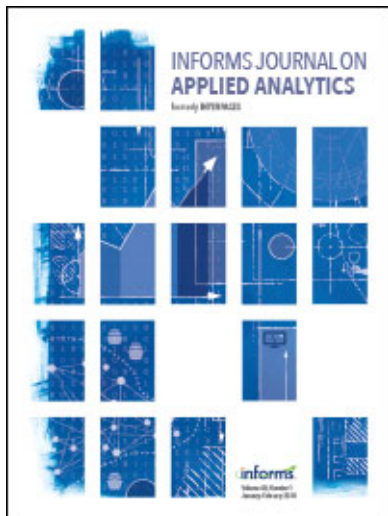




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## Book Reviews

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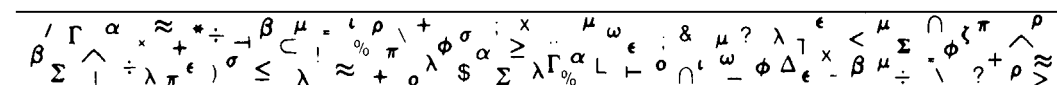


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# Book Reviews

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The range of books reviewed is wide, covering theory and applications in operations research, statistics, management science, 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 reviewed should send them to Professor Benjamin Lev. We list the books 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.

Ballester, Enrique and  
Romero, Carlos 1998, *Multiple Criteria  
Decision Making and its Applications to  
Economic Problems*, Kluwer Academic  
Press, Dordrecht, The Netherlands, 160  
pp., \$80.00.

The idea of a small book on multiple criteria decision making (MCDM) is appealing, and this 160 page book is thin enough to be considered small. The texts on MCDM with which I am most familiar are generally thick, expansive, and detailed, requiring at least several weeks (as opposed to several days) to work through.

I was thus eager to begin to read this thin book and committed 15 hours of my time to the task.

My purpose in this review is to address the issue of whether the book rewards readers for their effort. Does the scope, content, and style of writing pay off? The answer is mixed. On the one hand, Ballester and Romero have written a charming little book on MCDM; on the other hand, the book has a number of faults that distract from its initial charm.

The book has eight chapters. Chapter 1 includes a quick introduction to MCDM

and the terminology and a brief historical development of the field. One can read it quickly, mainly because not much is going on.

In chapter 2, the authors describe techniques for generating the efficient frontier using a production-planning example (constraint method) and then explain how to extract the optimal solution from the efficient set (compromise programming). The example is simple and well developed, but the presentation leaves much to be desired; for example, an aggravating number of *the's* are missing and sentence structure could often be improved.

In chapter 3, the authors describe the satisfying approach to MCDM using weighted-goal-programming and lexicographic-goal-programming techniques and present their solution using the sequential method. This discussion is direct and contains noticeably fewer typos.

Chapter 4 on utility theory is a tough read. I found it rather incoherent and disorganized with poorly presented examples. The two hours I spent on this chapter did not pay off.

In chapter 5, the authors describe some of the links between the various MCDM techniques and show the equivalence between compromise-programming (CP) and goal-programming (GP) formulations. They establish utility interpretation between CP and GP and discuss when to use the various MCDM techniques. The presentation is interesting although somewhat simplistic.

Chapters 6 through 8 are based mainly on the authors' research interest in linking the various MCDM model formulations within an economic perspective. This ma-

terial is specialized and may not appeal to all readers, although I found the presentation interesting; it is similar in spirit to G. Debreu's book [1959].

The book's less-than-perfect writing, however, takes its toll on the reader (I began to tire with chapter 5). This is not a major obstacle to understanding, but it definitely detracts from the presentation. The fact that the book has been translated may explain much of the problem. Throughout I found the authors to be best at analytic description and less successful at broad-based discussion.

Despite this book's faults, I found reading it to be worth my effort. I look forward, however, to a future revised edition.

#### Reference

Debreu, G. 1959, *Theory of Value—An Axiomatic Analysis of Economic Equilibrium*, John Wiley and Sons, New York.

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Duffuaa, Salih O.; Raouf, A.; and Campbell, John D. 1999, *Planning and Control of Maintenance Systems*, John Wiley and Sons, New York, 371 pp., \$79.95.

Discussing the importance of industrial maintenance to business competition is really unnecessary. It is obvious that to guarantee homogenous products, respect agreed-upon delivery dates, and provide good-quality products and service, it is absolutely necessary to have reliable, well-maintained equipment. It is not enough to have sound production planning, a fantastic marketing plan, and proper inventory management, for example, if equipment

and machines are then unable to work as they are supposed to.

If it is obvious that maintenance is a basic function any firm needs to compete, the question is, Why do most books on operations management traditionally not even devote a chapter to analyzing the management of this function? Duffuaa, Raouf, and Campbell justify this neglect in texts and courses, alluding to factors that I don't think determine this omission, such as the difficulty of measuring maintenance outputs or the complexity of its relationships with other functions. I think the problem lies with the complexity of the stochastic models that govern this function or perhaps the fact that maintenance is often considered to be someone else's problem, as it is frequently subcontracted.

The authors (maintenance consultants and researchers) have chosen the book's contents in such a way that it is easy, simple reading for students (they include an appendix with a summary of the statistical background needed, without abandoning rigor or limiting the scope of the topics covered).

The book is divided into 13 chapters. It starts with an introduction to the maintenance function and continues with maintenance control, preventative maintenance models, work measurement techniques, forecasting, planning and scheduling, material control, maintenance quality control, productivity, computerized maintenance management, maintenance training, maintenance auditing, and finally, advanced aspects of maintenance (DFM, TPM, MPR). Covering all the related aspects of maintenance management, as the authors do, is equivalent to covering all the typical top-

ics of a general operations management book. After all, maintenance is a function that advances alongside manufacturing itself.

Some might prefer greater emphasis on the nonquantitative aspects of maintenance management, which currently influence the field (maybe a wider treatment of TPM); however, I believe that many books cover these other aspects, and Duffuaa, Raouf, and Campbell have found their niche in the market.

Because their readers will probably be students or practitioners, the authors could have included a greater number of resolved examples to give students confidence in the knowledge they are acquiring.

This book fills a gap in teaching material (although it is an exaggeration to announce on the cover that this is "the first book to address maintenance and repair from an engineering perspective"; the authors cite other texts that do this in the bibliography). In this text, the authors present, in a simple way at the undergraduate level, statistical models and discussions concerning the design, planning, and control of maintenance systems and other aspects of maintenance management. This textbook is going to be of great help to whoever wishes to round off an operations management course with the quantitative aspects of maintenance.

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El-Taha, Muhammad and  
Stidham, Shaler, Jr. 1999, *Sample-  
Path Analysis of Queueing Systems*, Kluwer

Academic Press, Dordrecht, The Netherlands, 295 pp., \$115.00.

In 1974, Shaler Stidham published his famously misnamed paper, "A last word on  $L = \lambda W$ ." Twenty-five years later, he and his co-author Muhammad El-Taha give an authoritative treatment of the powerful methodology explicated in that paper, sample-path analysis of stochastic systems, and show how this technique, much of which the authors developed following the 1974 paper, can be applied in analyzing of queueing systems.

Early in the book, the authors state an essential point, "Throughout this book, unless otherwise stated, we make no stochastic assumptions. The quantities and processes defined are deterministic. They may be thought of as representing a fixed sample path of a stochastic system, defined on some probability space" (p. 4). This viewpoint permits many important theorems to be "separated" into a deterministic component and a stochastic component. Since stochastic processes are inherently more difficult to understand than their deterministic counterparts, this separation can provide insights and clarity that might otherwise be obscured in the stochastic fog that remains even after the infamous Laplacian curtain is lifted.

In particular, the authors provide illuminating discussions of ASTA and PASTA (when the system looks the same to the arriving customers, whose arrival times coincide with the times at which the system changes from one state to another, and an outside observer, who has no effect on the system), insensitivity (when the system behavior is independent of the details of a random process that drives it), stability,

and, of course, Little's theorem (a whole chapter of last words). The authors' insightful discussion of operational analysis (a tool for performance evaluation invented by computer scientists) is worth mentioning here.

The Applied Probability Association of INFORMS sponsors a biannual Best Publication Award. The 1999 award, which consisted of a plaque and \$1,000, was presented to El-Taha and Stidham at INFORMS Cincinnati in May 1999, for their careful and scholarly book. Here is the citation written by the award committee (Martin Puterman (Chair), Peter Glynn, and Ward Whitt):

The INFORMS Applied Probability Society awards its 1999 Best Publication Award to Muhammad El-Taha and Shaler Stidham, Jr. for their book, *Sample-Path Analysis of Queueing Systems*. This unique book provides the first unified treatment of an elegant and powerful methodology for deriving significant properties of queueing systems through in-depth analysis of a sample path of a stochastic process. In their book, El-Taha and Stidham show how this deterministic approach leads to direct, elegant, and rigorous derivations of important queueing system relations, including Little's law and its numerous variants. Insight and proof simplification are gained by separating the issue of the validity of a relationship from the more technical issues of existence of limits or of a stationary framework. The application to important queueing-theoretic topics, such as ASTA and insensitivity, is especially noteworthy. By collecting together such sample-path results, many originally due to the authors them-

selves, *Sample-Path Analysis of Queueing Systems* demonstrates the unity and power of the method. Muhammad El-Taha and Shaler Stidham's lively, clear, and precise presentation provides readers and students with a readily accessible introduction and overview of sample path analysis and its applications.

In summary, this is an important book, sure to be influential in the continuing development of the theory of stochastic models.

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Haimes, Yacov Y. 1998, *Risk Modeling, Assessment, and Management*, John Wiley and Sons, New York, 726 pp., \$105.00.

During recent years, several dozen books on risk analysis and management have been published. The coverage is very broad, from sophisticated mathematical analysis of complicated stochastic models to applications of modern information technologies. The authors of most of the books consider the problems of risk in finance, especially in investment. Haimes does not deal directly with risk in finance problems but with the general problem of risk.

Books on this subject are usually oriented to a rather precisely defined audience. The book by Haimes is supposedly for a very broad audience. The authors of books on risk management, for example, Beenhakker [1997] and Beroggi and Wal-

lace [1998], share common goals and use similar terminology, but they present different methods and techniques. Observing such diversity, one may get the impression that risk assessment and management is no more than the application of statistical and optimization techniques or information technologies to similar problems that occur in other disciplines. Haimes proves the contrary, that there is a theory and methodology of risk within a broader context of (stochastic) system modeling and optimization. Haimes' book is oriented to "significantly diverse readership," and its "readers may have different levels of interest in the quantitative/empirical and qualitative/normative aspects of risk" (p. xiv).

To meet the interests of such a broad potential readership, Haimes divides the book into two parts: Fundamentals and Advances. An extensive introduction and an appendix on optimization techniques (20 percent of the volume) should help the novice to understand the main material of the book. No knowledge of advanced mathematics is needed: "analytical methods and tools are presented without advanced mathematics, or with no mathematics at all" (p. xii).

In the first part, Haimes introduces the reader to "several fundamental philosophical and methodological questions" and a "holistic approach to problem solving" (p. 53). He focuses on conceptual and decision-making aspects of risk analysis. The latter include linear programming, decision trees, multi-objective trade-off analysis, multi-objective optimization, uncertainty, and Bayes theorem.

In the second part, Haimes develops

methods of risk assessment, modeling, and management using statistics of extremes, multi-objective decisions, and fault-tree techniques. He illustrates these methods by solving examples of real-life problems. However, it is doubtful that a reader who lacks the proper mathematical education will be able to analyze those problems with only the material in the Appendix. I think that the material in Part 2 assumes a knowledge of optimization theory and methods comparable to a one-term undergraduate course.

I fully agree with an assessment on the back cover of the book that it is "an essential reference for professionals working in universities, industry, and government, and anyone interested in risk analysis in virtually any discipline." But I am not sure that it should be recommended to novices; on the contrary, readers may fully benefit from Haimes' book if they have some preliminary knowledge of the techniques used in their profession (for example, from such texts as Beenhakker's [1997] or Beroggi and Wallace's [1998]) and experience with their applications. On the other hand, I think that the book may be especially useful for continuing education.

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