modern Logistics Management: Integrating Marketing Manufacturing, and Physical Distribution* (Wiley Series on Marketing Management), John Wiley and Sons, New York, 430 pp. with index, \$44.95.

This is an impressive book, by an impressive group of authors, who have an impressive amount of collective experience in logistics; but I was left with a feeling of disappointment after reading it. It includes references for further study at the end of each chapter, visuals through-

out, and a final chapter of cases, but I had difficulty on two points: (1) Who or what course should use this book? (2) What is logistics, anyway?

To take the second question first, the first chapter contains a long discussion of the concept of logistics, along with a formal definition, but it is so broad that it appears to coincide with management in general, all the way down to "... planning, implementing and controlling ...". At this point, it seems to be omitting physical manufacturing and personnel issues, but they are included further on in the book, at least by inference, including

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the design of whatever it is that is manufactured. Page 243 begins "The primary goal of logistics systems analysis is the design of a logistics system that supports ... the strategic goals of the corporation." I do not permit my students that degree of circularity of logic in what they write; surely such distinguished practitioners of logistics can do better, also.

The continuing theme running through this volume is that of "the systems approach," stressing that all parts of the organization are interrelated. This is a good point, but is neither new nor limited to logistics. In discussing specific operations of the corporation, the authors often make the point that it is not beneficial to completely optimize one part of the system at the expense of the rest — you should not minimize inventory-carrying costs at the expense of reliability of service and stockout costs, or of excessive manufacturing costs, for example. This may be obvious to upper level management, but one weakness of this book is that it doesn't mention the need to explain this to the people who work in inventory control. If they see managers taking actions that increase inventory cost above what is necessary, and they are not given a careful explanation about the reduction of overall costs permitted by such a policy, they may well become discouraged and decide that "THEY" do not really care about inventory costs. Such an attitude is not likely to be an asset to the firm.

The question of who should read this book is also related to the question of the breadth of "logistics." A partial list of the management techniques the reader

should understand includes: flow-charting, sales forecasting, economic order quantity computations, integer programming, location theory, micro-economics, MRP, compound interest calculations, statistics, seasonality influences, exponential smoothing, Box-Jenkins procedures, TOFC/RORO systems, management information systems, and computer utilization including robotics. This is not all, but it is illustrative. At what point in the curriculum is the student sufficiently familiar with all this to cope with such a book, or even such a topic? Graduate level seems necessary, perhaps even several years of experience beyond the MBA.

To summarize, this is a book about "scope." It requires the reader to focus on the broad scene without getting bogged down in the details; yet it is only by knowledge of the details that the actual work of the firm can be done.

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HU, T. C. 1982, *Combinatorial Algorithms*, Addison-Wesley, Reading, Massachusetts, 292 pp., \$31.95

Many different kinds of books have appeared with the title *Combinatorial Algorithms*. Professor Hu's contribution might best be called "Lecture Notes in Combinatorial Algorithms" or "Selected Topics in Combinatorial Algorithms." In places readers may feel almost as if they are hearing Professor Hu in class. This book is a valuable contribution to the literature of operations research and computer science. It shines particularly in its treat-

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ment of network flows, presenting a clear exposition that leads the reader from the Ford Fulkerson algorithm to the most modern approaches. Another area of strength is the treatment of dynamic programming, a subject that is difficult to explain well. (This strength is marred slightly by the possibility that the uninitiated reader might infer incorrectly from the summary of Chapter 3 that the result of a dynamic programming solution to a problem is always a polynomial time algorithm.)

Unfortunately the book was produced from camera-ready copy without the benefit of editorial intervention. While the lapses from standard English occasionally result in confusion, the reader can clear up this confusion by rereading carefully and studying the author's examples.

The book is rich with examples — sometimes they substitute for proofs — and rich with intuitive motivation and explanation. This gives a pleasant redundancy to most of the discussion, a redundancy that allows the reader to fill “conditional shortest paths.”

The author's use of big Oh notation is sometimes not standard; he will occasionally use it in place of saying two functions have the same order of growth or in referring to lower bounds, as he does early in Chapter 8. Curiously, the book does not define big Oh notation, while it does define other equally elementary concepts. The book appears to classify functions as either polynomial or exponential, using exponential as a catch-all for superpolynomial functions. The definition given for exponential functions (having n in the exponent) is not sufficiently precise to

resolve whether all superpolynomial functions are exponential.

At times, the richness of the exposition may cause problems for the uninitiated. For example, in Chapter 1, both the treatment of shortest paths and the treatment of minimum-cost-spanning trees make the subjects appear more complicated than they are. This is especially unfortunate because the intuitive insights on which the treatments are based are useful and revealing. Had the economics of publishing allowed a mathematically skilled editor to work with the author, the book might have shone in this chapter.

The chapter on binary trees leads to an updated treatment of the Hu-Tucker algorithm for the construction of (weighted) binary search trees of minimum total path length. The treatment attempts to show how the algorithm naturally arises as a generalization of the construction of Huffman trees. I had to study the examples to understand the terminology used in the description of Huffman trees. For example, “Replace the two smallest nodes by a node of weight $w_1 + w_2$ and do this recursively for the $n - 1$ weights ...” became clear in the light of an example that followed. The Hu-Tucker construction, an admittedly complex one, gets somewhat lost in the maze of intricate details that follows. This may be a case where the expert who developed a complex idea understands it so well that an explanation satisfying him does not satisfy mere mortals.

Most of the book is organized around Professor Hu's own work, and so his insights into why things work are especially valuable. Although the preface suggests

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that the first two chapters might be used as a text for an undergraduate course and it is clear that the manuscript has been used for courses, the book is most valuable as a reference. It should have a place on the bookshelves of anyone teaching or doing research in combinatorial optimization.

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FANDEL, GÜNTER; AND SPRONK, JAAP, eds. 1985, *Multiple Criteria Decision Methods and Applications*, Springer-Verlag, New York, 402 pp., \$42.00.

After a fitful start, multiple criteria decision making (MCDM) has taken its rightful place among the many disciplines of management science and operations research. The wealth of theory and applications that has emerged over the last 15 years gives ample testimony to this observation. Annual conferences and courses have served to disseminate much of the new results, and to teach the basic methodologies. The current text teaches the basics and contains a collection of papers presented at the First International Summer School on MCDM held in 1983 near Catania, Italy. The principal objectives of the organizers were to give a comprehensive picture of MCDM problems, methods, and software, and to publicize the theoretic and practical sides of ongoing work. They also wished to establish contact between practitioners and academics from various disciplines and to promote applications through critical appraisal of techniques and software.

The book is divided into two parts reflecting the summer school curriculum. The first is dedicated to the philosophy of multiple criteria decision making and to an overview of solution techniques. The corresponding eleven chapters cover nearly the full range of approaches, primarily in tutorial form. Jacquet-Lagrèze starts out with a discussion of the basic concepts associated with multicriteria decision support systems. By stressing the need for an integrated organizational framework, he establishes a theme that is revisited in at least three other chapters. A second theme, though somewhat less prominent, centers on outranking methods, which have gained considerable favor in Europe with the introduction of Bernard Roy's ELECTRE codes. This is reflected in the numerous references to the methodology and underscored in a survey paper by Ostanello. Given the heavy European participation in the course, this tilt is understandable. Only two of the 22 contributors are from the US.

Other chapters include separate discussions of the mathematics of multiobjective programming by Isermann and Zionts, and an introduction to the fundamentals of multiattribute utility theory (MAUT) by Vincke. In a less traditional vein, Colson presents some risk theories as they relate to MCDM while Fandel rounds out the section with a game-theoretic interpretation of decision making within large organizations.

Although much of this material is serviceable, none of it is new or insightful. Most of the standard texts, such as *Multiple Criteria Optimization* [Steuer 1985] or

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Multiobjective Decision Analysis with Engineering and Business Applications [Goicoechea, Hansen, and Duckstein 1982] do a considerably better job of presenting the theory and illustrating its use. If this book could have made any contribution, it would have been in the area of implementation. But this is its chief omission. While many of the authors are quick to point out the shortcomings of multicriteria methods, they offer little guidance for selecting an approach or overcoming the difficulties that are likely to arise in practice. When using MAUT, for instance, how does one effectively structure an interview session to assess utility functions and calibrate scaling constants? Or what can be done if the interviewee doesn't understand the question or can't formulate a proper response? These types of problems frustrate implementation, and I believe it would have been worthwhile exploring them in depth.

None of the papers in the first part of the book provides a blueprint for action. Surprisingly, the same can be said for those contained in the second half, despite the fact that the last eight chapters are devoted to applications. Once again, virtually all of this material retraces old ground and is conspicuously lacking in breadth. Except for Fandel's paper on wage bargaining, very little data is presented, and few models are fully developed. For example, neither of the papers on environmental evaluation and energy planning offers any analysis beyond a few sample calculations.

In conclusion, I must express my disappointment with the book, and can recommend it only to those who feel that their

libraries would be incomplete without everything published on MCDM.

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ROCKAFELLAR, R. T. 1984, *Network Flows and Monotropic Optimization*, John Wiley and Sons, New York, 616 pp., \$44.95.

The book presents an in-depth look at the theory of networks with applications to optimization problems. Optimization techniques are needed in many fields, such as transportation routing, economics, and electrical networks. This book presents an elegant derivation of different algorithms for achieving optimization.

The first four chapters review network principles and applications. This material is necessary so that the reader can follow the in-depth discussions in subsequent chapters. Chapters 5 through 9 present different algorithms to optimize cost, time, and path lengths as problem variables. One of the unique contributions of the book are Chapters 10 and 11 on monotropic programming. Rockafellar has been a leader in the subject of monotropic programming, and many of his previously published papers are condensed in these sections. Monotropic programming includes all problems with a focused objective function, where the problem is

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decomposed into a sum of linear functions formulated as convex functions of a single variable.

The book includes a complete list of references for network optimization. Because of the book's theoretical nature, the reader needs a knowledge of linear algebra concepts. Each chapter concludes with a section containing author's comments, references, and numerous exercises. This book should prove a valuable addition to operation research practitioners, engineering managers, and network decision and design engineers.

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FRYER, M. J. AND GREENMAN, J. V. 1987, *Optimization Theory: Applications in Operations Research and Economics*, Edward Arnold, York, Pennsylvania, pp. 293, \$9.95.

From its title, one gets the impression that this paperback book lies on the interface of the fields economics, operations research, and management science. Upon inspection, however, it becomes clear that the topics are presented from a mathematician's viewpoint. For example, the linear programming chapter describes two "applications" — least absolute deviation regression, and quadratic programming.

The first two thirds of the book — Chapters 1-5 — follows a typical sequence: (1) unconstrained optimizations, (2) optimization with equality constraints, (3) inequality constraints, (4) duality, and (5) linear programming. The authors emphasize the Lagrangian function as a unifying principle. Chapters 6 and 7 de-

part from tradition, presenting topics on optimal control theory. Again the primary method of analysis is Lagrangian (Hamiltonian).

The final short chapter (8) entitled "Postscript" is a potpourri of topics, including finite state systems, dynamic programming, stochastic programming, and the theory in perspective.

This book is extremely easy reading. It is filled with an abundance of graphics that greatly enhance the written and mathematical descriptions. Exercises are well thought out and, more important, answers are given in the appendix. The authors are obviously talented teachers.

My primary complaints, beside the misleading title, concern topics that have been omitted. There is little or no discussion of numerical algorithmic issues anywhere in the book. In fact, several topics are misleading, such as the discussion on degeneracy, in which it is suggested that random pivoting is the easiest way to avoid cycling. The authors do not emphasize the point that many optimization problems have a special structure that can be taken advantage of during the solution algorithms. Nonlinear and integer programming are also avoided. At the very least, the authors should have included reference to these topics.

Still, the book is a delight to read. It might be well suited for a first survey course on optimization in a mathematical sciences department. Students enrolled in economics or operations research curricula had better turn elsewhere.

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BOOK REVIEWS

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