INTERFACES 16: 5 September-October 1986 (pp. 117-123)

Book Reviews

MARION G. SOBOL

Edwin L. Cox School of Business
Southern Methodist University
Dallas, Texas 75275

BUNN, DEREK W. 1984, *Applied Decision Analysis*, McGraw-Hill, New York, 251 pp., $24.50.

Management scientists looking for an introduction to the decision analytic approach for modeling decision problems under uncertainty can end their search by reading *Applied Decision Analysis*. This well-written textbook is designed for either self-study by managers or use in a formal decision analysis course. Equal weight is placed on techniques for modeling preferences and means for modeling probabilistic judgments. An especially nice feature of the book is that after a technique is introduced, it is evaluated for its relative merits. This gives valuable information for use in the meta-level decision which managers face: how to decide among the different techniques for deciding among the options.

The first chapter in the book gives an overview of decision analysis as applied to problems which may contain multiple options, multiple objectives, and multiple stages, as well as uncertainty about which state of nature will occur. A unique feature is the introduction of the coherence principle as a unifying concept for the rest of the book:

> The *coherence principle* states that a necessary condition for rational beliefs and actions on the part of an individual is that they should all be logically consistent with each other, involving no mutual contradictions (p. 11).

The first half of the book focuses on the modeling of preferences. Single-attribute decision criteria which either do or do not rely on judgments of the probabilities of the states of nature are presented in Chapter 2. The concept of a certainty equivalent is used in Chapter 3 to introduce von Neumann-Morgenstern single-attribute utility theory. Axioms underlying the theory are presented and utility function assessment methods are described. The extension of single-attribute utility theory to problems with multiple attributes is covered in Chapter 5. The material in this chapter provides a good basis for further study of multiple-attribute utility theory, such as in Keeney and Raiffa, *Decisions with Multiple Objectives* [1976]. In Chapter 4, the book turns to the problem of screening options by dominance once the decision maker's utility function has been assessed. First-, second-, and third-degree stochastic dominance are briefly introduced through integral calculus notation, and a securities analysis example is presented.

The second half of the book focuses on probabilistic modeling. Techniques for assessing subjective probabilities are contained in Chapter 7, along with means for updating probabilities upon the receipt of extra information (using Bayes' theorem). Ways to evaluate the quality of assessed probability judgments using scoring rules are presented in Chapter 8. Chapter 10 contains the integration of a preference model with a probabilistic model in decision tree analyses of multiple-stage problems.

A number of decision analysis applications are described in the book. A case study and fault tree analysis of the problem of planning safety measures for nuclear reactors is in Chapter 6 and 8. Chapter 11 presents studies of research and development decision modeling and the use of influence diagrams in a production facility expansion problem.

The book is very suitable as a decision analysis course textbook or a supplementary text and has exercises and references at the ends of chapters. Graduate and upper-division undergraduate engineering, mathematics, and operations research students would have little problem with the mathematical level of the text. The text could also be used in an introductory decision analysis course for MBA students, but those with mathematical weaknesses would need supplementary material on integral calculus and probability. The book would be very appropriate for the decision analysis seminar I offer to advanced MBA and doctoral students.

Reference

Keeney, Ralph and Raiffa, Howard 1976, *Decisions with Multiple Objectives*, John Wiley, New York.

L. Robin Keller
Graduate School of Management, University of California at Irvine, Irvine, California 92717