

## Preface

The real world is characterized by deep *complexity*. May be a rather unremarkable observation, yet it has important implications on the manner policy problems are represented and decision-making is framed.

*Is contemporary democracy compatible with science in real-world policy-making?* This book gives answers in the affirmative. It also asserts that this congruence can have positive implications not only in terms of economic prosperity but also when dealing with the difficult sustainability policy problems of our millennium.

To address contemporary issues economic science will have to expand its empirical relevance by introducing more and more realistic assumptions to its models. One of the most interesting research orientations in recent times in the field of public economics is the explicit attempt to take account of political constraints, interest groups and collusion effects.

One of the main novelties of this book is its establishment of a clear relationship between social and public choice theories on one hand, and multiple criteria decision analysis on the other. The pioneering research developed by Arrow and Raynaud (1986) has shown that the relationships between multi-criteria decision theory and social choice are clear and relevant. The main directions of cross-fertilization between these research fields are twofold:

1. Multi-criteria decision theory can be an adequate framework for applied social (and public) choice.
2. Social choice can produce interesting theoretical results for ensuring the axiomatic consistency needed by multi-criterion aggregation conventions.

The first direction was not pursued at all by Arrow and Raynaud. These authors' explicit interest is in the so-called "*industrial outranking problem*", whose aim is to help decisions of business-people.

In empirical evaluations of public policies, multi-criteria decision theory is an adequate policy tool, since it allows us to take a wide range of assessment criteria into account (e.g. environmental impact, distributional equity, etc.), and not simply profit maximization, as a private economic agent would do. Thus the essential meaning of multi-criteria evaluation in a social context is simply *tolerance and democracy*. This is a very important feature when dealing with sustainability issues, since conflict among differing but equally legitimate values and interests is a

normal state of affairs in these kinds of complex policy problems. Given that in a sustainability context both market and government failures can occur, economic optimization cannot be the only evaluation criterion, nor can mythical, benevolent policy-makers offer any unilateral, optimal solution.

For these reasons the new concept of social multi-criteria evaluation (SMCE) is proposed here as a tool to integrate different scientific languages in a public choice framework, when “civil society” and ethical concerns about future generations have to be considered, along with policy imperatives and market conditions.

In sum, we can say that this book attempts to combine both public and social choice traditions with multi-criteria decision analysis in order to deal with sustainability paradoxes in a complex world with multiple dimensions, values and scales.

In the light of the previous observations, the book is organized into three main parts:

## **Part A**

### ***Methodological Foundations and Operational Consequences of Social Multi-Criteria Evaluation (SMCE)***

The main objective of this part is the proposal of the concept of “social multi-criteria evaluation” (SMCE) as a potentially useful framework for the application of public choice to the complex policy problems of our millennium, in which, as described by Funtowicz and Ravetz, “facts are uncertain, values in dispute, stakes high and decisions urgent”. The following main questions are dealt with:

1. Why “social” multi-criteria evaluation?
2. How should such an approach be developed?

The foundations of SMCE are based on concepts coming mainly from microeconomics, complex systems theory and philosophy, such as behavioural assumptions, cost–benefit analysis, reflexive complexity, post-normal science and incommensurability. Lessons from real-world case studies are also dealt with.

## **Part B**

### ***Consistency in Social Multi-Criteria Evaluation***

Mathematical algorithms have the important objective of guaranteeing consistency between the problem structuring and the ranking of feasible policy options. In Part B, desirable properties for formal procedures in SMCE are studied. The basic concepts of multi-criteria decision analysis and the most commonly used “multi-criteria

methods” are critically reviewed. Given that the discrete multi-criterion and the social choice problem have many characteristics in common, some results of social choice are used to improve the axiomatic consistency of multi-criterion mathematical procedures. The treatment of technical uncertainty of both stochastic and fuzzy nature is also dealt with in detail.

## **Part C**

### ***Mathematical Procedures to Search for Technical and Social Compromise Solutions***

A new mathematical aggregation convention explicitly designed for social multi-criteria evaluation problems is developed. This algorithm is combined with an eclectic procedure, based on concepts coming from land-use planning, fuzzy cluster analysis and social choice. The objective of this procedure is to illuminate distributional issues.

All properties respected by the two proposed procedures are clearly illustrated by means of their formal, descriptive and normative meanings. Musgrave’s distinction among negligibility assumptions, domain assumptions and heuristic assumptions is also used. Annex gives an empirical example of combining multi-criteria evaluation with sensitivity analysis.

Throughout the whole book various examples of real-world applications in fields such as publicly provided goods, land-use planning, water and renewable energy policies and composite indicators are discussed.



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