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Energy Systems Evaluation Applications of Multi-Criteria Decision-Making Theories in Healthcare and Biomedical Engineering Social Multi-Criteria Evaluation for a Sustainable Economy Multi-criteria Decision Making Methods **Multiple Criteria Decision Analysis for Industrial Engineering** *Readings in Multiple Criteria Decision Aid Multi-criteria Decision Analysis* **Spatial Multicriteria Decision Making and Analysis** *Type-2 Fuzzy Decision-Making Theories, Methodologies and Applications* **Weighting Methods and their Effects on Multi-Criteria Decision Making Model Outcomes in Water Resources Management** *Multi-criteria Decision Analysis for Supporting the Selection of Engineering Materials in Product Design* **Multi-Criteria Decision Making Weighting Methods and their Effects on Multi-Criteria Decision Making Model Outcomes in Water Resources Management** **A Type-2 Fuzzy Logic Approach for Multi-criteria Group Decision Making** *Multi-Criteria Decision Analysis VIKOR method for multiple criteria group decision making under 2-tuple linguistic neutrosophic environment* **Multi-Criteria Decision Modelling Guidelines for Applying Multi-criteria Analysis to the Assessment of Criteria and Indicators** **Spatial Multicriteria Decision Making and Analysis** **Multi-criteria Decision Making for Smart Grid Design and Operation** **Multi-Criteria Decision-Making Sorting Methods** **Multi-criteria Analysis in Legal Reasoning** *Multi-Criteria Decision-Making Techniques for Improvement Sustainability Engineering Processes* **Multi-Criteria Decision Models in Software Reliability** **Advanced Studies in Multi-Criteria Decision Making** **Material Selections by a Hybrid Multi-Criteria Approach** *Multi-*

Criteria Decision Analysis Fine–Kinney-Based Fuzzy Multi-criteria Occupational Risk Assessment **Modeling synergies in multi-criteria supplier selection and order allocation: An application to commodity trading** *Multi-criteria Decision-making Approach based on Multi-valued Neutrosophic Geometric Weighted Choquet Integral Heronian Mean Operator* **Multi Criteria Analysis in the Renewable Energy Industry** *Multi-Criteria Decision Making in Maritime Studies and Logistics A New Hesitant Fuzzy Linguistic TOPSIS Method for Group Multi-Criteria Linguistic Decision Making Big Data Analytics Using Multiple Criteria Decision-Making Models* MULTI-CRITERIA DECISION MAKING METHOD BASED ON SIMILARITY MEASURES UNDER SINGLE VALUED NEUTROSOPHIC REFINED AND INTERVAL NEUTROSOPHIC REFINED ENVIRONMENTS **Advanced Studies in Multi-Criteria Decision Making Multi-criteria Decision Analysis** *Multiple Criteria Decision Making for Sustainable Development* **Lead Management in NSW: an Application of Multi-criteria Analysis. Book 2: Data Sets** *Multi-criteria Decision Making Methods with Bipolar Fuzzy Sets*

Providing an accessible introduction to the application of multi-criteria analysis in law, this book illustrates how simple additive weighing, a well known method in decision theory, can be used in problem structuring, analysis and decision support for overall assessments and balancing of interests in the context of law. 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. One of the main novelties of this book is its establishment of a clear relationship between social and public choice on one hand and multiple criteria decision analysis on the other. This relationship leads to the new concept of Social Multi-Criteria Evaluation (SMCE). SMCE is proposed as a policy framework to integrate different scientific languages, for example, when concerns about civil society and future generations have to be considered along with policy imperatives and market conditions. In this article, the

VIKOR method is proposed to solve the multiple criteria group decision making (MCGDM) with 2-tuple linguistic neutrosophic numbers (2TLNNs). Firstly, the fundamental concepts, operation formulas and distance calculating method of 2TLNNs are introduced. Then some aggregation operators of 2TLNNs are reviewed. Multi-criteria Decision Analysis for Supporting the Selection of Engineering Materials in Product Design, Second Edition, provides readers with tactics they can use to optimally select materials to satisfy complex design problems when they are faced with the vast range of materials available. Current approaches to materials selection range from the use of intuition and experience, to more formalized computer-based methods, such as electronic databases with search engines to facilitate the materials selection process. Recently, multi-criteria decision-making (MCDM) methods have been applied to materials selection, demonstrating significant capability for tackling complex design problems. This book describes the rapidly growing field of MCDM and its application to materials selection. It aids readers in producing successful designs by improving the decision-making process. This new edition updates and expands previous key topics, including new chapters on materials selection in the context of design problem-solving and multiple objective decision-making, also presenting a significant amount of additional case studies that will aid in the learning process. Describes the advantages of Quality Function Deployment (QFD) in the materials selection process through different case studies Presents a methodology for multi-objective material design optimization that employs Design of Experiments coupled with Finite Element Analysis Supplements existing quantitative methods of materials selection by allowing simultaneous consideration of design attributes, component configurations, and types of material Provides a case study for simultaneous materials selection and geometrical optimization processes 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 Hesitant fuzzy linguistic decision making is a focus point in linguistic decision making, in which the main method is based on preference ordering. Multi-valued neutrosophic sets (MVNSs) have recently become a subject of great interest for researchers, and have been applied widely to multi-criteria decision-making (MCDM) problems. This book presents a rich collection of studies on the analysis of sustainable development from a multiple criteria decision-making (MCDM) perspective, written by some of the most prominent authors in the field of MCDM/A. The book constitutes a unique international reference guide to the analysis, measurement, and management of sustainability in a multidimensional decision analysis context. Chiefly intended for academics and policymakers, it reflects some of the latest methodological advances in decision-making, which are illustrated in real-life applications to sustainability-related topics in both the private and public sector. In this paper, we propose three similarity measure methods for single valued neutrosophic re?ned sets and interval neutrosophic re?ned sets based on Jaccard, Dice and Cosine similarity measures of single valued neutrosophic sets and interval neutrosophic sets. 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. 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. p="" The book covers the domain of multi-criteria decision making, a topic which has gained significant attention of researchers and practitioners spanning a variety of disciplines for enhancing their decision making in real life situation. The topics in this volume help readers understand the techniques in the model building and analysis stage. The chapters cover a variety of techniques and their applications for interesting problems. This book will be of interest to readers in diverse disciplines such as engineering, business, management, humanities, psychology and law. ^ This book presents a number of approaches to Fine–Kinney–based multi-criteria occupational risk-assessment. For each proposed approach, it provides case studies demonstrating their applicability, as well as Python coding, which will enable readers to implement them into their own risk assessment process. The book begins by giving a review of Fine–Kinney occupational risk-assessment methods and their extension by fuzzy sets. It then progresses in a logical fashion, dedicating a chapter to each approach, including the fuzzy best and worst method, interval-valued Pythagorean fuzzy VIKOR and interval type-2 fuzzy QUALIFLEX. This

book will be of interest to professionals and researchers working in the field of occupational risk management, as well as postgraduate and undergraduate students studying applications of fuzzy systems. This book presents various multi-criteria analysis methods for sustainability-oriented analysis and decision-making for energy systems, under various different conditions and scenarios. It presents methodologies to answer the questions relating to which of the options are the most sustainable among the alternatives, and how multi-criteria decision analysis methods can be used to select the most sustainable energy systems. A systematic innovative methodological framework is presented, which enables the most appropriate energy system to be selected under different conditions including: Scientific decision support tools for sustainable energy system selection; Fuzzy, grey, and rough sets based multi-criteria decision analysis; Decision-making models under uncertainties; and The combination of life cycle thinking and multi-criteria decision analysis This book is of interest to researchers, engineers, decision makers, and postgraduate students within the field of energy systems, sustainability, and multi-criteria decision analysis. Decision analysis has become widely recognized as an important process for translating science into management actions. With climate change and other systemic threats as driving forces in creating environmental and engineering problems, there is a great need for understanding decision making frameworks through a case-study based approach. Management of environmental and engineering projects is often complicated and multidisciplinary in scope and nature, thus issues that arise can be difficult to solve analytically. Multi-Criteria Decision Analysis: Case Studies in Engineering and the Environment provides detailed description of MCDA methods and tools and illustrates their applications through case studies focused on sustainability and system engineering applications. New in the Second Edition: Addresses current and emerging environmental and engineering problems Includes seven new case studies to illustrate different management situations applicable at the international level Builds on real case studies from recent and relevant environmental and engineering management experience Describes advanced MCDA techniques and extensions used by practitioners Provides corresponding decision models

implemented using the DECERNS software package Gives a more holistic approach to teaching MCDA methodology with a focus on sustainable solutions and adoption of new technologies, including nanotechnology and synthetic biology Given the novelty and inherent applicability of this decision-making framework to the environmental and engineering fields, a greater number of teaching tools for this topic need to be made available. This book provides those teaching tools, covering the breadth of the applications of MCDA methodologies with clear explanations of the MCDA process. The case studies are implemented in the DECERNS software package, allowing readers to experiment and explore and to understand the full process by which environmental managers assess these problems. This book is a great resource for professionals and students seeking to learn decision analysis techniques and apply similar frameworks to environmental and engineering projects This book provides insights into contemporary issues and challenges in multi-criteria decision models. It is a useful guide for identifying, understanding and categorising multi-criteria decision models, and ultimately implementing the analysis for effective decision-making. The use of multi-criteria decision models in software reliability engineering is a relatively new field of study, and this book collects all the latest methodologies, tools and techniques in one single volume. It covers model selection, assessment, resource allocation, release management, up-grade planning, open-source systems, bug tracking system management and defect prediction. Multi-Criteria Decision Models in Software Reliability: Methods and Applications will cater to researchers, academicians, post-graduate students, software developers, software reliability engineers and IT managers. 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. We propose a novel meta-approach to support collaborative multi-objective supplier selection and order allocation (SSOA) decisions by integrating multi-criteria decision analysis and linear programming (LP). This monograph discusses the theoretical and practical development of multicriteria decision making (MCDM). The main purpose of MCDM is the construction of systematized strategies for the "optimisation" of feasible options, as well as the justification of why some alternatives can be declared "optimal". However, at time, we must make decisions in an uncertain environment and such inconvenience gives rise to a much more elaborate scenario. This book highlights models where this lack of certainty can be flexibly fitted in and goes on to explore valuable strategies for making decisions under a multiplicity of criteria. Methods discussed include bipolar fuzzy TOPSIS method, bipolar fuzzy ELECTRE-I method, bipolar fuzzy ELECTRE-II method, bipolar fuzzy VIKOR method, bipolar fuzzy PROMETHEE method, and two-tuple linguistic bipolar fuzzy Heronian mean operators. This book is a valuable resource for researchers, computer scientists, and social scientists alike. This book integrates the type-2 fuzzy sets and multiple criteria decision making analysis in recent years and offers an authoritative treatise on the essential topics, both at the theoretical and applied end. In this book, some basic theory, type-2 fuzzy sets, methodology, algorithms, are introduced and then some compelling case studies in decision problems are covered in depth. The authors offer an authoritative treatise on the essential topics, both at the theoretical and applied end; In a systematic and logically organized way, the book exposes the reader to the essentials of the theory of type-2 fuzzy sets, methodology, algorithms, and their applications. Numerous techniques of decision making are carefully generalized by bringing the ideas of type-2 fuzzy sets; this concerns well-known methods including TOPSIS, Analytical Network Process, TODIM, and VIKOR. This book exposes the readers to the essentials of the theory of type-2 fuzzy sets, methodology, algorithms, and their applications. This book

examines Multi-Criteria Decision Modelling (MCDM) methodologies and facilitates diverse ways for strategic decision-making in a variety of practical applications. This book also provides a pragmatic foundation for solving real-life problems in different scenarios of emerging global markets. Multi-Criteria Decision Modelling: Application Techniques and Case Studies depicts the use of sensitivity analysis and modelling and includes case studies to understand and illustrate challenging concepts. It also offers step-by-step comprehensive methodologies for the utilization of MCDM to a variety of situations. The book deliberates ways for companies to use these methods to their advantage in order to achieve sustainability. Furthermore, it also presents an overview of the major streams of thought and provides a holistic view of the latest research and development trends in modelling and optimization. FEATURES Offers a stepwise comprehensive methodology for the application of MCDM to a variety of situations Presents an overview of the major streams of thought present in the MCDM technique Provides a holistic view of the latest research and development trends in the emerging markets in terms of modelling and optimization using MCDM for different industrial sectors Illuminates a practical foundation in order to provide a guide to address the problems of emerging markets Enlightens the ways for companies to use these methods to their advantage to be able to achieve sustainability This book is a guide for those performing decision analysis for academic purposes as well as for researchers aspiring to expand their knowledge on MCDM problem solving. First published in 1999, this volume consists of selected papers presented at the North American Meetings of the RSAI along with invited contributions from scholars active in the field of spatial multicriteria decision making and analysis. It is meant to present diverse lines of research in spatial multicriteria decision making and analysis under the multidisciplinary umbrella of Geographic Information Science. The first part explores selected theoretical and conceptual aspects of spatial multicriteria decision making and analysis not confined to any specific application domain. Part 2 consists of six chapters focusing on various forms of location decision and analysis problems. Finally, part 3 contains five chapters on various spatial decision problems whose systemic scope sets them apart from locational decision problems.

First published in 1999, this volume consists of selected papers presented at the North American Meetings of the RSAI along with invited contributions from scholars active in the field of spatial multicriteria decision making and analysis. It is meant to present diverse lines of research in spatial multicriteria decision making and analysis under the multidisciplinary umbrella of Geographic Information Science. The first part explores selected theoretical and conceptual aspects of spatial multicriteria decision making and analysis not confined to any specific application domain. Part 2 consists of six chapters focusing on various forms of location decision and analysis problems. Finally, part 3 contains five chapters on various spatial decision problems whose systemic scope sets them apart from locational decision problems. Applications of Multi-Criteria Decision-Making Theories in Healthcare and Biomedical Engineering contains several practical applications on how decision-making theory could be used in solving problems relating to the selection of best alternatives. The book focuses on assisting decision-makers (government, organizations, companies, general public, etc.) in making the best and most appropriate decision when confronted with multiple alternatives. The purpose of the analytical MCDM techniques is to support decision makers under uncertainty and conflicting criteria while making logical decisions. The knowledge of the alternatives of the real-life problems, properties of their parameters, and the priority given to the parameters have a great effect on consequences in decision-making. In this book, the application of MCDM has been provided for the real-life problems in health and biomedical engineering issues. Provides a comprehensive analysis and application multi-criteria decision-making methods Presents detail information about MCDM and their usage Covers state-of-the-art MCDM methods and offers applications of MCDM for health and biomedical engineering purposes The book is dedicated to the implementation of different multi-criteria decision-making techniques for various problems concerning planning and operation of the smart grid from the Society 5.0 perspective. It consists of a practical explanation of several multi-criteria approaches and examples of their application to real problems. In this book, the choice of the optimal smart grid strategy in planning and operation is made. Various areas

of smart grid problems are analyzed, from the smart grid project efficiency assessment to the electric vehicle charging schedule optimization. The comparison of alternatives is made using different techniques taking into account the presence of multiple criteria of both qualitative and quantitative nature, different performance indicators, and the uncertain environment of the smart grid. The book outlines in clear terms how the electricity grid can be modernized in such a way that it monitors, protects, and automatically optimizes the operation of its interconnected elements, taking into account different stakeholders and criteria and society in general. The book covers various smart grid aspects—from the distributed generator through the medium-voltage network and distribution system, to energy storage installations and to end-use consumers and their thermostats, electric vehicles, appliances, and other household devices. The book serves as a practical guide for researchers, energy and utility professionals, power system planners, regulators, policymakers, and others in the field. The success of any activity and process depends fundamentally on the possibility of balancing (symmetry) needs and their satisfaction. That is, the ability to properly define a set of success indicators. The application of the developed new multi-criteria decision-making (MCDM) methods can be eliminated or decreased by decision-makers' subjectivity, which leads to consistency or symmetry in the weight values of the criteria. In this Special Issue, 40 research papers and one review study co-authored by 137 researchers from 23 different countries explore aspects of multi-criteria modeling and optimization in crisp or uncertain environments. The papers propose new approaches and elaborate case studies in the following areas of application: MCDM optimization in sustainable engineering, environmental sustainability in engineering processes, sustainable multi-criteria production and logistics processes planning, integrated approaches for modeling processes in engineering, new trends in the multi-criteria evaluation of sustainable processes, and multi-criteria decision-making in strategic management based on sustainable criteria. Decision makers in the Renewable Energy sector face an increasingly complex social, economic, technological, and environmental scenario in their decision process. Different groups of decision-makers become involved in the process, each group bringing along different criteria

therefore, policy formulation for fossil fuel substitution by Renewable Energies must be addressed in a multi-criteria context. Multi Criteria Analysis in the Renewable Energy Industry is a direct response to the increasing interest in the Renewable Energy industry which can be seen as an important remedy to many environmental problems that the world faces today. The multiplicity of criteria and the increasingly complex social, economic, technological, and environmental scenario makes multi-criteria analysis a valuable tool in the decision-making process for fossil fuel substitution. The detailed chapters explore the use of the Multi-criteria decision-making methods and how they provide valuable assistance in reaching equitable and acceptable solutions in the selection of renewable energy projects. Common multi-criteria decision-making methods including Analytical Hierarchy Process, PROMETHEE, ELECTRE, TOPSIS and VIKOR are explored in detail with an application case of each method included at the end of each chapter. As such, Multi Criteria Analysis in the Renewable Energy Industry is an ideal resource for those groups of individuals, institutions and administration such as local authorities, academic institutions, environmental groups, and governments that, through their priorities and evaluation systems, have interests at stake and directly or indirectly influence the decision-making process. This book describes a wide range real-case applications of Multi-Criteria Decision Making (MCDM) in maritime related subjects including shipping, port, maritime logistics, cruise ports, waterfront developments, and shipping finance, etc. In such areas, researchers, students and industrialists, in general, felt struggling to find a step-by-step guide on how to apply MCDM to formulate effective solutions to solving real problems in practice. This book focuses on the in-depth analysis and applications of the most well-known MCDM methodologies in the aforementioned areas. It brings together an eclectic collection of twelve chapters which seek to respond to these challenges. The book begins with an introduction and is followed by an overview of major MCDM techniques. The next chapter examines the theory of analytic hierarchy process (AHP) in detail and investigates a fuzzy AHP (FAHP) approach and its capability and rationale in dealing with decision problems of ambiguous information. Chapter 4 proposes a generic methodology to identify the key factors influencing green

shipping and to establish an evaluation system for the assessment of shipping greenness. In Chapter 5, the authors describe a new function of fuzzy Evidential Reasoning (ER) to improve the vessel selection process in which multiple criteria with insufficient and ambiguous information are evaluated and synthesized. Chapter 6 presents a novel methodology by using an Artificial Potential Field (APF) model and the ER approach to estimate the collision probabilities of monitoring targets for coastal radar surveillance. Chapter 7 develops the inland port performance assessment model (IPPAM) using a hybrid of AHP, ER and a utility function. The next chapter showcases a challenging approach to address the risk and uncertainty in LNG transfer operations, by utilizing a Stochastic Utility Additives (UTA) method with the help of the philosophy of aggregation–disaggregation coupled with a robustness control procedure. Chapter 9 uses Entropy and Grey Relation Analysis (GRA) to analyze the relative weights of financial ratios through the case studies of the four major shipping companies in Korea and Taiwan: Evergreen, Yang Ming, Hanjin and Hyundai Merchant Marine. Chapter 10 systemically applies modern heuristics to solving MCDM problems in the fields of operation optimisation in container terminals. Arguing that bunkering port selection is typically a multi-criteria group decision problem, and in many practical situations, decision makers cannot form proper judgments using incomplete and uncertain information in an environment with exact and crisp values, in Chapter 11, the authors propose a hybrid Fuzzy-Delphi-TOPSIS based methodology with a sensitivity analysis. Finally, Chapter 12 deals with a new conceptual port performance indicators (PPIs) interdependency model using a hybrid approach of a fuzzy logic based evidential reasoning (FER) and a decision making trial and evaluation laboratory (DEMATEL). 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. 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 Multiple Criteria Decision Aid is a field which has seen important developments in the last few years. This is not only illustrated by the increasing number of papers and communications in the scientific journals and Congresses, but also by the activities of several international working groups. In 1983, a first Summer School was organised at Catania (Sicily) to promote multicriteria decision-aid in companies and to encourage specialists to exchange didactic material. The second School was held in 1985 at Narnur (Belgium) and I am pleased now to present the selected readings from the "Third International Summer School on Multicriteria Decision Aid: Methods, Applications and Software", which took place in Monte Estoril (Portugal), in 1988. was the quality of the contributions presented by the Such during the Summer School that I have decided to take lecturers advantage of this opportunity to produce a more carefully prepared and homogeneous book rather than a simple volume of proceedings. All the initial versions of the selected papers were revised and some, although not included in the programme of the School, were written in order to give a more complete overview of the MCDA field. Decision analysis has become widely recognized as an important process for translating science into management actions. With climate change and other systemic threats as driving forces in creating environmental and engineering problems, there is a great need for understanding decision making frameworks through a case-study based approach. Management of environmental and engineering projects is often complicated and multidisciplinary in scope and nature, thus issues that arise can be difficult to solve analytically. Multi-Criteria Decision Analysis: Case Studies in Engineering and the Environment provides detailed description of MCDA methods and tools and illustrates their applications through case studies focused on sustainability and system engineering applications. New in the Second Edition: Addresses current and emerging environmental and engineering problems Includes seven new case studies to illustrate different management situations applicable at the international level Builds on real case studies from

recent and relevant environmental and engineering management experience Describes advanced MCDA techniques and extensions used by practitioners Provides corresponding decision models implemented using the DECERNS software package Gives a more holistic approach to teaching MCDA methodology with a focus on sustainable solutions and adoption of new technologies, including nanotechnology and synthetic biology Given the novelty and inherent applicability of this decision-making framework to the environmental and engineering fields, a greater number of teaching tools for this topic need to be made available. This book provides those teaching tools, covering the breadth of the applications of MCDA methodologies with clear explanations of the MCDA process. The case studies are implemented in the DECERNS software package, allowing readers to experiment and explore and to understand the full process by which environmental managers assess these problems. This book is a great resource for professionals and students seeking to learn decision analysis techniques and apply similar frameworks to environmental and engineering projects

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. 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.

Multi Criteria Decision Making (MCDM) is a generic term for all methods that help people making decisions according to their preferences, in situations where there is more than one conflicting criterion. It is a branch of operational research dealing with finding optimal results in complex

scenarios including various indicators, conflicting objectives and criteria. The approach of MCDM involves decision making concerning quantitative and qualitative factors. The importance and success of MCDM are due to the fact that they have successfully dealt with different types of problematics for supporting decision makers such as choice, ranking and sorting, description. Even though, each of the different problematics in MCDM is important, Multi-Criteria Decision-Making Sorting Methods will focus on sorting approaches across a wide range of interesting techniques and research disciplines. The applications which have been and can be solved by these techniques are more and more important in current real-world decision-making problems. Therefore, the book provides a clear overview of MCDM sorting methods and the different tools which can be used to solve real-world problems by revising such tools and characterizing them according to their performance and suitability for different types of problems. The book is aimed at a broad audience including computer scientists, engineers, geography and GIS experts, business and financial management experts, environment experts, and all those professional people interested in MCDM and its applications. The book may also be useful for teaching MCDM courses in fields such as industrial management, computer science, and applied mathematics, as new developments in multi-criteria decision making. Provides insights into the latest research trends in MCDM sorting methods and fuzzy-based approaches Focuses on the application of MCDM sorting methods to GIS based problems Presents engineers, computer scientists and researchers with effective and efficient solutions to real-world problems This Brief presents a new method that is based on the author and his students' shared experience in applying a structured procedure that has as its main goal the creation of a material selection technique that uses language and employs a platform that is not restricted to engineers. Based on a hybrid approach that exploits both traditional and semi-quantitative concepts, it moves forward step-by-step, and uses a platform based on a Quality Function Deployment matrix framework. Candidate materials are screened out and finally assessed by two user-friendly graphic analysis tools, one based on the value curve of the product and the other on an original Bubble Maps tool. The Brief is written for all those whose aim is for a better

understanding of how to integrate and speed up the entire product development process from the initial product concept and engineering design phases to design specs, manufacturability and product marketing with optimal choice of materials.

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