

Book reviews

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GIUSEPPE MUNDA

**Multicriteria Evaluation in a Fuzzy Environment.
Theory and Applications in Ecological Economics**

Physical Verlag, Heidelberg 1995.
xiv + 255 pages, 28 figures.
ISBN 3-7908-0892-X.

The referred book suggests mathematical approach to the actual problem of conflicts between economic progress and the environmental protection. The linkage between the growth of production and consumption on one side and the ecological risks on the other one has led, on the general “ideological” level, to the formulation of the “*sustainable development*” concept. The book offers mathematical reflection of that idea. It is based on the paradigm considering efficiency, equity and sustainability for determining conflictual values of modern ecological economics. The main goal is to develop and verify multicriteria evaluation method being able to suggest effective compromises between their demands.

The environmental systems are complex, characterized by uncertainty, subjectivity and incompleteness which can be mathematically modelled namely by fuzzy set theoretical tools adequately reflecting the typical features of such vague qualitative and quantitative information. The referred work suggests a new approach to the multicriteria evaluation based on the semantic distance. It overcomes different weak points of the traditional comparison methods, and its evaluation matrices include crisp, as well as stochastic and fuzzy measurements of the performance of decision alternatives. The multicriteria evaluation method is based on some aspects of the partial comparability axiom, and it is relatively flexible for applications.

The text is divided into twelve chapters which are formed (except the first one devoted to the introductory presentation of starting notions) in three main parts of the book. The first part presents the *Theoretical Analysis of Cost-Benefit Analysis and Multicriteria Evaluation*, the second part is entitled *Multicriteria Evaluation in a Fuzzy Environment* and it is the main part of the book. The last part, *Application to a Real-World Environmental Management Problem*, illustrates the previous theoretical methods on the example of river Po basin environmental policy (Po is an Italian river). The book is completed by a short *Preface* and representative *References and Bibliography* including more than 400 items.

The book is written in a lucid style, the text is well organized into relatively short sections and subsections. Some sections are heuristic or prevalably heuristic, several of them demand elementary knowledge of mathematical logic and some tools of the higher mathematics (including some parts of Calculus).

The task of the author was not easy. The transdisciplinary character of the presented problems demanded to find a unitary style for presentation of mathematical, logical, economical, ecological (and in certain sense also philosophical and politological) topics. All of them touch the subject of the referred book and, on the other hand, none of them is sufficiently dominant to determine one “binding” style. The author has succeeded to overcome this difficulty and to create a consistently effecting text.

The problems of ecological economics belong to the typical features of the contemporary world. The referred book can be useful for any reader wishing to find their analysis based on mathematical approaches and analysis of their quantitative and qualitative, however uncertain, components.

Milan Mareš

ALAN D. TAYLOR

Strategy, Voting, Power and Proof

Springer-Verlag, New York – Berlin – London 1995.

xiv + 283 pages, 70 figures, 13 tables.

ISBN 0-387-94391-9

The referred book presents an interesting overview of several topics in which exact sciences, social sciences and political analysis meet each other and mutually contribute to their creative development. They touch the problems of strategical behaviour, political power and social optimality of control decisions.

The content of the book is divided into two main parts and it deals with five principal subjects. Each subject is introduced and treated on a basic level in one of five chapters of the first part and then its revision and advanced treatment is given in analogous five chapters of the second part. These principal subjects are: escalation of conflict investigated mostly by game theoretical modelling, game theoretic model of international conflict, yes-no voting procedure and robustness of the voting system, political power viewed mostly from the coalition game theory positions, and, finally, the social choice with some related optimization problems. References and the Index are included at the end of the book.

All topics are presented in a clear, lucid style and illustrated by examples taken from reality (e. g., East-West arm race, U.S. Federal voting system, Canadian Constitution and voting procedures, Cuban missile crisis, European Economic Community calculations, and others) which are consequently focused to political science. This orientation to the view of single discipline supports the general feeling of the unity of the text which is, objectively, divided into rather different and separable topics.

The reader of the referred book is not assumed to have high mathematical prerequisites (some elementary algebra, no calculus) or special education in social sciences. The author has evidently written his work as a specialized textbook for specific courses on mathematical applications in social and political sciences. It fully satisfies the demands following from this predestination. It is clearly written, well organized and respecting the pedagogic principles of explanation. The theoretical conclusions are discussed and illustrated by attractive examples. Anyhow, the students should not be the single readers of it. It gives a good and qualified overview of the main disciplines connecting exact and social sciences and in this sense it can be very useful for any mathematician or social scientist who is going to contribute to these connections.

The general trends in modern applied mathematics and information or control sciences show an increasing rate of non-traditional and non-technical applications. Those applications were motivated by a rapid development of mathematical methods, as well as of computers and computer science. On the other hand, they motivate the interest of mathematicians in the development of mathematical disciplines being able to model the complexity and vagueness of the social relations and political or macroeconomic processes. The referred book can open the way to non-traditional applications also for advanced mathematicians who become interested in it.

For all these reasons, the book can be recommended not only for university courses on politology but also for active researchers from both sides – mathematics and social sciences – looking for an introduction to the contract-points between their branches.

Milan Mareš