MULTIPLE CRITERIA DECISION MAKING

Edited by James L. Cochrane and Milan Zeleny

University of South Carolina Press Columbia, South Carolina, 1973

This volume is the direct result of a seminar on Multiple Criteria Decision Making held at the University of South Carolina on October 26—27, 1972.

There are few important problems of interest that can be approached by current methods of Decision Theory, Management Science and Operations Research without serious distortion. The ever-increasing complexity of their mathematical context does not shed more light on complex problems. New holes are not dug by digging old ones deeper.

Although the multiplicity of objectives in many areas of human decision making and judgement can be readily recognized and accepted, multiple goal behavior of men and organizations has traditionally been approximated by single, unchanging and technically manageable criteria. The traditional utility approach, suggesting that the alternative with the highest utility will be chosen, is not of much help under such conditions.

Mathematicians' concept of "optimality" is not quite sufficient. The "optimum optimorum" is being gradually replaced by fuzzy solution concepts such as compromise, arbitration, interaction, prominence, dominance, satisficing, negotiation and bargaining.

The important parte of the papers explored the relation between formalized decision-making techniques, utilizing computer and mathematical analysis and of human judgement, based on intuition, experience, and "professional insight". Rejuvenation of the role of human judgement, seams to be one of the main aspects of the literature on multiple criteria decision making but many participants seem to be skeptical about man's ability to choose among multiattributed alternatives-suggesting an interation.

The papers of this book are grouped into eight sections: I. Proloque: Morality, Psychology, and Multiple Objectives.

On analysis the problem: Is it moral to replace human judges by their models and thus ignore feelings, principles, and desires? Is it moral to accept possibly serious consequences (e.g., with regard to human health) of erroneous judgement if correct analyses by computerized models are possible?

II. Multiattributed utility, risk and uncertainty.

The fundamental principle of utility maximization is explored in relationship with multiple attributes. The discussions here are on a formal and abstract level while the problems of utility assessment and their applications.

III. Multiobjective optimization: utility and weights.

This deals with the multiple criteria problem more explicitly. It is formulated a new approach based on assignment of priorities to individual attributes. A concept of noncomparability is introduced. It is discussed one application of a concept of interactive programming and a decomposition of decision makers' weight space via multiparametric linear programming. An interesting concept of probabilities of optim is being introduced.

IV. Multiobjective optimization: the nondominated solution approach.

The approaches could be characterized by the common assumption that the utility function is too complex and too unstable for its direct assessment to be realistic. A set of nondominated solutions which contains a maximum of any implicit utility function is analyzed. The solution is then sought by successive and interactive reduction of the nondominated set.

V. Goal programming, finance, and capital budgeting.

The section groups the papers with applied areas of accounting, capital budgeting, and finance. Although goal programming is a traditional tool in these areas.

VI. Phisical, social, and market environments.

Problems with multiple objectives can be found in many practical areas of modern management.

VII. Objective, decisions, and their language.

It is discussed multiple criteria problems faced by practicing managers, and is presented the theory and practical implications of fuzzy sets on describing the complex decision problems.

VIII. Potential areas of applications.

The papers introduces a wide variety of technical apparatus relevant to multiple criteria analysis. For example, techniques of canonical analysis, Bayesian decision theory, heuristic programming, time-series analysis, regression analysis design, sampling, and others are generalized of adjusted in the direction of multiple dimensions.

Finally, a selected bibliography of works related to multiple criteria decision making is presented.

This volume represent a major addition to decision making literature.

(From editors' introduction).

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