Chapter 2 Multi Criteria Decision Analysis For Strategic | d4ad4977b53bee813c5ed2550ed5e530

Climate Change 2014 – Impacts, Adaptation and Vulnerability: Part A: Global and Sectoral Aspects: Volume 1, Global and Sectoral AspectsMulti-Criteria Decision-Making Models for Website EvaluationMulticriteria and Multiobjective Models for Risk, Reliability and Maintenance Decision AnalysisDecision MakingAdvanced Studies in Multi-Criteria Decision MakingMultiple Criteria Decision Making in Supply Chain ManagementMulti-Criteria Decision MakingMulti-Criteria Decision Making in Maritime Studies and LogisticsGIS and Multicriteria Decision AnalysisHandbook of Research on Artificial Intelligence Applications in the Aviation and Aerospace IndustriesMulti-criteria Decision AnalysisAdvances in ComputersMulti-Criteria Decision Making for the Management of Complex SystemsUsing Multi-criteria Decision Analysis in Natural Resource ManagementSocially Responsible InvestmentClimate Change 2014 – Impacts, Adaptation and Vulnerability: Global and Sectoral AspectsMulti-objective Optimization for Bridge Management SystemsModeling and Optimization of Advanced Manufacturing ProcessesFuzzy Multi-Criteria Decision MakingSupplier SelectionMulti Criteria Analysis in the Renewable Energy IndustryWeighting Methods and their Effects on Multi-Criteria Decision Making Model Outcomes in Water Resources ManagementMultiple Criteria Decision MakingBig Data Analytics Using Multiple Criteria Decision-Making ModelsMulti-Criteria Decision-Making Techniques in Waste ManagementMulti-criteria Decision Making MethodsSustainability Modeling In Engineering: A Multi-criteria PerspectiveEvaluation and Decision Models with Multiple CriteriaFuzzy Optimization and Multi-Criteria Decision Making in Digital MarketingStrategic Approach in Multi-Criteria Decision MakingMulti-criteria Decision Analysis for Supporting the Selection of Engineering Materials in Product DesignApplication of Multi-Criteria Decision Analysis in Environmental and Civil EngineeringApplications of Multi-Criteria Decision-Making Theories in Healthcare and Biomedical EngineeringMulti-Criteria Decision Analysis via Ratio and Difference JudgementMulti-criteria Analysis in Legal ReasoningMulti-Criteria Decision Analysis in ManagementGeographic Information Systems, Remote Sensing and Mapping for the Development and Management of Marine Aquaculture?-Discounting Method for Multi-Criteria Decision Making (?-D MCDM)Applied Machine Learning and Multi-Criteria Decision-Making in HealthcareEnergy Systems Evaluation (Volume 2)

Climate Change 2014 – Impacts, Adaptation and Vulnerability: Part A: Global and Sectoral Aspects: Volume 1, Global and Sectoral Aspects

Given the increasing need to optimize resources sustainably, decision-makers face challenges in analyzing and considering the numerous factors involved. This book makes an effort to present and concentrate on the challenges in decision-making processes for green and sustainable engineering. Through a collection of case studies such as evaluation of waste assessment and drainage system, sustainable building assessment, renewable energy selection, materials and manufacturing process optimization, and crop pattern influence in environmental and economic conditions, readers can learn how to apply cutting-edge Multiple-Criteria Decision Making (MCDM) methods in addressing complexities involved in the decision-making process.

Multi-Criteria Decision-Making Models for Website Evaluation

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.

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

The point of departure in the present book is that the decision makers, involved in the evaluation of alternatives under conflicting criteria, express their preferential judgement by estimating ratios of subjective values or differences of the corresponding logarithms, the so-called grades. Three MCDA methods are studied in detail: the Simple Multi-Attribute Rating Technique SMART, as well as the Additive and the Multiplicative AHP, both pairwise-comparison methods which do not suffer from the well-known shortcomings of the original Analytic Hierarchy Process. Context-related preference modelling on the basis of psycho-physical research in visual perception and motor skills is extensively discussed in the introductory chapters. Thereafter many extensions of the ideas are presented via case studies in university administration, health care, environmental assessment, budget allocation, and energy planning at the national and the European level. The issues under consideration are: group decision making with inhomogeneous power distributions, the search for a compromise solution, resource allocation and fair distributions, scenario analysis in long-term planning, conflict analysis via the pairwise comparison of concessions, and multi-objective optimization. The final chapters are devoted to the fortunes of MCDA in the hands of its designers. The research started in the late seventies, when I got involved in three different problems: the nomination procedures in a university, the evaluation of alternative energy-research proposals, and the evaluation of non-linear programming software.

Decision Making

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 MDCM 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 12deals 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).

Advanced Studies in Multi-Criteria Decision Making

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.

Multiple Criteria Decision Making in Supply Chain Management

This book integrates socially responsible investment into modern portfolio theory from a multi-criteria perspective. Socially responsible investment is a “new deal” championed by the institutional investment and bank sectors, agents that influence mutual funds and other collective investment schemes and which fear that financial strategies without ethical constraints can harm sustainable growth and prosperity. The book shows how to combine financial criteria such as profitability and risk with non-financial criteria such as the protection of the ecosystem, responsible consumption of energy, and healthcare campaigns. The book’s first part presents critical issues in ethical investment, while the second explains in detail the application of goal programming techniques for SRI funds, illustrating their use in actual cases. Part three demonstrates how compromise programming can be applied in the contexts of portfolio selection and risk management. Finally, in its fourth part the book examines the application of other decision-making support methods like the Analytic Hierarchy Process (AHP) framework, the Reference Point Method, and soft computing techniques for portfolio selection.

Multi-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.

Multi-Criteria Decision Making in Maritime Studies and Logistics

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.

GIS and Multicriteria Decision Analysis

This book provides an ideal foundation for readers to understand the application of artificial intelligence (AI) and machine learning (ML) techniques to expert systems in the healthcare sector. It starts with an introduction to the topic and presents chapters which progressively explain decision-making theory that helps solve problems which have multiple criteria that can affect the outcome of a decision. Key aspects of the subject such as machine learning in healthcare, prediction techniques, mathematical models and classification of healthcare problems are included along with chapters which delve in to advanced topics on data science (deep-learning, artificial neural networks, etc.) and practical examples (influenza epidemiology and retinoblastoma treatment analysis). Key Features: - Introduces readers to the basics of AI and ML in expert systems for healthcare - Focuses on a problem solving approach to the topic - Provides information on relevant decision-making theory and data science used in the healthcare industry - Includes practical applications of AI and ML for advanced readers - Includes bibliographic references for further reading The reference is an accessible source of knowledge on multi-criteria decision-support systems in healthcare for medical consultants, healthcare policy makers, researchers in the field of medical biotechnology, oncology and pharmaceutical research and development.

Handbook of Research on Artificial Intelligence Applications in the Aviation and Aerospace Industries

The purpose of this book is to present a comprehensive review of the latest research and development trends at the international level for modeling and optimization of the supplier selection process for different industrial sectors. It is targeted to serve two audiences: the MBA and PhD student interested in procurement, and the practitioner who wishes to gain a deeper understanding of procurement analysis with multi-criteria based decision tools to avoid upstream risks to get better supply chain visibility. The book is expected to serve as a ready reference for supplier selection criteria and various multi-criteria based supplier's evaluation methods for forward, reverse and mass customized supply chain. This book encompasses several criteria, methods for supplier selection in a systematic way based on extensive literature review from 1998 to 2012. It provides several case studies and some useful links which can serve as a starting point for interested researchers. In the appendix several computer code written in MatLab and VB.NET is also included for the interested reader. Lucid explosion of various techniques used to select and evaluate suppliers is one of the unique characteristic of this book. Moreover, this book gives in depth analysis of selection and evaluation of suppliers for traditional supply chain, closed loop supply chain, supply chain for customized product, green supply chain, sustainable supply chain and also depicts methods for supply base reduction and selection of large number of suppliers.

Multi-criteria Decision Analysis

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.

Advances in Computers

Examines the development of methodologies for network and project level optimization of multiple, user-specified bridge management performance criteria. The report also explores the development of bridge management software modules to implement the methodologies. The report includes software modules, a user's manual, and demonstration database as part of an accompanying CD-ROM, which is available for download as an ISO image.

Multi-Criteria Decision Making for the Management of Complex Systems

This latest Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) will again form the standard reference for all those concerned with climate change and its consequences, including students, researchers and policy makers in environmental science, meteorology, climatology, biology, ecology, atmospheric chemistry and environmental policy.

Using Multi-criteria Decision Analysis in Natural Resource Management

Multi-criteria decision making (MCDM) has been extensively used in diverse disciplines, with a variety of MCDM techniques used to solve complex problems. A primary challenge faced by research scholars is to decode these techniques using detailed step-by-step analysis with case studies and data sets. The scope of such work would help decision makers to understand the process of using MCDM techniques appropriately to solve complex issues without making mistakes. Multi-Criteria Decision Analysis in Management provides innovative insights into the rationale behind using MCDM techniques to solve decision-making problems and provides comprehensive discussions on these techniques from their inception, development, and growth to their advancements and applications. The content within this publication examines hybrid multicriteria models, value theory, and data envelopment. Ideal for researchers, management professionals, students, operations scholars, and academicians, this scholarly work supports and enhances the decision-making process.

Socially Responsible Investment

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

Climate Change 2014 – Impacts, Adaptation and Vulnerability: Global and Sectoral Aspects

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.

Multi-objective Optimization for Bridge Management Systems

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.

Modeling and Optimization of Advanced Manufacturing Processes

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.

Fuzzy Multi-Criteria Decision Making

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.

Supplier Selection

With the emergence of smart technology and automated systems in today's world, artificial intelligence (AI) is being incorporated into an array of professions. The aviation and aerospace industry, specifically, is a field that has seen the successful implementation of early stages of automation in daily flight operations through flight management systems and autopilot. However, the effectiveness of aviation systems and the provision of flight safety still depend primarily upon the reliability of aviation specialists and human decision making. The Handbook of Research on Artificial Intelligence Applications in the Aviation and Aerospace Industries is a pivotal reference source that explores best practices for AI implementation in aviation to enhance security and the ability to learn, improve, and predict. While highlighting topics such as computer-aided design, automated systems, and human factors, this publication explores the enhancement of global aviation security as well as the methods of modern information systems in the aeronautics industry. This book is ideally designed for pilots, scientists, engineers, aviation operators, air crash investigators, teachers, academicians, researchers, and students seeking current research on the application of AI in the field of aviation.

Multi Criteria Analysis in the Renewable Energy Industry

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

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

In this book we introduce a new procedure called ?-Discounting Method for Multi-Criteria Decision Making (?-D MCDM), which is as an alternative and extension of Saaty's Analytical Hierarchy Process (AHP).

Multiple Criteria Decision Making

This latest Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) will again form the standard reference for all those concerned with climate change and its consequences, including

students, researchers and policy makers in environmental science, meteorology, climatology, biology, ecology, atmospheric chemistry and environmental policy.

Big Data Analytics Using Multiple Criteria Decision-Making Models

The purpose of this book is to provide a resource for students and researchers that includes current application of a multi-criteria, decision-making theory in various fields such as: environment, healthcare and engineering. In addition, practical application are shown for students manually. In real life problems there are many critical parameters (criteria) that can directly or indirectly affect the consequences of different decisions. Application of a multi-criteria, decision-making theory is basically the use of computational methods that incorporate several criteria and order of preference in evaluating and selecting the best option among many alternatives based on the desired outcome.

Multi-Criteria Decision-Making Techniques in Waste Management

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. ^

Multi-criteria Decision Making Methods

Decision Making is a book where each chapter has been contributed to by a different author(s). The book synthesizes the analytical principles with business practice of Decision Making. Specifically, the book provides an interface between the main disciplines of engineering/technology and the organizational, administrative, and planning abilities of decision making. It is complementary to other sub-disciplines such as economics, finance, marketing, decision and risk analysis, etc. The chapters introduce and demonstrate decision making theory in practical case studies. It demonstrates key results for each sector with diverse real-world case studies. The theory is accompanied by relevant analysis techniques, with a progressional approach building from simple theory to complex and dynamic decisions with multiple data points, including big data, etc. Computational techniques, dynamic analysis, probabilistic methods, and mathematical optimization techniques are expertly blended to support analysis of multi-criteria decision-making problems with defined constraints and requirements.

Sustainability Modeling In Engineering: A Multi-criteria Perspective

While there are many different models for performing system analysis, the multi-criteria decision making method has proven to be one of the most efficient. By analyzing the key concepts of this theory, the technique can be enhanced and will benefit future organizations and companies in novel ways. Multi-Criteria Decision Making for the Management of Complex Systems provides a comprehensive examination of the latest strategies and methods involved in decision theory. Featuring extensive coverage on relevant topics such as nested scalar convolutions, Pareto optimality, nonlinear schemes, and operator performance, this publication is ideally designed for engineers, students, professionals, academics, and researchers seeking innovative perspectives on the supervision of advanced decision making theories in system analysis.

Evaluation and Decision Models with Multiple Criteria

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.

Fuzzy Optimization and Multi-Criteria Decision Making in Digital Marketing

This book addresses the problem of waste management by using multi-criteria decision-making (MCDM) methods. The authors discuss how to apply MCDM, a complex decision-making tool that involves both quantitative and qualitative factors, to develop strategies for effective waste management using various optimization models to rank alternatives, while also incorporating the concerns and needs of multiple stakeholders to find the most optimal decisions for various types of wastes. Typically, there does not exist a single optimal solution to waste problems; with help of MCDM, far better solutions can often be found and utilized to facilitate sustainable waste management techniques in various industries. This book provides unique, effective, and quick decision-making strategies for waste management. With the ever-increasing population and continuing human development, the problem of managing waste becomes increasingly essential, and this volume helps lead the way to finding sustainable solutions.

Strategic Approach in Multi-Criteria Decision Making

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.

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

This book covers various multiple-criteria decision making (mcdm) methods for modeling and optimization of advanced manufacturing processes (AMPs). Processes such as non-conventional machining, rapid prototyping, environmentally conscious machining and hybrid machining are finally put together in a single book. It highlights the research advances and discusses the published literature of the last 15 years in the field. Case studies of real life manufacturing situations are also discussed.

Application of Multi-Criteria Decision Analysis in Environmental and Civil Engineering

Providing useful insights on the use of Multi-Criteria Decision Analysis (MCDA) in natural resource management, this book examines a number of empirical applications for several countries and a variety of natural resources. This book gives in-depth analysis of the potential problems in applying MCDA techniques, including difficulties eliciting required information, lack of suitable measures for environmental variables and the need to develop innovative methods to simplify the use of MCDA.

Applications of Multi-Criteria Decision-Making Theories in Healthcare and Biomedical Engineering

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.

Multi-Criteria Decision Analysis via Ratio and Difference Judgement

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.

Multi-criteria Analysis in Legal Reasoning

Since its first volume in 1960, Advances in Computers has presented detailed coverage of innovations in computer hardware, software, theory, design, and applications. It has also provided contributors with a medium in which they can explore their subjects in greater depth and breadth than journal articles usually allow. As a result, many articles have become standard references that continue to be of significant,

lasting value in this rapidly expanding field. In-depth surveys and tutorials on new computer technology Well-known authors and researchers in the field Extensive bibliographies with most chapters Many of the volumes are devoted to single themes or subfields of computer science

Multi-Criteria Decision Analysis in Management

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.

Geographic Information Systems, Remote Sensing and Mapping for the Development and Management of Marine Aquaculture

The objective of this document is to illustrate the ways in which Geographical Information Systems (GIS), remote sensing and mapping can play a role in the development and management of marine aquaculture. The perspective is global. The approach is to employ example applications that have been aimed at resolving many of the important issues in marine aquaculture. The underlying purpose is to stimulate the interest of individuals in the government, industry and educational sectors of marine aquaculture to make more effective use of these tools. A brief introduction to spatial tools and their use in the marine fisheries sector precedes the example applications. The most recent applications have been selected to be indicative of the state of the art, allowing readers to make their own assessments of the benefits and limitations of use of these tools in their own disciplines. Also published in Chinese and Spanish.

?-Discounting Method for Multi-Criteria Decision Making (?-D MCDM)

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.

Applied Machine Learning and Multi-Criteria Decision-Making in Healthcare

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

Energy Systems Evaluation (Volume 2)

Abstract: "This book applies fuzzy theory and multi-criteria decision making principles for better practice in the digital business environment through the use of timely research and case studies on practical implementation of such theories in the digital marketplace"--Provided by publisher