Social Choice and

Multicriterion

**Decision-Making** 

Kenneth J. Arrow Hervé Raynaud

# **Social Choice And Multicriterion Decision Making**

**Paul E Johnson** 

#### **Social Choice And Multicriterion Decision Making:**

Social Choice and Multicriterion Decision-making Kenneth Joseph Arrow, Hervé Raynaud, 1986-01 This study comes to grips with the industrial outranking problem one of the major outstanding problems of current operations research and managerial decision making The problem simply stated is this given a large but finite set of criteria and a large but finite number of alternatives how can the criteria be ranked in priority order and how should the alternatives be ranked from best to worst consistent with the ordering of criteria that may be conflicting or incommensurable. There have been many proposed solutions to the problem Numerous empirical recipes among them the majority method have been submitted based in large part on the subjective judgments and biases of various observers The authors argue that the axiomatic formulation offers the surest path to a solution that is as objective as possible minimally distorted by the unwitting imposition of personal values They then develop a system of consistent and appealing axioms confront the paradoxes that put axiomatic systems in general at risk and demonstrate the applicability of their system to realistic industrial outranking problems Even within the axiomatic framework however some leeway remains for subjective choice and conscious value decisions One ad hoc criterion of choice the authors selected was that their method should be neither so flexible and open that personal biases might easily slip in nor so artificially rigid that the play of intuition and creativity was systematically excluded The book also takes a hard look at the theoretical and practical defects of the majority method the favored proposed solution and at such associated issues as committee decision techniques strategic majority voting and restriction conditions Kenneth A Arrow who was awarded the Nobel Memorial Prize in Economics in 1972 is Joan Kenny Professor of Economics and Professor of Operations Research at Stanford University Herve Raynaud is Professor University of Grenoble France Social Multi-Criteria Evaluation for a Sustainable Economy Giuseppe Munda, 2007-12-22 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 ax matic consistency needed by multi criterion aggregation conventions Social Choice and Democratic Values Eerik Lagerspetz, 2015-11-26 This book offers a comprehensive overview and critique of the most important political and philosophical interpretations of the basic results of social choice assessing their plausibility and seeking to identify the links between the theory of social choice and the more traditional issues of political theory and philosophy In this regard the author eschews a strong methodological commitment or technical formalism the approach is instead based on the presentation of political facts and illustrated via numerous real life examples This allows the reader to get acquainted with the philosophical and political dispute surrounding voting and collective decision making and its links to social choice theory **Domain Conditions in Social Choice Theory** Wulf Gaertner, 2001-09-06 Wulf Gaertner provides a comprehensive account of an important and complex issue within social choice theory how to establish a social welfare function while restricting the spectrum of individual preferences in a sensible way Gaertner's starting point is K I Arrow's famous Impossibility Theorem which showed that no welfare function could exist if an unrestricted domain of preferences is to be satisfied together with some other appealing conditions A number of leading economists have tried to provide avenues out of this impossibility by restricting the variety of preferences here Gaertner provides a clear and detailed account using standardized mathematical notation of well over forty theorems associated with domain conditions Domain Conditions in Social Choice Theory will be an essential addition to the library of social choice theory for scholars and their advanced graduate students Democratic Planning and Social Choice Dilemmas Tore Sager, 2020-07-24 Using the economic approach of social choice theory this unique book examines difficulties found in democratic processes involved in the creation and implementation of planning policies Social choice theory focuses on the hard trade offs to be made between rationality in decision making on the one hand and political values such as democracy liberalism and freedom from manipulation on the other As an institution can be seen as a set of rules the focus on rules and procedures of collective choice makes social choice theory well suited for analysing important political aspects of planning institutions Special attention is given to communicative planning and the logical reasons why all the desirable properties of dialogue cannot be simultaneously attained The analysis provides original and significant new insights into the process and the institutions involved It highlights weak spots of present planning techniques and procedures and suggests further steps towards institutionally enriched planning theory Handbook of Social Choice and Welfare Amartya Sen, Kotaro Suzumura,2007 Social Choice Paul E Johnson, 1998-06-25 Social Choice is a comprehensive exploration of the key questions concepts terminology methods and results of social choice theory **Decision Making Process** Denis Bouyssou, Didier Dubois, Henri Prade, Marc Pirlot, 2013-05-10 This book provides an overview of the main methods and results in the formal study of the human decision making process as defined in a relatively wide sense A key aim of the approach contained here is to try to break down barriers between various disciplines encompassed by this field including psychology

economics and computer science All these approaches have contributed to progress in this very important and much studied topic in the past but none have proved sufficient so far to define a complete understanding of the highly complex processes and outcomes This book provides the reader with state of the art coverage of the field essentially forming a roadmap to the field of decision analysis. The first part of the book is devoted to basic concepts and techniques for representing and solving decision problems ranging from operational research to artificial intelligence Later chapters provide an extensive overview of the decision making process under conditions of risk and uncertainty Finally there are chapters covering various approaches to multi criteria decision making Each chapter is written by experts in the topic concerned and contains an extensive bibliography for further reading and reference Handbook of Computational Social Choice Felix Brandt, Vincent Conitzer, Ulle Endriss, Jérôme Lang, Ariel D. Procaccia, 2016-04-25 The rapidly growing field of computational social choice at the intersection of computer science and economics deals with the computational aspects of collective decision making This handbook written by thirty six prominent members of the computational social choice community covers the field comprehensively Chapters devoted to each of the field's major themes offer detailed introductions Topics include voting theory such as the computational complexity of winner determination and manipulation in elections fair allocation such as algorithms for dividing divisible and indivisible goods coalition formation such as matching and hedonic games and many more Graduate students researchers and professionals in computer science economics mathematics political science and philosophy will benefit from this accessible and self contained book Cycles and Social Choice Thomas Schwartz, 2018-03-22 The centuries old paradox of voting is that majorities sometimes prefer x to y y to z and z to x a cycle The discovery of the sources and consequences of such cycles under majority rule and countless other regimes constitutes much of the mathematical theory of voting and social choice This book explores the big questions posed by the paradox of voting positive questions about how to predict outcomes and explain observed stability and normative questions about how to hold elections how to take account of preference intensities the relevance of social welfare to social choice and challenges to formal rationality individual and social The overall lesson is that cycles are facts ubiquitous and consequential in non obvious ways not puzzles to be solved much less maladies or misfortunes to be avoided or regretted Tools for Making Acute Risk Decisions CCPS (Center for Chemical Process Safety), 2010-09-14 The complexity of today s risk decisions is well known Beyond cost and risk there are many other factors contributing to these decisions including type of risk such as human injury or fatality the economic impact on the local community profitability availability of capital alternatives for reducing or eliminating the risk costs of implementing alternatives codes standards regulation and good industry practice This book presents a large range of decision aids for risk analysts and decision makers in industry so that vital decisions can be made in a more consistent logical and rigorous manner Though primarily aimed at the process industry this book can be used by anyone who makes similar decisions in other industries including those in management science The Mathematics of

Preference, Choice and Order Steven Brams, William V. Gehrlein, Fred S. Roberts, 2009-02-11 Peter Fishburn has had a splendidly productive career that led to path breaking c tributions in a remarkable variety of areas of research His contributions have been published in a vast literature ranging through journals of social choice and welfare decision theory operations research economic theory political science mathema cal psychology and discrete mathematics This work was done both on an individual basis and with a very long list of coauthors The contributions that Fishburn made can roughly be divided into three major topical areas and contributions to each of these areas are identified by sections of this monograph Section 1 deals with topics that are included in the general areas of utility preference individual choice subjective probability and measurement t ory Section 2 covers social choice theory voting models and social welfare S tion 3 deals with more purely mathematical topics that are related to combinatorics graph theory and ordered sets The common theme of Fishburn s contributions to all of these areas is his ability to bring rigorous mathematical analysis to bear on a wide range of dif cult problems Multiple Criteria Decision Making and its Applications to Economic Problems Enrique Ballestero, Carlos Romero, 2013-03-14 Multiple Criteria Decision Making and its Applications to Economic Problems ties Multiple Criteria Decision Making MCDM Multiple Objective Optimization MO and economics together It describes how MCDM methods goal programming can be used in economics The volume consists of two parts Part One of the book introduces the MCDM approaches This first part comprising Chapters 1 5 is basically an overview of MCDM methods that can most likely be used to address a wide range of economic problems Readers looking for an in depth discussion of multi criteria analysis can grasp and become acquainted with the initial MCDM tools language and definitions Part Two which comprises Chapters 6 8 focuses on the theoretical core of the book Thus in Chapter 6 an economic meaning is given to several key concepts on MCDM such as ideal point distance function etc It illustrates how Compromise Programming CP can support the standard premise of utility optimisation in economics as well as how it is capable of approximating the standard utility optimum when the decision makers preferences are incompletely specified Chapter 7 deals entirely with production analysis The main characteristic throughout the Chapter refers to a standard joint production scenario analysed from the point of view of MCDM schemes Chapter 8 focuses on the utility specification problem in the n arguments space within a risk aversion context A link between Arrows risk aversion coefficient and CP utility permits this task The book is intended for postgraduate students and researchers in economics with an OR MS orientation or in OR MS with an economic orientation In short it attempts to fruitfully link economics and MCDM Multiple Criteria Decision Making Günter Fandel, Tomas Gal, 2012-12-06 The organizers of the 12th International Conference on Multiple Cri teria Decision Making MCDM held June 19 23 1995 in Hagen received the second time the opportunity to prepare an international conference on MCDM in Germany the first opportunity has been the 3rd International Conference on MCDM in Konigswinter 1979 Quite a time ellapsed since then and therefore it might be interesting to compare some indicators of the development of the International Society on MCDM which has been

founded in Konigswinter Stanley Zionts has been elected first president and all 44 participants of that Conference became founding members Today our Society has over 1200 members and its own Journal MCDM World Scan In Hagen 1996 we had 152 participants from 34 countries It is interesting to mention that also other Groups established their organi zation like the European Working Group on Multiple Criteria Decision Aid the German Working Group on Decision Theory and Applications the Multi Objective Programming and Goal Programming Group ESIGMA and some others It is also interesting to note that the intersection of members of all these Groups and Societies is not empty and there is quite a cooperation among them

Algorithmic Decision Making with Python Resources Raymond Bisdorff, 2022-03-29 This book describes Python3 programming resources for implementing decision aiding algorithms in the context of a bipolar valued outranking approach These computing resources made available under the name Digraph3 are useful in the field of Algorithmic Decision Theory and more specifically in outranking based Multiple Criteria Decision Aiding MCDA The first part of the book presents a set of tutorials introducing the Digraph3 collection of Python3 modules and its main objects such as bipolar valued digraphs and outranking digraphs In eight methodological chapters the second part illustrates multiple criteria evaluation models and decision algorithms These chapters are largely problem oriented and demonstrate how to edit a new multiple criteria performance tableau how to build a best choice recommendation how to compute the winner of an election and how to make rankings or ratings using incommensurable criteria The book s third part presents three real world decision case studies while the fourth part addresses more advanced topics such as computing ordinal correlations between bipolar valued outranking digraphs computing kernels in bipolar valued digraphs testing for confidence or stability of outranking statements when facing uncertain or solely ordinal criteria significance weights and tempering plurality tyranny effects in social choice problems The fifth and last part is more specifically focused on working with undirected graphs tree graphs and forests The closing chapter explores comparability split interval and permutation graphs The book is primarily intended for graduate students in management sciences computational statistics and operations research The chapters presenting algorithms for ranking multicriteria performance records will be of computational interest for designers of web recommender systems Similarly the relative and absolute quantile rating algorithms discussed and illustrated in several chapters will be of practical interest to public and private performance auditors The Theory of Committees and Elections by Duncan Black and Committee Decisions with Complementary Valuation by Duncan Black and R.A. Newing Iain S. McLean, Alistair McMillan, Burt L. Monroe, 2013-03-09 R H Coase Duncan Black was a close and dear friend A man of great simplicity un worldly modest diffident with no pretensions he was devoted to scholarship In his single minded search for the truth he is an example to us all Black's first degree at the University of Glasgow was in mathematics and physics Mathematics as taught at Glasgow seems to have been designed for engineers and did not excite him and he switched to economics which he found more congenial But it was not in a lecture in economics but in one on politics that he found his star One lecturer A K White

discussed the possibility of constructing a pure science of politics This question caught his imagination perhaps because of his earlier training in physics and it came to absorb his thoughts for the rest of his life But almost certainly nothing would have come of it were it not for his appointment to the newly formed Dundee School of Economics where the rest of the teaching staff came from the London School of Economics At Glasgow economics as in the time of Adam Smith was linked with moral philosophy At Dundee Black was introduced to the analytical x The Theory o Committees and Elections approach dominant at the London School of Economics This gave him the approach he used in his attempt to construct a pure science Wastewater Reuse - Risk Assessment, Decision-Making and Environmental Security Mohammed K. Zaidi, 2007-05-23 This North Atlantic Treaty Organization NATO Advanced Research Workshop ARW was devoted to Wastewater Reuse Risk Assessment Decision Making and Environmental Security held in Istanbul Turkey at the Hotel Villa Suites Taksim during October 12 16 2006 More than 100 scientists had requested to partipate but only 63 could attend the meeting representing 20 countries Azerbaijan Canada Czech Republic Egypt Greece Italy Israel Jordan Kyrgyzstan Lithuania Portugal Romania Spain The Netherlands Tunisia Turkey Turkmenistan Ukraine United States of America and Uzbekistan 48 papers and 10 posters were presented only 45 research papers were selected and put in this proceedings manual Other papers although they had good information could not be included due to poor data not related to the topic or failed to meet the deadline You may feel some difficulty in understanding some of the papers due to the fact that they were initially written in presenter's home language and then translated into English by nonscientific people who have very little knowledge or interest in putting correct scientific terms Financial support came from the NATO Program for Security through Science Public Diplomacy Division and sponsored by the Society of Risk Analysis SRA Twelve 12 individual participants contributed towards their travel and two 2 for their living expenses , Multiple Criteria Decision Analysis Salvatore Greco, Matthias Ehrgott, José Rui Figueira, 2016-02-18 In two volumes this new edition presents the state of the art in Multiple Criteria Decision Analysis MCDA Reflecting the explosive growth in the field seen during the last several years the editors not only present surveys of the foundations of MCDA but look as well at many new areas and new applications Individual chapter authors are among the most prestigious names in MCDA research and combined their chapters bring the field completely up to date Part I of the book considers the history and current state of MCDA with surveys that cover the early history of MCDA and an overview that discusses the pre theoretical assumptions of MCDA Part II then presents the foundations of MCDA with individual chapters that provide a very exhaustive review of preference modeling along with a chapter devoted to the axiomatic basis of the different models that multiple criteria preferences Part III looks at outranking methods with three chapters that consider the ELECTRE methods PROMETHEE methods and a look at the rich literature of other outranking methods Part IV on Multiattribute Utility and Value Theories MAUT presents chapters on the fundamentals of this approach the very well known UTA methods the Analytic Hierarchy Process AHP and its more recent extension the Analytic Network

Process ANP as well as a chapter on MACBETH Measuring Attractiveness by a Categorical Based Evaluation Technique Part V looks at Non Classical MCDA Approaches with chapters on risk and uncertainty in MCDA the decision rule approach to MCDA the fuzzy integral approach the verbal decision methods and a tentative assessment of the role of fuzzy sets in decision analysis Part VI on Multiobjective Optimization contains chapters on recent developments of vector and set optimization the state of the art in continuous multiobjective programming multiobjective combinatorial optimization fuzzy multicriteria optimization a review of the field of goal programming interactive methods for solving multiobjective optimization problems and relationships between MCDA and evolutionary multiobjective optimization EMO Part VII on Applications selects some of the most significant areas including contributions of MCDA in finance energy planning problems telecommunication network planning and design sustainable development and portfolio analysis Finally Part VIII on MCDM software presents well known MCDA software packages Decision Making and Action Jean-Charles Pomerol, 2012-12-27 Making a decision of any importance is never simple On the one hand specialists in decision theory do not come within the reach of most policy makers and secondly there are very few books on pragmatic decision that are not purely anecdotal In addition there is virtually no book that provides a link between decision making and action This book provides a bridge between the latest results in artificial intelligence neurobiology psychology and decision making for action What is the role of intuition or emotion What are the main psychological biases of which we must be wary How can we avoid being manipulated What is the proper use of planning How can we remain rational even if one is not an expert in probabilities Perhaps more importantly for managers how does one go from decision to action So many questions fundamental to the practice of decision making are addressed This book dissects all issues that arise almost daily for decision makers at least for major decisions Drawing on numerous examples this book answers in plain language and imagery all your questions The final chapter takes the form of a brief reminder everything you have to remember to be a good decision maker

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