Multicriteria Decision Model And Decision Springer

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Multi-Criteria Decision-Making Models for Website Evaluation

This work examines all the fuzzy multicriteria methods recently developed, such as fuzzy AHP, fuzzy TOPSIS, interactive fuzzy multiobjective stochastic linear programming, fuzzy multiobjective dynamic programming, grey fuzzy multiobjective optimization, fuzzy multiobjective geometric programming, and more. Each of the 22 chapters includes practical applications along with new developments/results. This book may be used as a textbook in graduate operations research, industrial engineering, and economics courses. It will also be an excellent resource, providing new suggestions and directions for further research, for computer programmers, mathematicians, and scientists in a variety of disciplines where multicriteria decision making is needed.

Big Data Analytics Using Multiple Criteria Decision-Making Models

The field of multiple criteria decision analysis (MCDA), also termed multiple criteria decision aid, or multiple criteria decision making (MCDM), has developed rapidly over the past quarter century and in the process a number of divergent schools of thought have emerged. This can make it difficult for a new entrant into the field to develop a comprehensive appreciation of the range of tools and approaches which are available to assist decision makers in dealing with the ever-present difficulties of seeking compromise or consensus between conflicting inter ests and goals, i.e. the "multiple criteria". The diversity of philosophies and models makes it equally difficult for potential users of MCDA, i.e. management scientists and/or decision makers facing problems involving conflicting goals, to gain a clear understanding of which methodologies are appropriate to their particular context. Our intention in writing this book has been to provide a compre hensive yet widely accessible overview of the main streams of thought within MCDA. We aim to provide readers with sufficient awareness of the underlying philosophies and theories, understanding of the practi cal details of the methods, and insight into practice to enable them to implement any of the approaches in an informed manner. As the title of the book indicates, our emphasis is on developing an integrated view of MCDA, which we perceive to incorporate both integration of differ ent schools of thought within MCDA, and integration of MCDA with broader management theory, science and practice.

Multicriteria Decision-Making Under Conditions of Uncertainty

With almost every business application process being linked with a web portal, the website has become an integral part of any organization. Satisfying the end user□s needs is one of the key principles of designing an effective website. Because there are different users for any given website, there are different criteria that users want. Thus, evaluating a website is a multi-criteria decision-making problem in which the decision maker□s opinion should be considered for ranking the website. Multi-Criteria Decision-Making Models for Website Evaluation is a critical scholarly resource that covers the strategies needed to evaluate the navigability and efficacy of websites as promotional platforms for their companies. Featuring a wide range of topics including linguistic modelling, e-services, and site quality, this book is ideal for managers, executives, website designers, graphic artists, specialists, consultants, educationalists, researchers, and students.

Strategic Approach in Multi-Criteria Decision Making

With contributions from some of the top academics and scientists in the field, Advanced Studies in Multi-Criteria Decision Making presents an updated view of the landscape of Decision Sciences, current research topics, the interaction with other sciences and fields, as well as the prospects and challenges at an international level. Given that Decision Sciences are recognized today as indispensable for confronting the major societal challenges in science and technology, this book would be of interest to decision-makers, managers, and researchers from academia, and industrial/services companies that would like a fresh insight into MCDM. Features Integrates a wide range of scientific fields with a general reader approach,

including applied researchers from the social, business, enterprise sciences Suitable for academics and professionals Presents a broad coverage of MCDM tools either in industry or in services companies and systems Provides a fresh overview on MCDM studies promoted by prestigious R&D institutions

Multicriteria Methodology for Decision Aiding

A guide to the various models and methods to multicriteria decision-making in conditions of uncertainty presented in a systematic approach Multicriteria Decision-Making under Conditions of Uncertainty presents approaches that help to answer the fundamental questions at the center of all decision-making problems: "What to do?" and "How to do it?" The book explores methods of representing and handling diverse manifestations of the uncertainty factor and a multicriteria nature of problems that can arise in system design, planning, operation, and control. The authors—noted experts on the topic—and their book covers essential questions, including notions and fundamental concepts of fuzzy sets, models and methods of multiobjective as well as multiattribute decision-making, the classical approach to dealing with uncertainty of information and its generalization for analyzing multicriteria problems in condition of uncertainty, and more. This comprehensive book contains information on "harmonious solutions" in multiobjective problem-solving (analyzing "i>X, F> models), construction and analysis of "i>X, R/i" models, results aimed at generating robust solutions in analyzing multicriteria problems under uncertainty, and more. In addition, the book includes illustrative examples of various applications, including real-world case studies related to the authors' various industrial projects. This important resource: Explains the design and processing aspect of fuzzy sets, including construction of membership functions, fuzzy numbers, fuzzy relations, aggregation operations, and fuzzy sets transformations Describes models of multiobjective decision-making ("i>X. M/i" models), their analysis on the basis of using the Bellman-Zadeh approach to decision-making in a fuzzy environment, and their diverse applications, including multicriteria allocation of resources Investigates models of multiattribute decision-making ("i>X, R/i" models) and their analysis on the basis of the construction and processing of fuzzy preference relations as well as demonstrating their applications to solve diverse classes of multiattribute problems Explores notions of payoff matrices and fuzzy-set-based generalization and modification of the classic approach to decision-making under conditions of uncertainty to generate robust solutions in analyzing multicriteria problems Written for students, researchers and practitioners in disciplines in which decision-making is of paramount relevance, Multicriteria Decision-Making under Conditions of Uncertainty presents a systematic and current approach that encompasses a range of models and methods as well as new applications.

Multi-Criteria Decision Analysis to Support Healthcare Decisions

Decision support systems have experienced a marked increase in attention and importance over the past 25 years. The aim

of this book is to survey the decision support system (DSS) field – covering both developed territory and emergent frontiers. It will give the reader a clear understanding of fundamental DSS concepts, methods, technologies, trends, and issues. It will serve as a basic reference work for DSS research, practice, and instruction. To achieve these goals, the book has been designed according to a ten-part structure, divided in two volumes with chapters authored by well-known, well-versed scholars and practitioners from the DSS community.

Multicriterion Decision in Management

Multiple Criteria Decision Making (MCDM) is all about making choices in the presence of multiple conflicting criteria. MCDM has become one of the most important and fastest growing subfields of Operations Research/Management Science. As modern MCDM started to emerge about 50 years ago, it is now a good time to take stock of developments. This book aims to present an informal, nontechnical history of MCDM, supplemented with many pictures. It covers the major developments in MCDM, from early history until now. It also covers fascinating discoveries by Nobel Laureates and other prominent scholars. The book begins with the early history of MCDM, which covers the roots of MCDM through the 1960s. It proceeds to give a decade-by-decade account of major developments in the field starting from the 1970s until now. Written in a simple and accessible manner, this book will be of interest to students, academics, and professionals in the field of decision sciences.

New Perspectives in Multiple Criteria Decision Making

This textbook presents methodologies and applications associated with multiple criteria decision analysis (MCDA), especially for those students with an interest in industrial engineering. With respect to methodology, the book covers (1) problem structuring methods; (2) methods for ranking multi-dimensional deterministic outcomes including multiattribute value theory, the analytic hierarchy process, the Technique for Order Preference by Similarity to Ideal Solution (TOPSIS), and outranking techniques; (3) goal programming,; (4) methods for describing preference structures over single and multi-dimensional probabilistic outcomes (e.g., utility functions); (5) decision trees and influence diagrams; (6) methods for determining input probability distributions for decision trees, influence diagrams, and general simulation models; and (7) the use of simulation modeling for decision analysis. This textbook also offers: · Easy to follow descriptions of how to apply a wide variety of MCDA techniques · Specific examples involving multiple objectives and/or uncertainty/risk of interest to industrial engineers · A section on outranking techniques ; this group of techniques, which is popular in Europe, is very rarely mentioned as a methodology for MCDA in the United States · A chapter on simulation as a useful tool for MCDA, including ranking & selection procedures. Such material is rarely covered in courses in decision analysis · Both material review questions and problems at the end of each chapter . Solutions to the exercises are found in the Solutions Manual

which will be provided along with PowerPoint slides for each chapter. The methodologies are demonstrated through the use of applications of interest to industrial engineers, including those involving product mix optimization, supplier selection, distribution center location and transportation planning, resource allocation and scheduling of a medical clinic, staffing of a call center, quality control, project management, production and inventory control,and so on. Specifically, industrial engineering problems are structured as classical problems in multiple criteria decision analysis, and the relevant methodologies are demonstrated.

Multiple Criteria Decision Making in Supply Chain Management

This volume is devoted to models and methods in multiple objectives decision making. The importance of the multiple dimensions of decision making was first recognised during the 1960s and since then progress has been made in that theoretical or application oriented contributions may now be categorized under two main headings:- Multiattribute Decision Making (MADM) which concerns the sorting, the ranking or the evaluation of objects of choice according to several criteria and Multiobjective Decision Making (MODM) which deals with the vector optimization in mathematical programming. The above are also presented in the context of various applications, namely banking, environment, health, manpower, media, portfolio and traffic control, resulting in a book for a wide variety of readers.

Multiple Criteria Decision Making

Multicriterion Decision in Management: Principles and Practice is the first multicriterion analysis book devoted exclusively to discrete multicriterion decision making. Typically, multicriterion analysis is used in two distinct frameworks: Firstly, there is multiple criteria linear programming, which is an extension of the results of linear programming and its associated algorithms. Secondly, there is discrete multicriterion decision making, which is concerned with choices among a finite number of possible alternatives such as projects, investments, decisions, etc. This is the focus of this book. The book concentrates on the basic principles in the domain of discrete multicriterion analysis, and examines each of these principles in terms of their properties and their implications. In multicriterion decision analysis, any optimum in the strict sense of the term does not exist. Rather, multicriterion decision making utilizes tools, methods, and thinking to examine several solutions, each having their advantages and disadvantages, depending on one's point of view. Actually, various methods exist for reaching a good choice in a multicriterion setting and even a complete ranking of the alternatives. The book describes and compares these methods, so-called `aggregation methods', with their advantages and their shortcomings. Clearly, organizations are becoming more complex, and it is becoming harder and harder to disregard complexity of points of view, motivations, and objectives. The day of the single objective (profit, social environment, etc.) is over and the wishes of all those involved in all their diversity must be taken into account. To do this, a basic knowledge of multicriterion decision

analysis is necessary. The objective of this book is to supply that knowledge and enable it to be applied. The book is intended for use by practitioners (managers, consultants), researchers, and students in engineering and business.

Multiple-Criteria Decision Making

This book introduces students on Multiple Criteria Decision Aiding and Making courses to practical, real-world cases. Each case study introduces a problem or situation together with a method, and a description and explanation of a computer application. In this sense each chapter is based on four pillars: the problem, the model building, the methods and their implementation. The book presents and elaborates a rich and comprehensive set of practical problems comprising multiple criteria, including numerous approaches for their solution, for decision support or decision aid. It complements traditional textbooks and lecture material by employing case studies to promote a deeper understanding of the investigated concepts and help students apply these methods to other areas.

Multi-Criteria Decision Analysis

This book presents a broad range of innovative applications and case studies in all areas of management and engineering, including public administration, finance, marketing, engineering, transportation, and energy systems. It addresses issues related to problem structuring, preference modeling, and model construction, presenting a framework that provides clear decision-making support in practice. In addition, it includes hybrid and integrated techniques combining multiple criteria decision making (MCDM) with other analytical methods. The book reflects the growing impact of MCDM in the field of management science and operations research. Building on recent and established theoretical advances and presenting their applications in specific domains, it offers a comprehensive resource for researchers, graduate students and professionals alike.

Multicriteria Decision Aid and Artificial Intelligence

Multiple Criteria Decision Making (MCDM) is a subfield of Operations Research, dealing with decision making problems. A decision-making problem is characterized by the need to choose one or a few among a number of alternatives. The field of MCDM assumes special importance in this era of Big Data and Business Analytics. In this volume, the focus will be on modelling-based tools for Business Analytics (BA), with exclusive focus on the sub-field of MCDM within the domain of operations research. The book will include an Introduction to Big Data and Business Analytics, and challenges and opportunities for developing MCDM models in the era of Big Data.

Multiple Criteria Decision Making and Aiding

From selecting sites for new hospitals, schools, and factories, to managing forests and rivers, to creating and maintaining highways and bridges, public and private organizations are often called on to make decisions on geographic questions that involve a multitude of alternatives and often conflicting evaluation criteria. This book presents a formal mechanism for dealing with these situations, capturing the information in a Geographic Information System and processing it to derive optimal recommendations for confronting these complex questions.

Multi-criteria Decision Analysis for Supporting the Selection of Engineering Materials in Product Design

This book focuses on two of the most important aspects of wind farm operation: decisions and control. The first part of the book deals with decision-making processes, and explains that hybrid wind farm operation is governed by a set of alternatives that the wind farm operator must choose from in order to achieve optimal delivery of wind power to the utility grid. This decision-making is accompanied by accurate forecasts of wind speed, which must be known beforehand. Errors in wind forecasting can be compensated for by pumping power from a reserve capacity to the grid using a battery energy storage system (BESS). Alternatives based on penalty cost are assessed using certain criteria, and MCDM methods are used to evaluate the best choice. Further, considering the randomness in the dynamic phenomenon in wind farms, a fuzzy MCDM approach is applied during the decision-making process to evaluate the best alternative for hybrid wind farm operation. Case studies from wind farms in the USA are presented, together with numerical solutions to the problem. In turn, the second part deals with the control aspect, and especially with yaw angle control, which facilitates power maximization at wind farms. A novel transfer function-based methodology is presented that controls the wake center of the upstream turbine(s); lidar-based numerical simulation is carried out for wind farm layouts; and an adaptive control strategy is implemented to achieve the desired yaw angle for upstream turbines. The proposed methodology is tested for two wind farm layouts. Wake management is also implemented for hybrid wind farms where BESS life enhancement is studied. The effect of yaw angle on the operational cost of BESS is assessed, and case studies for wind farm datasets from the USA and Denmark are discussed. Overall, the book provides a comprehensive guide to decision and control aspects for hybrid wind farms, which are particularly important from an industrial standpoint.

Multi-criteria Decision Making Methods

Decision-aid Philippe Vincke Universitï¿1⁄2 Libre de Bruxelles Over the past decade the discipline of multicriteria decision-aid has been extensively developed in the world of mathematics. As its name indicates, multicriteria decision-aid aims to give

decision-makers a tool which should enable them to advance in solving decision problems where several points of view must be taken into account. Written by one of the leading authorities in the field, this book provides a unique introduction to the foundations, models and methods of multicriteria decision-aid. Challenging the monocriteria decision-aid approach to problem solving, Vincke presents us with a unique book which deals with preference modelling, the multiple attribute utility theory, the outranking approach and interactive decision-making methods in the same text. Multicriteria Decision-aid is directed at graduates and postgraduates studying in the fields of management, operations research, decision analysis and all those who, in business and administration, wish to take part in decision-making through scientific reasoning.

Multicriteria and Multiobjective Models for Risk, Reliability and Maintenance Decision Analysis

This book intends to be a complimentary reference for graduate and undergraduate courses of Business and Engineering. Readers not familiar with Multi-Criteria Decision Making (MCDM) and supply chain management (SCM) may have a first glance, reading isolate chapters. Moreover, the sequential order from Chapters 1 to 8 may be more instructive. Readers with expertise on MCDM or SCM will find interesting applications or proposals. The book also presents a systematic literature review, which confirms the leadership of analytic hierarchy process (AHP) and data envelopment analysis (DEA).

Multiple-Criteria Decision-Making (MCDM) Techniques for Business Processes Information Management

This book provides comprehensive coverage of the latest research on multiple criteria research analysis (MCDA) and related areas, gathering a collection of high-quality chapters prepared by leading scholars in the field. By covering the established streams in MCDA research and simultaneously exploring new and emerging areas of application, it offers a unique reference resource for the future development of MCDA. The book approaches MCDA as one of the most active areas in operations research and management science (OR/MS). It presents not only the significant advances achieved to date, but also the new opportunities and challenges arising for both the theory and practice of MCDA. Among many others, the book addresses behavioral and conceptual aspects of decision aiding and decision making, problem structuring issues in the framework of new technological and socio-economic advances, methodological and algorithmic advances for analytical modeling and decision aiding, as well as a number of new application areas in engineering, business, and the social sciences.

Evaluation and Decision Models with Multiple Criteria

This book is an outgrowth of formal graduate courses in multiple-criteria decision making (MCDM) that the author has

taught at the University of Rochester, University of Texas at Austin, and University of Kansas since 1972. The purpose is, on one hand, to offer the reader an integral and systematic view of various concepts and techniques in MCDM at an "introductory" level, and, on the other hand, to provide a basic conception of the human decision mechanism, which may improve our ability to apply the techniques we have learned and may broaden our lIJ.ind for modeling human decision making. The book is written with a goal in mind that the reader should be able to assimilate and benefit from most of the concepts in the book if he has the mathematical maturity equivalent to a course in operations research or optimiz ation theory. Good training in linear and nonlinear programming is sufficient to digest, perhaps easily, most of the concepts in the book.

Multi-criteria Decision Analysis

Information management is a common paradigm in modern decision-making. A wide range of decision-making techniques have been proposed in the literature to model complex business and engineering processes. In this Special Issue, 16 selected and peer-reviewed original research articles contribute to business information management in various current real-world problems by proposing crisp or uncertain multiple-criteria decision-making (MCDM) models and techniques, mostly including multi-attribute decision-making (MADM) approaches, in addition to a single paper proposing an interactive multi-objective decision-making (MODM) approach. Particular attention is devoted to information aggregation operators—65% of papers dealt with this item. The topics of this Special Issue gained attention in Europe and Asia. A total of 48 authors from seven countries contributed to this Issue. The papers are mainly concentrated in three application areas: supplier selection and rational order allocation, the evaluation and selection of goods or facilities, and personnel selection/partner selection. A number of new approaches are proposed that are expected to attract great interest from the research community.

Multiple Criteria Decision Making Theory and Application

He consider a cone dominance problem: given a "preference" cone lP and a set n X ~ R of available, or feasible, alternatives, the problem is to identify the non dominated elements of X. The nonzero elements of lP are assumed to model the do- nance structure of the problem so that y s X dominates x s X if Y = x + P for some nonzero p S lP. Consequently, x S X is nondominated if, and only if, ({x} + lP) n X = {x} (1.1) He will also refer to nondominated points as efficient points (in X with respect to lP) and we will let EF(XJP) denote the set of such efficient points. This cone dominance problem draws its roots from two separate, but related, ori gins. The first of these is multi-attribute decision making in which the elements of the set X are endowed with various attributes, each to be maximized or minimized.

Trends in Multicriteria Decision Making

This book provides comprehensive coverage of the latest research on multiple criteria research analysis (MCDA) and related areas, gathering a collection of high-quality chapters prepared by leading scholars in the field. By covering the established streams in MCDA research and simultaneously exploring new and emerging areas of application, it offers a unique reference resource for the future development of MCDA. The book approaches MCDA as one of the most active areas in operations research and management science (OR/MS). It presents not only the significant advances achieved to date, but also the new opportunities and challenges arising for both the theory and practice of MCDA. Among many others, the book addresses behavioral and conceptual aspects of decision aiding and decision making, problem structuring issues in the framework of new technological and socio-economic advances, methodological and algorithmic advances for analytical modeling and decision aiding, as well as a number of new application areas in engineering, business, and the social sciences.

Handbook on Decision Support Systems 1

This collection of papers gives a broad overview of the state of the art in Multiple Criteria Decision Making (MCDM), in both theory and practice. Topical sections are ranging from preference modelling and methodological developments to a number of applications of MCDM thinking. Special sections are devoted to applications in natural resources and environmental management issues, to negotiation and group decision support, and to philosophical issues, particularly in the interface between systems thinking and MCDM. The book will be relevant not only to those working in the area of MCDM, but also to researchers and practitioners concerned with broader areas of management science, especially those concerned with decision support systems and negotiation support.

Evaluation and Decision Models with Multiple Criteria

axiomatic results should be at the heart of such a science. Through them, we should be able to enlighten and scientifically assist decision-making processes especially by: - making that wh ich is objective stand out more c1early from that which is less objective; - separating robust from fragile conc1usions; - dissipating certain forms of misunderstanding in communication; - avoiding the pitfall of illusory reasoning; - emphasizing, once they are understood, incontrovertible results. The difficulties I encountered at the begining of my career as an operations researcher, and later as a consultant, made me realize that there were some limitations on objectivity in decision-aiding. In my opinion, five major aspects must be taken into consideration: 1) The borderline (or frontier) between what is and what is not feasible is often fuzzy. Moreover, this borderline is frequently modified in light of what is found from the study itself. 2) In many real-world

problems, the "decision maker D" does not really exist as a person truly able to make adecision. Usually, several people (actors or stakeholders) take part in the decision process, and it is important not to confuse the one who ratifies adecision with the so-called decision maker in the decision ai ding process. This decision maker is in fact the person or the set of persons for whom or in the name of whom decision aiding effort is provided.

Multi-Criteria Methods and Techniques Applied to Supply Chain Management

This book provides a systematic way of how to make better decisions in water resources management. The applications of three weighting methods namely rating, ranking, and ratio are discussed in this book. Additionally, data mining on keywords is presented using three popular scholarly databases: Science Direct, Scopus, and SciVerse. Four abbreviated keywords (MCDM, MCDA, MCA, MADM) representing multi-criteria decision-making were used and these three databases were searched for different popular weighting methods for a period of 13 years (2000-2012). The book provides also a review of weighting methods applied in various multi-criteria decision-making (MCDM) methods and also presents survey results on priority ranking of watershed management criteria undertaken by 30 undergraduate and postgraduate students from the Faculty of Civil Engineering, Universiti Teknologi Malaysia.

Fuzzy Multi-Criteria Decision Making

Presents recent advances in both models and systems for intelligent decision making. Organisations often face complex decisions requiring the assessment of large amounts of data. In recent years Multicriteria Decision Aid (MCDA) and Artificial Intelligence (AI) techniques have been applied with considerable success to support decision making in a wide range of complex real-world problems. The integration of MCDA and AI provides new capabilities relating to the structuring of complex decision problems in static and distributed environments. These include the handling of massive data sets, the modelling of ill-structured information, the construction of advanced decision models, and the development of efficient computational optimization algorithms for problem solving. This book covers a rich set of topics, including intelligent decision support technologies, data mining models for decision making, evidential reasoning, evolutionary multiobjective optimization, fuzzy modelling, as well as applications in management and engineering. Multicriteria Decision Aid and Artificial Intelligence: Covers all of the recent advances in intelligent decision making. Includes a presentation of hybrid models and algorithms for preference modelling and optimisation problems. Provides illustrations of new intelligent technologies and architectures for decision making in static and distributed environments. Explores the general topics on preference modelling and learning, along with the coverage of the main techniques and methodologies and applications. Is written by experts in the field. This book provides an excellent reference tool for the increasing number of researchers and practitioners interested in the integration of MCDA and AI for the development of effective hybrid decision support

methodologies and systems. Academics and post-graduate students in the fields of operational research, artificial intelligence and management science or decision analysis will also find this book beneficial.

Multiple Criteria Decision Analysis

Supply chain management decisions are made under the conflicting criteria of maximizing profit and customer responsiveness while minimizing supply chain risk. Multiple Criteria Decision Making in Supply Chain Management provides a comprehensive overview of multi-criteria optimization models and methods that can be used in supply chain decision making. Presenting the contributions of internationally known authors, researchers, educators, and practitioners, this new book in the Operations Research Series provides readers with a single source guide to recent developments in this area. The focus of the book is on the design and operation of the supply chain system, which involves connecting many production and distribution systems, often across wide geographic distances, in such a way that the businesses involved can ultimately satisfy the consumer demand as efficiently as possible, resulting in maximum financial returns to those businesses connected to that supply chain system. The book includes several case studies on the design and operation of supply chain networks in manufacturing and healthcare.

GIS and Multicriteria Decision Analysis

Environmental management is often complicated and multidisciplinary and the issues that arise can be difficult to solve analytically. Often, decision makers take ad hoc approaches, which may result in the ignoring of important stakeholder opinions or decision criteria. Multi-criteria decision analysis (MCDA) provides a framework by which these types of decisions can be made but, despite being used effectively in many fields, it is not often used in environmental management. Given the novelty and inherent applicability of this decision making framework to the environmental field, there is a need for more teaching tools for MCDA. In particular, there is a need for a case study based approach to help readers navigate the many MCDA methods and decide how to apply them to a specific case. Through a collection of case studies, Multi-Criteria Decision Analysis: Environmental Applications and Case Studies gives readers the tools to apply cutting-edge MCDA methods to their own environmental projects. It offers an overview of the types of MCDA available and a conceptual framework of how it is applied, with the focus on its applicability for environmental science. Taking an in-depth look at the case of sediment management, the book introduces different steps of MCDA processes—from problem formulation and model development to criteria weighing and alternative scoring. The authors then explore the case using various MCDA methods, which allows readers to see clearly how the methodologies differ and gain a better understanding of the mechanistic operation of the analysis. A series of case studies in nanotechnology collectively demonstrate the application of MCDA in situations of high variability and uncertainty that require the integration of technical information and expert

judgment—an area where MCDA clearly shines. The authors describe multiple decisions—from risk classification to value of information analysis to the assessment of potential research and funding investments—that readers may face in dealing with emerging environmental threats. Demonstrating the broad applicability of MCDA methods for different types of cases, the book presents a series of case studies ranging from oyster restoration to oil spill response. In conjunction with these cases, the book also provides corresponding decision models that are implemented by the DECERNS software and allow users to examine the same case using multiple MCDA tools. The DECERNS software and models are available for download at www.crcpress.com. Intended both as a research and teaching tool, this book inspires creative thinking when applying MCDA to complicated environmental issues.

Multicriteria Decision Making

Multi-Criteria Decision Making (MCDM) has been one of the fastest growing problem areas in many disciplines. The central problem is how to evaluate a set of alternatives in terms of a number of criteria. Although this problem is very relevant in practice, there are few methods available and their quality is hard to determine. Thus, the question `Which is the best method for a given problem?' has become one of the most important and challenging ones. This is exactly what this book has as its focus and why it is important. The author extensively compares, both theoretically and empirically, real-life MCDM issues and makes the reader aware of quite a number of surprising `abnormalities' with some of these methods. What makes this book so valuable and different is that even though the analyses are rigorous, the results can be understood even by the non-specialist. Audience: Researchers, practitioners, and students; it can be used as a textbook for senior undergraduate or graduate courses in business and engineering.

Multiple Criteria Decision Making

At a practical level, mathematical programming under multiple objectives has emerged as a powerful tool to assist in the process of searching for decisions which best satisfy a multitude of conflicting objectives, and there are a number of distinct methodologies for multicriteria decision-making problems that exist. These methodologies can be categorized in a variety of ways, such as form of model (e.g. linear, non-linear, stochastic), characteristics of the decision space (e.g. finite or infinite), or solution process (e.g. prior specification of preferences or interactive). Scientists from a variety of disciplines (mathematics, economics and psychology) have contributed to the development of the field of Multicriteria Decision Making (MCDM) (or Multicriteria Decision Analysis (MCDA), Multiattribute Decision Making (MADM), Multiobjective Decision Making (MODM), etc.) over the past 30 years, helping to establish MCDM as an important part of management science. MCDM has become a central component of studies in management science, economics and industrial engineering in many universities worldwide. Multicriteria Decision Making: Advances in MCDM Models, Algorithms, Theory and Applications aims to bring

together `state-of-the-art' reviews and the most recent advances by leading experts on the fundamental theories, methodologies and applications of MCDM. This is aimed at graduate students and researchers in mathematics, economics, management and engineering, as well as at practicing management scientists who wish to better understand the principles of this new and fast developing field.

New Concepts and Trends of Hybrid Multiple Criteria Decision Making

Formal decision and evaluation models are so widespread that almost no one can pretend not to have used or suffered the consequences of one of them. This book is a guide aimed at helping the analyst to choose a model and use it consistently. A sound analysis of techniques is proposed and the presentation can be extended to most decision and evaluation models as a "decision aiding methodology".

New Perspectives in Multiple Criteria Decision Making

This book showcases a large variety of multiple criteria decision applications (MCDAs), presenting them in a coherent framework provided by the methodology chapters and the comments accompanying each case study. The chapters describing MCDAs invite the reader to experiment with MCDA methods and perhaps develop new variants using data from these case studies or other cases they encounter, equipping them with a broader perception of real-world problems and how to overcome them with the help of MCDAs.

Models and Methods in Multiple Criteria Decision Making

This book integrates multiple criteria concepts and methods for problems within the Risk, Reliability and Maintenance (RRM) context. The concepts and foundations related to RRM are considered for this integration with multicriteria approaches. In the book, a general framework for building decision models is presented and this is illustrated in various chapters by discussing many different decision models related to the RRM context. The scope of the book is related to ways of how to integrate Applied Probability and Decision Making. In Applied Probability, this mainly includes: decision analysis and reliability theory, amongst other topics closely related to risk analysis and maintenance. In Decision Making, it includes a broad range of topics in MCDM (Multi-Criteria Decision Making) and MCDA (Multi-Criteria Decision Aiding; also known as Multi-Criteria Decision Analysis). In addition to decision analysis, some of the topics related to Mathematical Programming area are briefly considered, such as multiobjective optimization, since methods related to these topics have been applied to the context of RRM. The book addresses an innovative treatment for the decision making in RRM, thereby improving the integration of fundamental concepts from the areas of both RRM and decision making. This is accomplished by presenting

an overview of the literature on decision making in RRM. Some pitfalls of decision models when applying them to RRM in practice are discussed and guidance on overcoming these drawbacks is offered. The procedure enables multicriteria models to be built for the RRM context, including guidance on choosing an appropriate multicriteria method for a particular problem faced in the RRM context. The book also includes many research advances in these topics. Most of the multicriteria decision models that are described are specific applications that have been influenced by this research and the advances in this field. Multicriteria and Multiobjective Models for Risk, Reliability and Maintenance Decision Analysis is implicitly structured in three parts, with 12 chapters. The first part deals with MCDM/A concepts methods and decision processes. The second part presents the main concepts and foundations of RRM. Finally the third part deals with specific decision problems in the RRM context approached with MCDM/A models.

Multiple Criteria Decision Analysis

This book examines multiple criteria decision making (MCDM) and presents the Sequential Interactive Modelling for Urban Systems (SIMUS) as a method to be used for strategic decision making. It emphasizes the necessity to take into account aspects related to real world scenarios and incorporating possible real life aspects for modelling. The book also highlights the use of sensitivity analysis and presents a method for using criteria marginal values instead of weights, which permits the drawing of curves that depicts the variations of the objective function due to variations of these marginal values. In this way it also gives quantitative values of the objective function allowing stakeholders to perform a comprehensive risk analysis for a solution when it is affected by exogenous variables. Strategic Approach in Multi-Criteria Decision Making: A Practical Guide for Complex Scenarios is divided into three parts. Part 1 is devoted to exploring the history and development of the discipline and the way it is currently used. It highlights drawbacks and problems that scholars have identified in different MCDM methods and techniques. Part 2 addresses best practices to assure quality MCDM process. Part 3 introduces the concept of Linear Programming and the proposed SIMUS method as techniques to deal with MCDM. It also includes case studies in order to help document and illustrate difficult concepts, especially related to demands from a scenario and also in their modelling. The decision making process can be a complex task, especially with multi-criteria problems. With large amounts of information, it can be an extremely difficult to make a rational decision, due to the number of intervening variables, their interrelationships, potential solutions that might exist, diverse objectives envisioned for a project, etc. The SIMUS method has been designed to offer a strategy to help organize, classify, and evaluate this information effectively.

Advanced Studies in Multi-Criteria Decision Making

This book presents an introduction to MCDA followed by more detailed chapters about each of the leading methods used in

this field. Comparison of methods and software is also featured to enable readers to choose the most appropriate method needed in their research. Worked examples as well as the software featured in the book are available on an accompanying website.

Multicriteria Decision-Aid

This book describes the growing field of multi-criteria decision making (MCDM) as applied to materials selection in product design. Useful in academic and research contexts, as well as to practitioners in materials engineering and design, it aids readers in producing successful designs by improving the decision-making process in materials selection. It is a constant challenge for designers, even when educated in the fundamentals of materials and mechanical engineering, to select the best materials to satisfy complex design problems. Current approaches to materials selection range from the use of intuition and experience to computer-based methods including electronic databases and search engines. Increasingly, MCDM methods are proving effective in materials selection for complex design problems. These methods supplement existing quantitative methods, such as selection charts, by allowing simultaneous consideration of design attributes, component configurations and types of material. Discusses the rationale for optimal materials selection in the context of achieving the best engineering design Describes methodologies for supporting enhanced decision-making in materials selection Includes end-of-chapter review questions and practical case studies from biomedical and aerospace engineering applications

Multiple Criteria Decision Analysis for Industrial Engineering

The field of multiple criteria decision analysis (MCDA) - also sometimes termed multiple criteria decision aid, or multiple criteria decision making (MCDM) - has developed rapidly over the past quarter century and in the process a number of divergent schools of thought have emerged. Multiple Criteria Decision Analysis: An Integrated Approach provides a comprehensive yet widely accessible overview of the main streams of thought within MCDA. Two principal aims are: To provide sufficient awareness of the underlying philosophies and theories, understanding of the practical detail of the methods, and insight into practice to enable researchers, students and industry practitioners to implement MCDA methods in an informed manner; To develop an integrated view of MCDA, incorporating both integration of different schools of thought within MCDA and integration of MCDA with broader management theory, science and practice, thereby informing the development of theory and practice across these areas. It is felt that this two-fold emphasis gives a book which will be of value to the following three groups: Practicing decision analysts or graduate students in MCDA for whom this book should serve as a state-of-the-art review, especially as regards techniques outside of their own specialization; Operational researchers or graduate students in OR/MS who wish to extend their knowledge into the tools of MCDA; Managers or

management students who need to understand what MCDA can offer them.

Decision and Control in Hybrid Wind Farms

Representing the first collection on the topic, this book builds from foundations to case studies, to future prospects, providing the reader with a rich and comprehensive understanding of the use of multi-criteria decision analysis (MCDA) in healthcare. The first section of the collection presents the foundations of MCDA as it is applied to healthcare decisions, providing guidance on the ethical and theoretical underpinnings of MCDA and how to select MCDA methods appropriate to different decision settings. Section two comprises a collection of case studies spanning the decision continuum, including portfolio development, benefit–risk assessment, health technology assessment, priority setting, resource optimisation, clinical practice and shared decision making. Section three explores future directions in the application of MCDA to healthcare and identifies opportunities for further research to support these.

Weighting Methods and their Effects on Multi-Criteria Decision Making Model Outcomes in Water Resources Management

When people or computers need to make a decision, typically multiple conflicting criteria need to be evaluated; for example, when we buy a car, we need to consider safety, cost and comfort. Multiple criteria decision making (MCDM) has been researched for decades. Now as the rising trend of big-data analytics in supporting decision making, MCDM can be more powerful when combined with state-of-the-art analytics and machine learning. In this book, the authors introduce a new framework of MCDM, which can lead to more accurate decision making. Several real-world cases will be included to illustrate the new hybrid approaches.

Fuzzy Multicriteria Decision-Making

Fuzzy Multicriteria Decision-Making: Models, Algorithms and Applications addresses theoretical and practical gaps in considering uncertainty and multicriteria factors encountered in the design, planning, and control of complex systems. Including all prerequisite knowledge and augmenting some parts with a step-by-step explanation of more advanced concepts, the authors provide a systematic and comprehensive presentation of the concepts, design methodology, and detailed algorithms. These are supported by many numeric illustrations and a number of application scenarios to motivate the reader and make some abstract concepts more tangible. Fuzzy Multicriteria Decision-Making: Models, Algorithms and Applications will appeal to a wide audience of researchers and practitioners in disciplines where decision-making is paramount, including various branches of engineering, operations research, economics and management; it will also be of

interest to graduate students and senior undergraduate students in courses such as decision making, management, risk management, operations research, numerical methods, and knowledge-based systems.

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