

EWG-MCDA EURO Working Group on Multicriteria Decision Aiding Groupe de Travail Européen Aide Multicritère à la Décision

NEWSLETTER BULLETIN

Groupe de Travail Européen "Aide Multicritère à la Décision" Série 4, nº 6, Fortemps 2023.

Dear Friends,

We are pleased to share with you the joy and satisfaction of a very prestigious award for our coordinator Roman Słowiński, who was honored with the Humboldt Research Award, the most prestigious German scientific award.

The Humboldt Research Award is an award given by the <u>Alexander von Humboldt Foundation</u> of Germany to internationally renowned scientists and scholars who work outside of Germany in recognition of their lifetime's research achievements. Recipients are "academics whose fundamental discoveries, new theories or insights have had a significant impact on their own discipline and who are expected to continue producing cutting-edge academic achievements in the future".



President of the Humboldt Foundation Prof. Robert Schlögl presented the prize to prof. Roman Słowiński during the ceremony in Bamberg on March 24, 2023 (photo credit: Humboldt Foundation).

The Laudation for the Humboldt Research Award 2023 winner declaims as follows:

Professor Roman Słowiński is a world-leading authority in the field of Operations Research. He has shaped the research in different fields, most notably in decision support with his breakthrough methodological developments. His research has applications in medicine, pharmacology, engineering, and economics.

We congratulate Roman Słowiński in the name of the whole EURO Working Group on Multiple Criteria Decision Aiding.

José Rui Figueira and Salvatore Greco



Opinion Makers Section

European Working Group "Multiple Criteria Decision Aiding" Series 4, nº 6, Spring 2023.

About the 95th Meeting of the EWG on MCDA in Jaén, Spain

On April 13-15, 2023, at University of Jaén, Jaén, Spain, the 95th Meeting of the Euro Working Group on Multicriteria Decision Aiding was a great success in terms of organization and participation. The main theme of the 95th meeting of the EURO working group on Multiple Criteria Decision Aiding (EWG-MCDA 95) aimed at studying the potential of multiple criteria decision aiding methods to developing measuring tools for circular economy.

Organized by the research group on *Intelligent Systems Based on Fuzzy Decision Analysis*, the School of Enginering of Jaén and the University of Jaén; the Meeting offered an opportunity to present research on topics covering all theoretical and practical aspects of MCDA specified on circular economy.



Open Ceremony 95th EWG-MCDA meeting

The event started with the keynote lecture provided by Prof. Humberto Bustince on *"Some considerations about information functions and their applications in MCDA"*



Humberto Bustince during his Talk

During the meeting were introduced different contributions about MCDA theoretical foundations, circular economy, consesus models for circular economy, circular economy on healthcare, decision support tools, etc.



Group Picture 95th EWG-MCDA meeting at visiting Baeza

During the Meeting more than 35 scholars presentially and more than 15 scholars attend online to the different sessions and discussions. These scholars came from Europe, North Africa, Canada, India and China. In total 50 scholars from Europe, North Africa and Canada attended the Meeting, and more than 20 research papers were submitted for regular communication, while 15 research papers were also submitted as discussion papers.

During this Meeting, the new volume entitled: Multicriteria Decision Aiding Interventions. Applications for Analysts, was presented, analysed and discussed by Prof. M.F. Norese (<u>https://link.springer.com/book/9783031284649</u>). The book focuses on the difficulties or complexities of the decision problems that impact decision aid interventions. It presents comprehensively a different application in each chapter. And finally introduced the features a common framework to facilitating a conclusive and transparent synthesis of all the approaches.

CONFERENCE PROGRAMME

Thursday

13th April 2023

<u>13:30 – 14:30 Keynote Lecture</u>

Humberto Bustince Sola Some considerations about information functions and their applications in MCDA

<u>15:30 – 16:30 Session 1</u>

A comprehensive minimum cost consensus model for large scale group decision making for circular economy measurement

R. M. Rodríguez, A. Labella, P. Nuñez-Cacho, V. Molina-Moreno, L. Martínez

Circular Economy in HealthCare: Challenges and Issues *Christine Huttin*

Interactive decision support tool for sustainability assessment of energy technologies

Laura Sofia Mesa Estrada, Martina Haase, Manuel Baumann, Tim Müller

<u>Discussion</u> Assessing policy interventions to stimulate the transition of electric vehicle technology in the European Union *J.R. Figueira, H. Martins, C.O. Henriques, C.S. Silva, A.S. Costa*

<u>Discussion</u> A participatory group decision making framework to evaluate the Swiss energy transition

Eleftherios Siskos, Peter Burgherr

<u>16:30 – 17:30 Session 2</u>

Perceptual maps to aggregate rating values: An application to measure customers' interest on the reduction of food waste Walaa Abuasaker, Jennifer Nguyen, Núria Agell, Mónica Sánchez, Francisco Javier Ruiz

Public perception on waste valorization Rodion Iurev, Silvia Bolado, Pedro García-Encina, José Luis García-Lapresta, María Molinos-Senante

Assessing Progress Towards SDGs Implementation Using Multiple Reference Point Based Multicriteria Methods: The Case Study of the European Countries

Elena Ricciolini, Lucia Rocchi, Matteo Cardinali, Luisa Paolotti, Francisco Ruiz de la Rúa, José Manuel Cabello González, Antonio Boggia (Online)

<u>Discussion</u> Spatialised multicriteria analysis for decision support to reduce pesticides in a wine-growing watershed in Alsace, France

Francis Macary, Sylvain Payraudeau, Gwenaël Imfeld

<u>Discussion</u> Multicriteria decision support for evaluating new agricultural systems in agroforestry

Odile Phelpin, Francis Macary, Laurence Denaix

<u>Discussion</u> Improving e-procurement strategy through DRSA implementation *Mladen Stamenković, Aleksa Dokić*

Friday

14th April 2023

Analysis of third alternatives' impact in PROMETHEE II ranking Boris Coquelet, Yves De Smet

Promethee γ : a new Promethee based method for partial ranking based on valued coalitions of monocriterion net flow scores

Gilles Dejaegere, Yves De Smet

Group decision-making based on manipulated data Konrad Kułakowski, Jacek Szybowski, Jiri Mazurek, Sebastian

Ernst

Andness-directed aggregation operators in deep learning ensembles for aiding in eye diseases detection *Aida Valls, Mohammed Yousef Salem Ali, Mohammed Jabreel, Mohamed AbdelNasser, Marc Baget*

<u>Discussion</u> Interactions in multicriteria portfolio decision analysis problems *Maria Barbati, Matteo Brunelli, Salvatore Corrente*

<u>Discussion</u> On the Consensus Process based on Discrete Fuzzy Numbers *Juan Vicente Riera, Sebastia Massanet*

<u>11:50 – 13:00 Session 4</u>

How to build an MCDA approach in cooperation with decision-makers *Grzegorz Miebs*

An Emotional Relevance Fuzzy-Based Indicator for CES assessment: the MCDA contribution in supporting Circular Regeneration processes

Sabrina Sacco, Stefano Cuntò, Ferdinando Di Martino, Eugenio Muccio, Giuliano Poli, Piero Zizzania, Maria Cerreta

MCDA methods used in different approaches to find optimal corridors and paths for linear infrastructure projects *Jean-Philippe Waaub*

<u>Discussion</u> An application of MCDA procedure to the location of radioactive waste deposit according to Legislative Decree *Antonino Scarelli, Silvio Giove*

Discussion A multicriteria model for household finance *Panos Xidonas*

<u>Discussion</u> A novel sorting approach based on the Choquet Integral

Sarah Ben Amor, Renata Pelissari, Leonardo Tomazeli Duarte, João Marcos Travassos Romano

Group activities

Session 5

Multicriteria Decision Aiding Interventions. Applications for Analysts

Maria Franca Norese, María A. De Vicente y Oliva, Irène Abi-Zeid

<u>Discussion</u> Explaining and predicting customer churn by monotonic rules induced from ordinal data

Roman Słowiński, Marcin Szeląg Discussion Preference disaggregation: a probabilistic view

Moha Ghaderi, Milosz Kadzinski

Luis Martínez and Rosa M. Rodríguez

martin@ujaen.es and mrrodrig@ujaen.es



MCDA Research Groups

NSID - Laboratory for NeuroScience and Behavioral Studies in Decision

Ana Paula Cabral Seixas Costa, Anderson Carneiro Silva, Lúcia Roselli, Danielle Costa Morais and Adiel Teixeira de Almeida (Center for Decision Systems and Information Development (CDSID), Universidade Federal de Pernambuco, Recife, PE, Brazil).

Presentation

The Laboratory for NeuroScience and Behavioral Studies in Decision (NSID) is a multi-user laboratory, founded in late 2016, which is located at the Federal University of Pernambuco (UFPE), Brazil. Its aim is to improve decisionmaking and group decision and negotiation research by undertaking behavioral and neuroscience studies. Currently, the lab team has over 15 members, including professors, postdoc, doctoral, master's and undergraduate students. In this presentation, a particular emphasis is given to how Decision NeuroScience Studies modulate MCDA methods.

Decision Neuroscience

Many studies in the most diverse areas have been dedicated to evaluating the role that cognition plays in their approaches, and have related these to purchasing or economic decisions, for instance.

Behavioral studies aim to understand how internal and external characteristics related to individuals influence their choices, and reach broader issues of scientific interest. A natural evolution of this is the use of neuroscience as an integral area of research efforts. Neuroscientific tools and techniques help to assess features that traditional means of collection and research are not capable of doing.

Studying the decision-making process in its various contexts involves understanding the underlying cognitive aspects since humans are not fully rational decision-maker (DM) beings. What is meant by this is that emotions are also directors of human behavior, and hence influence the way we act and decide.

There is, therefore, a strategic opportunity for several researchers who now have the means not only to answer hitherto unresolvable research questions, but also to pose new ones. Such advantages, on the other hand, are accompanied by challenges, among which are: the difficulties in collecting and processing data, which are generally voluminous; the need for researchers to spend considerable time on this; and the high cost of acquiring neuroscience tools.

The result of this integrative movement has given rise to new areas of research such as Decision Neuroscience, which investigates aspects of the decision-making process from the perspective of neuroscience. This is the context into which NSID fits. Its lines of research are:

- Analysis of behavioral aspects for modeling the DM's preferences
- Decision support system (DSS) interfaces
- Individual behavior in the context of a negotiation
- DM behavior in the context of group decision
- Evaluating preferences and buying behavior in relation to product packaging in marketing

The diversity of actions is possible due to the multi-user nature of the laboratory, which also ensures the benefits of multi-disciplinarity can be exploited. Thus, in the marketing area, studies have been conducted on how different packaging compositions, varying elements and their arrangement, influence the purchase decision. In the area of Group Decision and Negotiation (GDN), features related to the profiles of DMs/ negotiators and to support systems are considered in order to generate improvements to the interaction dynamics, and thereby seek to achieve good solutions. In the multicriteria decision- /aiding (MCDA) area, studies have evaluated the effect of multiple attributes on the decision-making process. These have generated insights that help to improve both DSS, such as FITradeoff, and the interaction between two main actors in the decision-making process, namely, the analyst, and the DM.

Such studies are conducted with the neuroscience tools available at the NSID, among which electroencephalogram (EEG) and eye-tracking equipment stand out. The former is used to collect data on electrical activity in the brain which are collected via the scalp. The approach used is non-invasive and totally safe for the participant in the experiments and for the researcher. The EEG is very useful, since it enables neural data to be collected with high temporal precision that can be related to experimentally controlled questions. Thus, how certain stimuli and factors relate to cognitive effort and engagement can be assessed. Eye-Tracking is a technique used to collect pupillometric data and eye movements. It is very useful when the interest is to investigate the processes of allocating attention and of making cognitive effort. In addition, the infrastructure of the NSID includes 5 experimental labs and 2 Decision Conferencing rooms, 5 development and experiment planning rooms, breakout spaces, a kitchen, a secretary's office and waiting area (visitors/participants in experiments).



Therefore, the NSID has contributed to the advancement of Decision Neuroscience, and thereby generated practical results

for the areas of MCDA, GDN and marketing in a process of continuous improvement and discovery.

Selected articles

Roselli, L. R. P., & de Almeida, A. T. (2023). The use of the success-based decision rule to support the holistic evaluation process in FITradeoff. International Transactions in Operational Research.

Carneiro de Lima da Silva, A. L., Cabral Seixas Costa, A. P., & de Almeida, A. T. (2022). Analysis of the cognitive aspects of the preference elicitation process in the compensatory context: a neuroscience experiment with FITradeoff. International Transactions in Operational Research.

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da Silva, A. L. C. L., Costa, A.P.C.S. & de Almeida, A.T. (2021). Exploring cognitive aspects of FITradeoff method using neuroscience tools. Annals of Operations Research, 1-23.

de Almeida, A.T., Frej, E.A. & Roselli, L.R.P (2021). Combining holistic and decomposition paradigms in preference modeling with the flexibility of FITradeoff. Cent Eur J Oper Res 29, 7–47.

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Carrillo, P. A. A., Roselli, L. R. P., Frej, E. A., & de Almeida, A. T. (2018). Selecting an agricultural technology package based on the flexible and interactive tradeoff method. Annals of Operations research, 1-16.

de Moura, J. A., & Costa, A. P. C. S. (2018). Personality Traits and Negotiation Style Effects on Negotiators' Perceptions in a Web-Based Negotiation. Journal of Organizational and End User Computing (JOEUC), 30, 1-19.

Ana Paula Cabral Seixas Costa and

Adiel Teixeira de Almeida

apcabral@hotmail.com and almeida@cdsid.org.br

MCDA at CeBER, University of Coimbra, Portugal

Luis Dias, Maria João Alves, Humberto Rocha, João Paulo Costa

The Centre for Business and Economics Research (CeBER) is a research centre at the University of Coimbra, recognized and funded by the Foundation for Science and Technology, I.P., with national funding through projects UIDB/05037/2020 and UIDP/05037/2020. CeBER is a very young research centre, having started its activity in 2016, being hosted by a relatively young school – the Faculty of Economics, now celebrating its 50th anniversary – within one of the oldest universities in Europe, dating back to the 13th century. CeBER has over 80 members with a PhD, most of them also members of the Faculty of Economics, working in the fields of Business, Economics, Management Science / Operation Research, and frequently engaged in multidisciplinary research (mainly with engineering, environmental sciences, health sciences, and psychology). CeBER's researchers coordinate PhD programmes in Economics, Management and Management Science (Decision Aiding Science), as well as Master's programmes in Economics and Management, admitting over 200 postgraduate students per year.

CeBER focuses on developing and applying quantitative models and methods to address emergent research questions in Management and Economics, as well as addressing societal challenges through truly cross-disciplinary projects. These challenges include innovation and innovative organizations, health and well-being, inequality, and efficient and sustainable use of natural resources. The centre is organised around three thematic clusters:

1. Organizational Innovation and Development, encompassing the interactions between strategy, marketing and people; entrepreneurship and innovation ecosystems; financial markets and corporate finance; and also applying predictive and prescriptive analytics for forecasting and operational and strategic planning in organizations.

2. Institutions and Policies for Sustainable Development, encompassing macroeconomic performance; regional studies and sector studies; industrial organization, firm dynamics and the labour market; and also sustainability assessment and dealing with socioeconomic and environmental interactions.

3. Health Decisions and Policy, encompassing the economics of health and healthcare, economic evaluation of healthcare programmes and technologies, and decision aiding in health.

The authors, together with other colleagues partly working on MCDA-related topics (Paulo Melo, Pedro Godinho, Rui Lourenço, et al.), stem from the group created by João Clímaco at INESC Coimbra in the 1980s, which become well-known for its work on interactive MCDA methods and software (TRIMAP, IRIS, VIP Analysis, iMOLPe, etc.), and its emphasis on methods promoting a progressive articulation of preferences (INESC Coimbra was featured previously in this Newsletter, Series 3, No. 19, Spring 2009). The collaboration between CeBER's MCDA group and INESC Coimbra (Carlos Henggeler Antunes, Joana Dias, Luís Alçada et al.) therefore remains very strong.

Research topics in MCDA

The main topics of research in recent years include:

- Decision aiding based on incomplete information, seeking robust conclusions and performing stochastic analyses, e.g., see contributions dealing with qualitative assessments (Dias et al. 2018), and contributions to SMAA methods (Dias and Vetschera, 2019).
- Outranking methods, see e.g. Dias et al. 2018; Dias and Rocha, 2023.
- Preference learning and indirect elicitation methods, e.g., see Dias et al. 2022; Oliveira et al. 2021.
- Exploiting links between MCDA and Data Envelopment Analysis, namely developing and applying Value-Based DEA, e.g., see Labijak-Kowalska et al. (2023).
- Multiobjetive linear and integer programming, see e.g. Antunes, Alves and Clímaco, 2016.
- Multiobjective bilevel programming, both concerning new concepts and methods (Alves, Antunes and Costa, 2021; Alves and Antunes, 2022) and applications to optimize electricity dynamic retail pricing (Alves and Antunes, 2018)
- Group decision making and negotiation, e.g., see Bezerra et al. 2017, Sarabando et al. 2019, Dias and Vetschera, 2022.
- Multicriteria Project Planning, e.g., see Godinho and Costa, 2020.
- Data Mining for Decision Making, e.g., see Antunes et al. 2017, Freire et al., 2022.
- Health Care applications, e.g., see Carrasqueira et al. 2023a; Carrasqueira et al. 2023b; Dias et al. 2023.

Teaching

CeBER's researchers are in charge of several course units at the Faculty of Economics, and they are core faculty in the PhD Programme in Decision Aiding Science at UC. MCDA topics are included in:

- Decision Analysis (Masters in Management, Masters in Economics, and Masters in Energy for Sustainability)
- Decision Processes (MBA)
- Logistics (Masters in Management, MBA)
- Multicriteria Decision Aiding (PhD Programme in Decision Aiding Science)
- Multiobjective Decision (PhD Programme in Decision Aiding Science)
- Operations Research (Bachelor degree in Management)
- Quantitative Methods in Management (PhD Programme in Decision Aiding Science)

References and other selected publications *Books*

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Dias, L.C., Dias, J., Ventura, T., Rocha, H., Ferreira, B., Khouri, L., Lopes, M.C., 2022. Learning target-based preferences through additive models: an application in radiotherapy treatment planning. *European Journal of Operational Research*, 302, 1, 270-279

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Labijak-Kowalska, A., Kadzinski, M., Spychała, I., Dias, L.C., Fiallos, J., Patric, J., Michalowski, W., Farion, K., 2023. Performance evaluation of emergency department physicians using robust value-based additive efficiency model, *International Transactions in Operational Research*, 30, 1, 503-544

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Sarabando, P., L.C. Dias, R. Vetschera, 2019. Group Decision Making with Incomplete Information: a dominance and quasioptimality volume-based approach using Monte-Carlo simulation, *International Transactions in Operational Research*, 26(1), 318-339.

> *Luis Dias* <u>lmcdias@fe.uc.pt</u>



Software

SOCRATES (SOcial multi-CRiteria AssessmenT of European policieS)

SOCRATES (SOcial multi CRiteria AssessmenT of European policieS) is a new multiple criteria web application, recently developed at JRC. All interfaces are grounded on the principle of User Experience Design (UXD) to guarantee an intuitive and easy human-machine interaction. The objective of SOCRATES is to support the implementation of the main principles of social multi-criteria evaluation (SMCE), which has been explicitly designed for public policy. All methodological and mathematical details behind the SOCRATES software can be found in *Azzini and Munda*, 2020; *Munda*, 2004, 2008, 2009, 2012, 2021; Saltelli et al. 2010, detailed in the list of references below.

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/ cannot leach an/body anything / can only make them think.	SOCRATES Social Multi-Criteria Assessment of European PolicieS	
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The implementation of a Social Multi-Criteria framework involves the following main steps:

- 1. Selection of the social actors relevant for the problem at hand.
- 2. Definition of social actors' values, desires and preferences.
- Generation of evaluation criteria as a process of technical translation of social actors' needs, preferences and desires.
- 4. Construction of the multi-criteria impact matrix.
- 5. Construction of an equity impact matrix, illuminating all the distributional consequences of each single option on the various social actors.
- 6. Application of multi-criteria, social choice and conflict analysis algorithms.
- 7. Sensitivity and robustness analysis.

Overall, the objective of SOCRATES and the underlying SMCE methodology is not to substitute policy-makers through a mathematical model, but to improve their understanding of the main features of the problem at hand, such as key assumptions, degree of uncertainty, robustness of results and overall technical and social defensibility of options chosen. The philosopher Socrates said "I cannot teach anybody anything. I can only make them think." This is the main inspiring principle of the SOCRATES software too.

Three main components constitute the core of SOCRATES: multi-criteria, equity and sensitivity analyses. **Multi-criteria analysis** requires the definition of relevant dimensions, objectives and criteria. It uses weights as importance coefficients and clarify their role in the hierarchical structure. The impact matrix may include either quantitative (including also stochastic and/or fuzzy uncertainty) and qualitative (ordinal and/or linguistic) measurements of the performance of an alternative with respect to an evaluation criterion. Indifference and preference thresholds, based on fuzzy relations, can also be used. It supplies a ranking of the alternatives according to the set of evaluation criteria (i.e. the technical compromise solution/s) computed by using the Kemeny non-compensatory aggregation rule. Its basic idea is that the maximum likelihood ranking of policy options is the ranking supported by the maximum number of criteria (or criterion weights) for each pair-wise comparison, summed over all pairs of options considered. **Equity analysis** requires as input a set of social actors and their evaluation of the alternatives considered in the multi-criteria analysis. This makes a clear distinction between opinions (or in general more subjective evaluations) contained in the social impact matrix and evidence contained in the multi-criteria impact matrix. The equity analysis produces the following information:

- indications of the distance of the positions of the various social groups (i.e. possibilities of convergence of interests or coalition formations)
- ranking of the alternatives according to actors' impacts or preferences (social compromise solution).

The objective of **sensitivity analysis** is to check if the rankings provided are stable and to determine which of the input parameters influence more the model output. *Local sensitivity analysis* looks at the sensitivity of results to a) the exclusion/inclusion of different criteria and dimensions and b) dimensions, criteria or social actors weight changes. All parameters are changed one at a time. *Global sensitivity analysis* focuses on all the possible combinations of criterion weights; all parameters are changed simultaneously. The whole information produced by local and global sensitivity analyses is synthesized into simple graphics.

As a framework for policy evaluation and conflict management, SMCE has demonstrated its applicability to realworld problems in various geographical and cultural contexts. Recently the SMCE principles and the SOCRATES software have been applied in a set of official impact assessments of the European Commission. A first public study is the "IMPACT ASSESSMENT REPORT Accompanying the document Proposal for a Regulation of the European Parliament and of the Council on standards of quality and safety for substances of human origin intended for human application and repealing Directives 2002/98/EC and 2004/23/EC <u>EUR-Lex</u> - <u>SWD:2022:190:FIN - EN - EUR-Lex (europa.eu)</u>"

Currently, the United Nation International Atomic Energy Agency is using SMCE and the SOCRATES software in its activities of decommissioning and environmental remediation, in the framework of the MAESTRI project (Management Systems Supporting Environmental Remediation Projects) developed in the scope of the Environet (Network on Environmental Remediation and NORM Management).

Related links

 SOCRATES Manual and Web Application: <u>https://knowledge4policy.ec.europa.eu/modelling/to</u> <u>pic/social-multi-criteria-evaluation-policy-</u> <u>options_en/socrates_en</u>

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Giuseppe Munda, European Commission, Joint Research Centre (JRC), Ispra, Italy giuseppe.munda@ec.europa.eu



Forthcoming meetings

(This section is prepared by Carlos Henggeler Antunes <u>ch@deec.uc.pt</u>)

11-15/6/2023 Group Decision and Negotiation conference Tokyo, Japan http://gdnconference.org/gdn2023/

19-20/6/2023

DESDEO Future of Interactive Multiobjective Optimization Forum

University of Jyväskylä, Finland https://www.jyu.fi/it/en/research/scholarly-events/desdeo23

19-22/6/2023 PhD Summer School on Operations and Supply Chain Management Liverpool, UK https://www.researchgate.net/publication/369180212

21-23/6/2023

IPCO 2023 - 4th Conference on Integer Programming and Combinatorial Optimization University of Wisconsin–Madison, USA https://optimization.discovery.wisc.edu/ipco-2023-madison/

24-26/6/2023

2023 INFORMS Manufacturing and Service Operations Management Conference McGill University, Montreal, Québec, Canada https://www.informs.org

25-30/6/2023 Isolde XVI - International Symposium on Locational Decisions Kaiserslautern and Baden-Baden, Germany http://www.isolde2023.de

26-28/6/2023 EUROHOPE Summer School in Humanitarian Logistics ONLINE https://forms.gle/f2hxkWahpBQxUJNXA

26-30/6/2023 22nd ECMI conference on Industrial and Applied Mathematics Wroclaw, Poland https://ecmi2023.org/

29/6-1/7/2023 ICEBRS 2023 - International Conference on Economics and Business Roads to Sustainability University of Coimbra, Coimbra, Portugal https://ucpages.uc.pt/feuc/icebrs-2023/

29/6-1/7/2023 HELORS: 9th International Symposium and 31st National Conference on Operational Research Athens, Greece http://eeee2023.uniwa.gr/

3-5/7/2023 29th International Annual EurOMA Conference Leuven, Belgium https://euroma2023.org/

10-11/7/2023 Conference on scenario planning and foresight Warwick, UK https://warwick.ac.uk/fac/soc/wbs/subjects/orms/ormsevents/ scenario2023/ 10-14/7/2023 IFORS 2023 Santiago, Chile https://ifors2023.com/

10-23/7/2023 PhD Course on Choice-Based Optimization 2023 Lübeck-Travemünde, Germany https://vhbonline.org/veranstaltungen/prodok/kurse-2023/2307ms08

15-19/7/2023 GECCO 2023 - The Genetic and Evolutionary Computation Conference Lisbon, Portugal https://gecco-2023.sigevo.org/HomePage

17-21/7/2023 European Study Group with Industry (ESGI)171 Old College, University of Edinburgh https://www.icms.org.uk/workshops/2023/european-studygroup-industry-171

24-26/7/2023 OPTIMIZATION 2023 University of Aveiro, Aveiro, Portugal https://optimization2023.web.ua.pt/index.html

24-28/7/2023 XVI International Conference on Stochastic Programming California, USA <u>https://gsm.ucdavis.edu/faculty-and-research/faculty-</u> <u>conferences/xvi-international-conference-stochastic-</u> <u>programming</u>

8-11/8/2023 International Conference on Bilevel Optimization University of Southampton, UK https://www.bilevelconference2023.org/

16-18/8/2023 Modeling and Optimization: Theory and Applications (MOPTA) 2023 Lehigh University, Bethlehem, PA (USA) <u>https://coral.ise.lehigh.edu/~mopta/</u>

19-21/8/2023 M-PREF 2023: 14th Multidisciplinary Workshop on Advances in Preference Handling Macau, S.A.R <u>https://sites.google.com/view/m-pref-2023/home</u>

21-26/8/2023 EURO PhD School on Operations Research in Computational Biology, Bioinformatics and Medicine Istanbul, Turkey https://euro-cbbm.ku.edu.tr/members/

23-25/8/2023

EUROPT 20th Workshop on Advances in Continuous Optimization Budapest, Hungary <u>http://www.europt.hu/</u>

28-29/8/2023 5th Workshop of the Euro Working Group on Pricing and Revenue Management Zurich, Switzerland https://www.ema.uzh.ch/en/main-events/LG7G.html

29/8-1/9/2023 GOR conference 2023 Hamburg, Germany https://www.or2023.uni-hamburg.de/en.html

3-6/9/2023 6th International Conference on Dynamics of Information Systems (DIS 2023) Prague, Czech Republic https://dis2023.ujep.cz/

4-7/9/2023 Optimization and Decision Science (ODS) 2023 Ischia, Italy http://www.airoconference.it/ods2023/

4-7/9/2023 16th International Symposium on Algorithmic Game Theory (SAGT) London, UK https://www.royalholloway.ac.uk/research-andteaching/departments-and-schools/computer-science/sagt-2023

4-8/9/2023 EURO PhD School on Data Science meets Combinatorial Optimization Paderborn, Germany http://

4-6/9/2023 International Conference on Data Envelopment Analysis Surrey Business School, University of Surrey, UK https://dataenvelopment.com/dea45/

6-8/9/2023 14th International Conference on Computational Logistics Berlin, Germany https://www.iccl2023.uni-hamburg.de/en.html

7-8/9/2023 ATMOS 2023 - 23rd Symposium on Algorithmic Approaches for Transportation Modeling, Optimization, and Systems Amsterdam, The Netherlands <u>https://algo-conference.org/2023/atmos/</u>

7-8/9/2023 IWOLOCA 2023 - XII International Workshop on Locational Analysis and Related Problems 2023 (IWOLOCA) Edinburgh, Scotland https://redloca.ulpgc.es/en/redloca23.html

12-14/9/2023 The OR Society's Annual Conference OR65 Bath, UK https://www.theorsociety.com/events/annual-conference/

13-15/9/2023 41st International Conference on Mathematical Methods in Economics Prague, Czech Republic https://mme2023.vse.cz/

14/9/2023 RAMOO - Recent Advances in Multi-Objective Optimization Workshop Rome, Italy <u>https://moo.univie.ac.at/</u>

17-20/9/2023 16th International Workshop on Computational Optimization (WCO23) Warsaw, Poland <u>https://fedcsis.org/2023/wco</u>

17-20/9/2023 EURO PhD School on Retail Operations and Analytics Stockholm, Sweden <u>https://www.su.se/stockholm-business-</u> <u>school/education/courses-and-programmes/summer-school-</u> <u>on-retail-operations-1.636289?q=&xpanded=</u>

18-19/9/2023 7th EURO Working Group on Humanitarian Operations Mini-Conference Bath, United Kingdom https://www.bath.ac.uk/events/euro-hope-mini-conference-2023/

20-22/9/2023 6th EWG Retail Meeting Stockholm, Sweden <u>https://www.su.se/stockholm-business-</u> <u>school/research/conferences-and-seminars/6th-ewg-retail-</u> <u>meeting-stockholm-september-20-22-2023-1.647452</u>

20-22/9/2023 SOR '23 The 17th International Symposium on Operations Research in Slovenia Bled, Slovenia <u>https://sor.fov.um.si/</u>

22-26/9/2023 LOD 2023: The 9th Int. Conf. on Machine Learning, Optimization & Data Science Lake District, UK https://lod2023.icas.cc

23-24/9/2023

FORS50 Conference on Operations Research (OR) Jyväskylä, Finland https://www.operaatiotutkimus.fi/index.php/fors50/

25-27/9/2023 6th European Conference on Computational Optimization (EUCCO) Heidelberg University, Germany https://tinyurl.com/eucco2023

21-13/9/2023 96th Meeting of EURO Working Group on MCDA Paris, France https://mcda96.sciencesconf.org

2-4/10/2023 MOPGP: The 15th International Conference on Multiple Objective Programming and Goal Programming İzmir, Turkey https://mopgp.org/

15-18/10/2023 2023 INFORMS Annual Meeting Phoenix Convention Center, Arizona, USA https://www.informs.org

1-4/11/2023 META'2023 International Conference on Metaheuristics and Nature Inspired Computing Marrakech, Morocco http://meta2023.sciencesconf.org/

18-20/12/2023 Joint Event: 56th Annual Convention of ORSI (2023- ORSI) and 10th International Conference on Business Analytics and Intelligence (2023- ICBAI) Bangalore, INDIA https://mgmt.iisc.ac.in/orsi-ka/

22-26/1/2024 IWOBIP 2024 - International Workshop on Bilevel Optimization Rancagua, Chile <u>https://dmatheorynet.blogspot.com/2023/03/dmanet-savedate-iwobip-2024.html</u>

13-14/3/2024 Heureka '24 - Optimization in Transport & Traffic (in German) Stuttgart, Germany <u>https://easychair.org/cfp/heureka2024</u>

26-28/6/2024 The 3rd International Conference on Applied Mathematics in Engineering (ICAME'24) HYBRID/Balikesir, Turkey https://icame.balikesir.edu.tr/

Spring 2024 97th Meeting of EURO Working Group on MCDA Madrid, Spain

http://www.cs.put.poznan.pl/ewgmcda/

2-7/6/2024

27th International Conference on Multiple Criteria Decision Making (MCDM2024) Hammamet, Tunisia https://mcdm2024.org/

30/6-3/7/2024 EURO 2024 Copenhagen, Denmark https://euro2024cph.dk/

Autumn 2024 98th Meeting of EURO Working Group on MCDA Catania, Italy http://www.cs.put.poznan.pl/ewgmcda/

Spring 2025 99th Meeting of EURO Working Group on MCDA Athens, Greece http://www.cs.put.poznan.pl/ewgmcda/



Books

Dias, Luis, Avaliação Multicritério em Processos de Decisão (Multicriteria Evaluation in Decision Processes), Imprensa da Universidade de Coimbra / Coimbra University Press, September 2022 (in Portuguese)

Abstract:

Many decision-making processes – especially the most important ones – concern decisions that can have several economic, environmental, social or technical consequences. The decision process should then encompass not a single, but multiple criteria in the evaluation of the different alternatives. This book introduces the theme of multi-criteria evaluation in decision processes, from the structuring phase, which defines what to evaluate and how to evaluate, to the attainment of conclusions that are sought to be robust in the face of doubts that may exist. The book criticizes some simplified methods sometimes used in practice, and it presents in detail some wellfounded processes for conducting a multi-criteria evaluation. The text intends to be pedagogical, while identifying some of the most recent advances in the area of multi-criteria decision aiding (MCDA).

Contents:

- 1. Introduction
- 1.1. Multicriteria decision aiding
- 1.2. Panorama of aggregation methods
- 1.3. Book organization
- 2. Structuring: the basis for the analysis
- 2.1. Structuring in the context of a decision process
- 2.2. Actors in a decision process

2.3. Purpose of the evaluation 2.4. Viewpoints for the evaluation 2.5. Criteria and performance 2.6. Types of problem 3. Criticism of simplified approaches 3.1. Simplification strategies 3.2. Borda's positional method 3.3. Weighted sum 4. Multiattribute value functions 4.1. Theoretical basis 4.2. Building utility or value functions 4.3. Additive model 4.4. Return to the example 4.5. Advantages and limitations 5. Complements on multiattribute value functions 5.1. Difficulties to address 5.2. MACBETH 5.3. UTA 5.4. Sensitivity analysis 5.5. Robustness analysis (VIP Analysis) 5.6 Stochastic analysis (SMAA) 6. ELECTRE Methods 6.1. Basic ideas 6.2. Building an outranking relation 6.3. Choice (ELECTRE I) 6.4. Ranking 6.5. Rating (ELECTRE TRI) 6.6. Ranking in association with rating 7. Complements on ELECTRE methods 7.1. Difficulties to address 7.2. Cards method 7.3. Inference 7.4. Robustness analysis 7.5 Stochastic analysis (SMAA) 8. Some specific types of decisions 8.1. Portfolios 8.2. Uncertainty 8.3. Group decision



URL: <u>http://books.uc.pt/book?book=1223</u>

TOPSIS and its Extensions: A Distance-based MCDM Approach

Studies in Systems, Decision and Control (SSDC, volume 447), Springer Nature 2022

Hsu-Shih Shih

Department of Management Sciences, Tamkang University New Taipei, Taiwan, R.O.C. hshih@mail.tku.edu.tw

David L. Olson

Department of Supply Chain Management and Analytics College of Business, University of Nebraska-Lincoln, U.S.A. david.olson@unl.edu

Product details

Publisher: Springer Nature; 1st ed. 2022 edition Language: English Hardcover: 221 pages ISBN-13: 978-3031095764

From the Back Cover

The objective of the book is to provide materials to demonstrate the development of TOPSIS and to serve as a handbook. It contains the basic process of TOPSIS, numerous variant processes, property explanations, theoretical developments, and illustrative examples with real-world cases. Possible readers would be graduate students, researchers, analysts, and professionals who are interested in TOPSIS, a distance-based algorithm, and who would like to compare TOPSIS with other MCDM methods. The book serves as a research reference as well as a self-learning book with step-bystep illustrations for the MCDM community.





Announcements and Call for Papers

Call for the "Bernard Roy Award 2023" of the EURO Working Group on Multiple Criteria Decision Aiding

Policy

-The Bernard Roy Award of EWG MCDA (<u>http://www.cs.put.poznan.pl/ewgmcda/</u>) is a recognition conferred to a researcher under 40 years old for an outstanding contribution to the methodology and/or applications of Multiple Criteria Decision Aiding (MCDA).

-The award will be officially bestowed at the opening session of the EWG MCDA Autumn meeting (in 2023 organized in Paris) if there is a suitable candidate. In this case, following a presentation of the competition by the chair of the Jury, the laureate will be invited to give a talk.

Award

The laureate then will receive the financial award (1000 EUR) and the diploma.

Eligibility

-The Bernard Roy Award of EWG MCDA shall be awarded for a body of work in MCDA, preferably published over the last decade. Although recent work will not be excluded, care shall be taken to allow the contribution to stand the test of time. -The potential award recipient shall have a recognized stature in the MCDA community. Significance, innovation, depth, and scientific excellence shall be emphasized.

Nominations

- Candidates can be nominated by any three members of the EWG MCDA. Becoming a member is free (Please, send an email to <u>Milosz Kadziński</u>.

- A candidature for the Bernard Roy Award of EWG MCDA is composed of the nomination letter along with a recent and detailed CV, up to 5 best publications, as well as a self-description of the achievements up to 3 page long in a standard manuscript format. The nominations must be sent to the Jury chair by the due date of May 20, 2023.

Selection process

-Only one award may be assigned on each occasion. -One person may receive the award at most once in her/his lifetime.

-The jury evaluates the nominees essentially on the basis of their scientific activities (papers in top journals, editorials, relevance of methodological proposals and/or applications, ...).

Jury

-The jury for the current edition is composed of Professors Roman Słowiński (chair), Sara Ben Amor, Maria Franca Norese, Salvatore Greco and Nicolas Matsatsinis.

Timing

-Deadline for nominations: May 20, 2023. -The Jury chair informs the EWG coordinators who invite the laureate to the meeting: July 31, 2023.

-Preparation of the diploma by the EWG coordinators. Presentation of the laureate and her/his talk during the EWG MCDA 96th EWG MCDA meeting, September 2023, ESSCA School of Management, Paris Campus, France. An electronic copy of the laureate's presentation handed over to the EWG coordinators will be made available on the EWG on MCDA Web Site.

Applications should be sent to Professor Roman Słowiński at: <u>roman.slowinski@cs.put.poznan.pl</u>.

BR award: winners

- 2022: Banu Lokman, University of Portsmouth

- 2021: Matteo Brunelli, University of Trento
- 2020: Salvatore Corrente, University of Catania
- 2019: Milosz Kadziński, Poznan University of Technology

Annals of Operations Research

Special Issue on "Advances in Applied Probability and Data Science Dedicated to the 70th Birthday of Professor Michael N. Katehakis"

Submission deadline: December 31, 2023

Special Issue Editors:

Eugene A. Feinberg, Stony Brook University, USA Odysseas Kanavetas, Leiden University, The Netherlands Sheldon M. Ross, University of Southern California, USA Flora Spieksma, Leiden University, The Netherlands

More details can be found here!

Annals of Operations Research

Special Issue on "Advances in Statistical Modelling for Social Science"

Submission deadline: May 31, 2024

Special Issue Editors:

Andrea Nigri, Department of Economics, Management and Territory, University of Foggia, Italy

Susanna Levantesi, Department of Statistics, Sapienza University of Rome, Italy

Leonardo Salvatore Alaimo, Department of Social Sciences and Economics of University of Rome La Sapienza, Italy

More details can be found here!

Annals of Operations Research

Special Issue on "Advances in Stochastic Models Dedicated to the 80th Birthday of Professor Isaac Sonin"

Submission deadline: December 31, 2023

Special Issue Editors:

Eugene A. Feinberg, Stony Brook University, USA Odysseas Kanavetas, Leiden University, The Netherlands Michael N. Katehakis, Rutgers University, USA Sheldon M. Ross, University of Southern California, USA Flora Spieksma, Leiden University, The Netherlands

More details can be found here!

Annals of Operations Research

Special Issue on "Credit Risk Modeling Innovations in a Changing World"

Submission deadline: January 31, 2024

Special Issue Editors:

Galina Andreeva, University of Edinburgh Business School, UK

Jonathan Crook, University of Edinburgh Business School, UK

Christophe Mues, University of Southampton, UK

More details can be found here!

Annals of Operations Research

Special Issue on "Decision-Making Under Uncertainty: A Multidisciplinary Perspective"

Submission deadline: May 15, 2023

Special Issue Editors:

Nan Ye, The University of Queensland, Australia Hanna Kurniawati, Australian National University, Australia Marcus Hoerger, The University of Queensland, Australia Dirk Kroese, The University of Queensland, Australia Jerzy Filar, The University of Queensland, Australia More details can be found here!

Annals of Operations Research

Special Issue on "Ensemble AI-Driven Metaheuristic Optimization in OR: Newest Contributions in Theory, Methods, and Applications"

Submission deadline: June 30, 2024

Special Issue Editors:

Mohammad Shokouhifar, Shahid Beheshti University, Iran Alireza Goli, University of Isfahan, Iran Zaoli Yang, Beijing University of Technology, China Gerhard-Wilhelm Weber, Poznan University of Technology, Poland

More details can be found here!

Annals of Operations Research

Special Issue on "Ensemble Learning for Operations Research and Business Analytics"

Submission deadline: January 15, 2024

Special Issue Editors:

Matthias Bogaert, Ghent University, Belgium Koen W. De Bock, Audencia Business School, France Philippe Du Jardin, EDHEC Business School, France More details can be found here!

Annals of Operations Research Special Issue on "Game Theoretical Models and Applications (SING 18)"

Submission deadline: June 20, 2024

Special Issue Editors:

Encarnación Algaba, University of Sevilla, Spain René van den Brink, Vrije Universiteit, The Netherlands Giuseppe Caristi, University of Messina, Italy Massimiliano Ferrara, University Mediterranea of Reggio Calabria, Italy

More details can be found here!

Annals of Operations Research

Special Issue on "Interpretable Machine Learning and Explainable Artificial Intelligence"

Submission deadline: August 15, 2023

Special Issue Editors:

Kazim Topuz, The University of Tulsa, USA Akhilesh Bajaj, The University of Tulsa, USA Kristof Coussement, IÉSEG School of Management, France Timothy L. Urban, The University of Tulsa, USA

More details can be found here!

Annals of Operations Research

Special Issue on "MCDA in Climate, Technology, and Finance"

Submission deadline: December 31, 2023

Special Issue Editors:

Panos Xidonas, ESSCA School of Management, France Guillaume Schier, ESSCA School of Management, France Béatrice Collin, ESSCA School of Management, France

More details can be found here!

Annals of Operations Research

Special Issue on "Multiple Objective Programming and Goal Programming: Making Better Decisions with Artificial Intelligence and Business Analytics"

Submission deadline: June 15, 2023

Special Issue Editors:

Davide La Torre, SKEMA Business School, Université Côte d'Azur, France

Hatem Masri, University of Bahrain, Kingdom of Bahrain

More details can be found here!

Annals of Operations Research

Special Issue on "Multiple Objective Programming and Goal Programming: Sustainability and Beyond"

Submission deadline: May 15, 2023

Special Issue Editors:

Ayhan Özgür Toy, Yaşar University, Türkiye Levent Kandiller, Yaşar University, Türkiye Hatem Masri, University of Bahrain, Kingdom of Bahrain

More details can be found here!

Annals of Operations Research

Special Issue on "New Trends of Combinatorial Optimization and Application"

Submission deadline: May 30, 2023

Special Issue Editors:

Imed Kacem, Université de Lorraine, France

Safa Bhar Layeb, University of Tunis El Manar, Tunisia

Nelson Maculan, Universidade Federal do Rio de Janeiro, Brazil

A. Ridha Mahjoub, Université Paris-Dauphine, France

More details can be found here!

Annals of Operations Research

Special Issue on "Operations Research in the 21st Century XXI Latin-Ibero-american Conference on Operations Research, CLAIO 2022"

Submission deadline: June 30, 2023

Special Issue Editors:

Valeria Leoni, National University of Rosario, Argentina Javier Marenco, University of Buenos Aires, Argentina Eduardo Moreno, Adolfo Ibáñez University, Chile Juan G. Villegas, Universidad de Antioquia, Colombia Paula Zabala, University of Buenos Aires, Argentina

More details can be found here!

Annals of Operations Research

Special Issue on "OR Applications for Resource Efficient and Climate Change Driven Issues in Digital Sustainable and Circular Supply Chains"

Submission deadline: December 31, 2023

Special Issue Editors:

Malin Song, Anhui University of Finance and Economics (AUFE), China

Sachin Kumar Mangla, Jindal Global Business School, O P Jindal Global University, Haryana, India

Alessio Ishizaka, NEOMA Business School, France

Konstantinos P. Tsagarakis, School of Production Engineering and Management, Technical University of Crete, Greece

More details can be found here!

Annals of Operations Research

Special Issue on "OR Driven Technology Innovation for Efficient Decarbonized Supply Chains in a Digital Economy"

Submission deadline: October 30, 2023

Special Issue Editors:

Suresh K. Jakhar, Indian Institute of Management Lucknow, India

Guo Li, Beijing Institute of Technology, China

Sachin Kumar Mangla, University of Plymouth, UK

Suresh Sethi, University of Texas at Dallas, USA

Malin Song, Anhui University of Finance and Economics, China

More details can be found here!

Annals of Operations Research

Special Issue on "Prescriptive Analytics Using Machine Learning and Mathematical Programming for Sustainable Operations Research"

Submission deadline: May 30, 2023

Special Issue Editors:

Abbas Mardani, University of South Florida, USA Reza Farzipoor Saen, Sohar University, Oman Charbel Jose Chiapetta Jabbour, University of Lincoln, UK

More details can be found here!

Annals of Operations Research

Special Issue on "Recent Trends in Operations Research and Game Theoretic Approach in Decision Making"

Submission deadline: June 30, 2024

Special Issue Editors:

S. K. Neogy, Indian Statistical Institute, India

R. B. Bapat, Indian Statistical Institute, India

K. Manjunatha Prasad, Manipal Academy of Higher Education, India

More details can be found here!

Annals of Operations Research

Special Issue on "Reliability and Statistical Computing"

Submission deadline: May 30, 2023

Special Issue Editor:

Hoang Pham, Rutgers University, USA

More details can be found here!

Annals of Operations Research

Special Issue on "Reliability Management with Applications in Smart Information Systems"

Submission deadline: May 15, 2023

Special Issue Editors:

Cheng-Fu Huang, Feng Chia University, Taiwan Ping-Chen Chang, National Quemoy University, Taiwan

More details can be found here!

Annals of Operations Research

Special Issue on "Risk Management and Modeling in Financial Economics"

Submission deadline: December 30, 2023

Special Issue Editors:

Jean-Luc Prigent, University of Cergy-Pontoise, France Ephraim Clark, Middlesex University, UK Giovanni Barone-Adesi, University of Lugano, Switzerland

More details can be found here!

Annals of Operations Research

Special Issue on "Smart and Sustainable Production, Logistics, and Supply Chain: Trends, Challenges, Methods, and Best Practices"

Submission deadline: November 30, 2023

Special Issue Editors:

Paulina Golinska-Dawson, Poznan University of Technology, Poland

Beata Mrugalska, Poznan University of Technology, Poland

Youngchul Shin, Ajou University, Korea

Gerhard-Wilhelm Weber, Poznan University of Technology, Poland

More details can be found here!

Annals of Operations Research

Special Issue on "Transparent and Responsible Artificial Intelligence: Implications for Operations Research"

Submission deadline: July 31, 2023

Special Issue Editors:

Ali Emrouznejad, University of Surrey, UK

Soumyadeb Chowdhury, TBS Business School, France More details can be found <u>here</u>!

Annals of Operations Research

Special Issue on "Uncertainty in Data and Decision Analytics – IUKM 2023"

Submission deadline: December 18, 2023

Special Issue Editor:

Van-Nam Huynh, Japan Advanced Institute of Science and Technology, Japan

More details can be found <u>here</u>!

Annals of Operations Research

Special Issue on "Understanding the Complexity of Financial and Economic Systems' Dynamics: Evidence from Artificial Intelligence Techniques, Big Data, and Technology"

Submission deadline: September 30, 2023

Special Issue Editors:

Bertrand Maillet, Emlyon Business School, France

Hachmi Ben Ameur, INSEEC School of Business Economics, France

Roberto Casarin, Ca' Foscari University of Venice, Italy Zied Ftiti, EDC Paris Business School, France Massimiliano Caporin, University of Padova, Italy

More details can be found here!

Computers & Industrial Engineering

Special Issue on "New trends in line balancing and model sequencing in assembly, disassembly and manufacturing environments"

Submission deadline: May 25, 2023

Special Issue Editors:

Olga Battaïa (<u>olga.battaia@kedgebs.com</u>), Kedge Business School, France

Xavier Delorme (<u>delorme@emse.fr</u>), Mines Saint-Etienne, France

Alexandre Dolgui (<u>alexandre.dolgui@imt-atlantique.fr</u>), IMT Atlantique, France

Hichem Haddou-Benderbal (<u>hicham.haddou-ben-</u> <u>derbal@univ-amu.fr</u>), Aix-Marseille University, France

More details can be found here!

Computers & Industrial Engineering

Special Issue on "Data-driven value chain digital ecosystem of Manufacturing Enterprises"

Submission deadline: August 31, 2023

Special Issue Editors:

Runliang Dou (<u>drl@tju.edu.cn</u>), College of Management and Economics, Tianjin University, China

Kuo-Yi Lin (<u>kylink1008@hotmail.com</u>), School of Business, Guilin University of Electronic Technology, Guilin, 541004, China

Mohammad T. Khasawneh (<u>mkhasawn@binghamton.edu</u>), Department of Systems Science and Industrial Engineering, State University of New York at Binghamton, USA

Shubin Si (<u>sisb@nwpu.edu.cn</u>), School of Mechanical Engineering, Northwestern Polytechnical University, Xian, 710072, China

More details can be found here!

Computers & Industrial Engineering

Special Issue on "Data-driven value chain digital ecosystem of Manufacturing Enterprises"

Submission deadline: November 30, 2023

Special Issue Editors:

Özer Uygun (<u>ouygun@sakarya.edu.tr</u>), Sakarya University, Sakarya, Türkiye

Caner Erden (<u>cerden@subu.edu.tr</u>), Sakarya University of Applied Sciences, Sakarya, Türkiye

More details can be found here!

Computers & Operations Research

Special Issue on "Variable Neighborhood Search"

Submission deadline: June 30, 2023

Special Issue Editors:

Raca Todosijević (<u>raca.todosijevic@uphf.fr</u>, <u>racatodosijevic@gmail.com</u>), Polytechnic University Hauts de France, Valenciennes, France

Jack Brimberg (<u>Jack.Brimberg@rmc.ca</u>), Royal Military College of Canada, Kingston, Ontario, Canada

Said Salhi (<u>S.Salhi@kent.ac.uk</u>), Kent Business School, University of Kent, UK

Dragan Urošević (<u>draganu@mi.sanu.ac.rs</u>), Mathematical Institute of SASA, Belgrade, Serbia

More details can be found here!

Decision Sciences

Special Issue on "AI-Driven Decision Sciences"

Submission deadline: August 30, 2023

Special Issue Editors:

Meng Li (mli@bauer.uh.edu), University of Houston

Chao Liang (<u>chaoliang@ceibs.edu</u>), China Europe International Business School

Paul A. Pavlou (<u>pavlou@central.uh.edu</u>), University of Houston

More details can be found <u>here</u>!

Decision Support Systems

Special Issue on "The Evolution of Organizations and Stakeholders for Metaverse Ecosystems: Adaptation, challenges and policy interventions"

Submission deadline: August 15, 2023

Special Issue Editors:

Arpan Kumar Kar* (<u>arpan_kar@yahoo.co.in</u>, <u>arpankar@iitd.ac.in</u>), Department of Management Studies, Indian Institute of Technology Delhi, New Delhi, India

Patrick Mikalef (<u>patrick.mikalef@ntnu.no</u>), Department of Computer Science, Norwegian University of Science and Technology, Norway

Rohit Nishant (<u>rohit.nishant@fsa.ulaval.ca</u>), Department of MIS, Faculté des sciences de l'administration, Universite Laval, Quebec, Canada

Xin (Robert) Luo (<u>xinluo@unm.edu</u>), Anderson School of Management, The University of New Mexico, USA

Manish Gupta (<u>manish.gupta.research@gmail.com</u>), School of Management, Mahindra University, Hyderabad, India

* Coordinating Editor

More details can be found here!

Group Decision and Negotiation

Special Issue on "New Trends in Intelligent Group Decision Making and Consensus Modelling"

Submission deadline: July 31, 2023

Special Issue Editors:

Francisco Chiclana, Institute of Artificial Intelligence, School of Computer Science and Informatics, De Montfort University, Leicester, UK

Yucheng Dong, Business School of Sichuan University, China

Enrique Herrera-Viedma, Andalusian Research Institute on Data Science and Computational Intelligence (DaSCI), Department of Computer Science and AI, University of Granada, Granada, Spain

Cong-Cong Li, School of Economics and Management, Southwest Jiaotong University, Chengdu, China

Zhen Zhang, Institute of Systems Engineering, School of Economics and Management, Dalian University of Technology, China

More details can be found here!

International Journal of Production Economics

Special Issue on "Data-driven Digital Transformation in Operations and Supply Chain Management"

Submission deadline: January 20, 2024

Special Issue Editors:

Konstantina Spanaki (<u>kspanaki@audencia.com</u>), Audencia Business School, Nantes France

Denis Dennehy (<u>denis.dennehy@swansea.ac.uk</u>), Swansea University, Wales UK

Thanos Papadopoulos (<u>a.papadopoulos@kent.ac.uk</u>), Kent Business School, University of Kent, UK

Rameshwar Dubey (<u>r.dubey@montpellier-bs.com</u>, <u>r.dubey@ljmu.ac.uk</u>), Montpellier Business School, France and Liverpool Business School, Liverpool John Moores University, UK

More details can be found here!

International Journal of Production Economics

Special Issue on "AI Platforms for Digital Servitization and Solution Delivery"

Submission deadline: December 31, 2023

Special Issue Editors:

Yancy Vaillant (<u>y.vaillant@tbs-education.es</u>), Dept. of Strategy, Entrepreneurship & Innovation, TBS Education, Barcelona, Spain

Samuel Fosso Wamba (<u>s.fosso-wamba@tbs-education.fr</u>), Dept. of Information, Operations and Management Sciences, TBS Education, Toulouse, France

Rodrigo Rabetino (<u>rodrigo.rabetino@uwasa.fi</u>), School of Management, University of Vaasa, Vaasa, Finland

More details can be found here!

International Journal of Production Economics

Special Issue on "Smart Product Platforming in the Industry 4.0 Era"

Submission deadline: September 30, 2023

Special Issue Editors:

George Huang (gqhuang@hku.hk), University of Hong Kong, Hong Kong

Roger Jiao (<u>roger.jiao@me.gatech.edu</u>), Georgia Institute of Technology, USA

Bart MacCarthy (<u>Bart.Maccarthy@nottingham.ac.uk</u>), University of Nottingham, UK

Linda Zhang (<u>l.zhang@ieseg.fr</u>), IESEG School of Management, France

More details can be found here!

International Transactions in Operational Research

Special Issue on "Artificial Intelligence-Driven Decision Making in Health and Medicine"

Submission deadline: July 31, 2023

Special Issue Editors:

Davide La Torre (<u>davide.latorre@skema.edu</u>), SKEMA Business School and Université Côte d'Azur, France

Leopoldo Bertossi, SKEMA Business School and Carleton University, Canada

Herb Kunze, University of Guelph, Canada

Marc Poulin, Abu Dhabi School of Management, UAE

More details can be found here!

International Transactions in Operational

Research

Special Issue on "Decision Support Systemsin an uncertain world"

Submission deadline: November 30, 2023

Special Issue Editors:

Ana Paula Cabral Seixas Costa (<u>apcabral@cdsid.org.br</u>), Federal University of Pernambuco, Brazil

Daouda Kamissoko (<u>daouda.kamissoko@mines-albi.fr</u>), IMT Mines Albi, University of Toulouse, France

José Maria Moreno-Jiménez (<u>moreno@unizar.es</u>), Zaragoza University, Spain

More details can be found here!

International Transactions in Operational

Research

Special Issue on "Efficiency and Productivity Analysis of Public Services in Practice" Submission deadline: December 31, 2023

Special Issue Editors:

Tommaso Agasisti (<u>tommaso.agasisti@uam.es</u>), Politecnico di Milano, School of Management, Italy

Eva M. De La Torre (<u>eva.torre@uam.es</u>), Universidad Autónoma de Madrid, Spain

Kristof De Witte (<u>kristof.dewitte@kuleuven.be</u>), Katholieke Universiteit Leuven, Belgium

Gabriela Sicilia (<u>gsicilia@ull.es</u>), Universidad de La Laguna, Spain

More details can be found here!

Journal of Multi-Criteria Decision Analysis

Special Issue on "AHP/ANP and Cross Fertilizations with other MCDA Methodologies"

Submission deadline: June 30, 2023

Special Issue Editors:

Birsen Karpak (<u>bkarpak@ysu.edu</u>), Youngstown State University, USA

Enrique Mu (emu@carlow.edu), Carlow University, USA

More details can be found here!

Journal of Multi-Criteria Decision Analysis

Special Issue on "The Interface Between Biomedicine and MCDA: A Mutually Beneficial Relationship"

Submission deadline: September 30, 2023

Special Issue Editor:

Evangelos Triantaphyllou (<u>etriantaphyllou@yahoo.com</u>), Division of Computer Science and Engineering, Louisiana State University, Baton Rouge, LA, USA, and Department of Medicine, Section of Hematology and Medical Oncology, School of Medicine, Tulane University, New Orleans, LA, USA

More details can be found <u>here</u>!

OMEGA

Special Issue on "Production and Service Operations Management in Digital Economy"

Submission deadline: December 31, 2023

Special Issue Editors:

Zhong-Zhong Jiang (<u>zzjiang@mail.neu.edu.cn</u>), Northeastern University, Shenyang, China

Liming Yao (<u>lmyao@scu.edu.cn</u>), Sichuan University, Chengdu, China

Xiaoyang Zhou (<u>zhouxiaoyang@xjtu.edu.cn</u>), Xian Jiaotong University, Xian, China

More details can be found here!

OMEGA

Special Issue on "Intelligent decision analysis based on online data"

Submission deadline: June 30, 2023

Special Issue Editors:

Luis C. Dias (<u>lmcdias@fe.uc.pt</u>), University of Coimbra, Coimbra, Portugal

Huchang Liao (<u>liaohuchang@scu.edu.cn</u>), Sichuan University, Chengdu, China

More details can be found here!



Recent contributions in brief

Roselli, L.R.P., de Almeida A.T.. The use of the successbased decision rule to support the holistic evaluation process in FITradeoff. *International Transactions in Operational Research*, v. 30, p. 1299-1319, 2023. https://onlinelibrary.wiley.com/doi/full/10.1111/itor.12958

Most decisions faced by society are multi-criteria decisionmaking/aiding problems (MCDM/A). Therefore, to support Decision-Makers (DMs) to solve these problems, several methods and procedures have been proposed and are available in the literature. The paper entitled "The use of the successbased decision rule to support the holistic evaluation process in FITradeoff" proposed the Success-Based Decision Rule (SBDR), which is an important tool to support DMs and analysts during the decision process with the FITradeoff method. The recommendations provided by this rule are probabilities of success in expressing dominance relations between alternatives using graphical and tabular visualizations. In other words, the SBDR provides recommendations for the analyst and, consequently, DMs to use or not to use visualizations to select the best alternative. The recommendations are derived by combining the probability of success (π) and the standard deviation (σ). This

rule is based on the Hit Rate (HR) variable, applying the Bernoulli model, which fits well in the process. The SBDR has been generated from behavioral studies which used graphical and tabular visualizations to investigate how DMs express dominance relations between alternatives using these kinds of visualizations. Three neuroscience experiments have been conducted using two neuroscience tools: eye-tracking and electroencephalogram. In this context, the SBDR represents a modulation (transformation) made in the FITradeoff method based on behavioral studies. Due to the use of FITradeoff to solve several real-life applications, this method, and consequently the Success-Based Decision Rule, which is implemented in its Decision Support System, presents a potential impact in supporting the society to solve problems in social, environmental, and financial scopes. Hence, the SBDR can indirectly impact the society in supporting decisionmakers to solve important problems regarding their companies and personal life's. In the paper an application to support a supplier selection problem is presented, based on the proposed SBDR. Moreover, the recommendations provided by the SBDR can easily implemented in other MCDM/A in the context of MAVT.

Contact: almeida@cdsid.org.br

Cinelli, M., Burgherr, P., Kadziński, M., & Słowiński, R. (2022). Proper and improper uses of MCDA methods in energy systems analysis. *Decision Support Systems*, *163*, 113848. <u>https://doi.org/10.1016/j.dss.2022.113848</u>

There is optimism in the MCDA/MCDM community when trends show increasing use of their (i.e., MCDA/MCDM) methods in a wide pool of application areas. This is prominent in the literature that focuses on transportation, healthcare, energy systems, contaminated sites, finance, and logistics, to name a few. There is, however, an explicit requirement that should be respected when using MCDA/MCDM methods for a certain decision-making problem, and this is that they need to be fit for the purpose. Like a regular car is fit for driving from city A to city B on a tarmac-paved road, and a barbecue grill is fit for preparing your burger for a nice dinner, MCDA/MCDM methods are fit for providing decision recommendations of a certain type for a specific description of a decision-making process. You would not use a regular car to drive you from city A to city B on an off-road track. You would also not use an induction tablet for cooking a burger if you want it to smell of smoked wood. With this same reasoning, you would not use an MCDA/MCDM method developed for a certain type of decision-making problem for another one. With our work, we evaluate the MCDA methods used in 56 case studies performing energy systems analysis at different scales. We, unfortunately, found that a large share of studies (about 60% of the 56 we analyzed) used MCDA methods that were not the most adequate for the respective decision problem. We clustered these improper uses into six categories and developed dedicated guidelines for each of them. These read as follows:

• Guideline 1: Criteria weights are tailored to each MCDA method;

- Guideline 2: The desired decision recommendation should be carefully selected;
- Guideline 3: Numerical does not always mean quantitative;
- Guideline 4: Numerical does not necessarily mean ratio;
- Guideline 5: Not all the MCDA methods implement the same steps;
- Guideline 6: The interdependencies between the criteria can refine the preference model.

Each of these guidelines is presented as a training tool for MCDA/MCDM students, researchers, and practitioners who want to comprehend the characteristics of the existing MCDA methods and/or develop new and more advanced ones. In addition, the guidelines are streamlined in a web-based software called MCDA Methods Selection Software (MCDA-MSS), available for free at <u>http://mcdamss.com</u>. This is a good solution for MCDA/MCDM methods developers and practitioners (including consultants and analysts) who want to support actual decision-makers in properly applying these

methods in real-life decision-making problems.

Contact: m.cinelli@luc.leidenuniv.nl

Lami I.M., Todella, E. A multi-methodological combination of the strategic choice approach and the analytic network process: From facts to values and vice versa, *European Journal of Operational Research*, Volume 307, Issue 2, 2023, Pages 802-812, ISSN 0377-2217, https://doi.org/10.1016/j.ejor.2022.10.029.

The importance of problem structuring—and Problem Structuring Methods (PSMs) specifically—for Multi-Criteria Decision Analysis (MCDA) has been acknowledged in the literature and practices of the last decades. This depends on the recognition that problem structuring is central to providing a richer view of the problematic situation for the subsequent phases of MCDA. However, little attention has been directed to an opposite point of view, reflecting on any aspects or weaknesses shown by PSMs in the process that can be balanced through integration with MCDA.

The paper proposes a new multi-methodological framework combining a PSM and an MCDA to address the problem of composing facts and values in the decision-making process of policymaking. PSMs interventions imply a process of integration among technical and social aspects to produce knowledge and negotiations. In this research, we address the above-mentioned lack of attention on MCDA contribution to PSMS by adopting a specific perspective on tackling complex socio-technical phenomena, related to Actor-Network Theory (ANT). We position our work theoretically in relation to Bruno Latour's concept of the "collective" as a potential description of the decision-making process, with its conflicts and negotiations, openings, and closures. With Latour, we can say that there are no "separate chambers" in which facts (i.e., the use of public resources, different time horizons) and values (i.e., the values of different stakeholders, the legitimacy of public decisions) are discussed; rather, all these aspects are

considered together in a cycle that encompasses them, progressively expanding and contracting to arrive at a tangible result: a decision.

SCA enables the detection of relevant issues in the decision problems and their articulation in alternatives. At the same time, the integration with ANP allows the hierarchization of alternatives in an aggregated evaluation and, in so doing, discussion of the problem to be faced in a more transparent and more structured—manner. Combining SCA and ANP has the potential for emphasizing the advantages of each method in an integrated practice, as a crucial contribution to how MCDA can be useful for PSMs.



Contact: Isabella.lami@polito.it elena.todella@polito.it

Costa, A. S., Figueira, J. R., & Borbinha, J. (2022). A multiple criteria socio-technical approach for the Portuguese Army Special Forces recruitment. *40R - A Quarterly Journal of Operations Research*, *20*(2), 289–331. https://doi.org/10.1007/s10288-021-00481-2

In this paper, we present an approach for selecting military candidates for the Portuguese Army Special Forces. Through a constructive process with the Decision Maker (DM), who is an expert in the assessment and selection of the candidates to the Portuguese Army, we construct a model using CAT-SD (CATegorization by Similarity-Dissimilarity)-a Multiple Criteria Decision Aiding (MCDA) method for classification problems with nominal categories. These categories are defined a priori without any order of preference among them. The aim is to assign soldiers that completed the initial military training to four categories: Commandos, Paratroopers, Special Operations, and Snipers. Each category is defined by at least one reference profile and the assignment is done depending on the pairwise comparison of the soldiers with those reference profiles in terms of similarity-dissimilarity, while all criteria and preference parameters are considered. We start by designing generic interaction protocols to be used by the analyst and the DM when applying the CAT-SD method and we apply such protocols guided by the analyst for the elicitation of the model parameters (e.g., criteria weights, likeness thresholds, etc.). DecSpace, an online platform for supporting the use of MCDA methods, is used for obtaining the results. Thus, the soldiers are assigned to at least one suitable Special Forces category or to the category 'unsuitable

candidates'. This study is a significant contribution to the research on the recruitment and selection process of the Portuguese Army, and also illustrates how the proposed interaction protocols and the DecSpace can be applied and be potentially used in similar cases.

Contact: anasaracosta@tecnico.ulisboa.pt

Mesquita-Cunha, M., Figueira, J. R., Barbosa-Póvoa, A. P. (2023). New ε-constraint methods for multi-objective integer linear programming: A Pareto front representation approach. *European Journal of Operational Research*, 306(1), 286-307. https://doi.org/10.1016/j.ejor.2022.07.044

Multi-objective problems involve complex decision-making scenarios that require comprehensive analysis. Generation methods offer an interesting approach to these problems by providing the decision-maker (DM) with complete information on the problem, through the whole set of nondominated criterion vectors. Nevertheless, offering too many solutions may overwhelm the DM, making it difficult to identify the best course of action. Alternatively, a representative set of the Pareto front provides an overview of the problem's trade-offs, while still being concise.

Generating a representative set of the Pareto front is also a multi-objective problem that must consider the number of alternatives to present, the uniformity, and the coverage of the representation. In this work, we propose three new ε -constraint based algorithms for the representation problem of multi-objective integer linear programming problems. Each algorithm deals with a specific dimension of the representation problem.

One of the challenges for generation methods is the poor estimation of the Pareto front bounds. This issue is particularly relevant when dealing with more than two objectives and can affect the algorithm's efficiency and representation quality. The proposed algorithms incorporate strategies to overcome this challenge.

The algorithms were evaluated on their efficiency and on the quality of the generated Pareto front representations. The results show that the uniformity and cardinality algorithms are very efficient at computing the Pareto front for binary and integer problems with one or more constraints, ranking amongst the best in literature. Regarding the quality of the generated representations, the experiments highlight that the coverage and uniformity algorithms perform well on their target metric. In contrast, the cardinality algorithm presents a hybrid behavior, showing low coverage errors on lower target cardinalities and high uniformity levels on higher target cardinalities.

Contact: <u>mariana.cunha@tecnico.ulisboa.pt</u>

Stiglmayr, M., Figueira, J. R., Klamroth, K., Paquete, L., Schulze, B. (2022). Decision Space Robustness for Multiobjective Integer Linear Programming. *Annals of Operations Research*, Vol. 319, p. 1769-1791, https://link.springer.com/article/10.1007/s10479-021-04462-w. DOI:10.1007/s10479-021-04462-w Decision space robustness is an important concept which measures the reliability of solutions subject to deviations in the practical implementation, which we investigate in the context of multi-objective integer linear programming. An efficient solution is considered to be decision space robust if many solutions in its neighborhood are sufficiently good alternatives in the case that this solution can not be implemented. This rather new area of research differs from many other robustness concepts dealing with imperfect knowledge of data parameters.

In industrial or economical applications, a previously computed optimal or efficient solution may be subject to small changes or deviations during its implementation phase. These deviations may be due to technical, political, and/or strategic reasons, which are generally not known beforehand and which are thus not included in the optimization model. As a consequence, a solution obtained with an optimization method may, in practice, not be implementable, or may be affected with severe drawbacks. Thus, it would be desirable to have an alternative solution in its neighborhood by which it can be substituted.

We focus on multi-objective integer programming problems that have a discrete solution set. Implementation uncertainties then relate to specific variables as, for example, items that were selected for a knapsack solution, but that become unavailable when the solution is to be implemented. The definition of the neighborhood of a given solution is therefore closely related to the combinatorial structure of the problem.

Decision space robustness measures can be based on one of the questions:

- Are there enough neighboring feasible solutions for a selected efficient solution that may be used to replace it?

- Are there enough efficient neighbors around the selected efficient solution?

- Are there enough high quality neighbors around the selected efficient solution?

In this paper we suggest different decision space quality measures. Thereby, we distinguish between cardinality based indicators like the feasibility robustness and the efficiency robustness indicator, which count the number of feasible solutions or efficient solutions in the neighborhood, respectively, and ε -robustness indicators.

The ε -robustness measures the distance of neighboring solutions to the Pareto front in terms of a stretching factor. Thereby, we consider different variants of ε -robustness by taking the worst-case or the average-case into account.

We illustrate our robustness concepts on multi-objective cardinality constrained knapsack problems and multiobjective shortest path problems. Moreover, we show possible fields of applications for the proposed robustness indicators namely the representation of the efficient set and a composite qualitative robustness index using Electre Tri-C. In both applications decision robustness can be used as a secondary criterion which integrates the implementation robustness of the selected solutions into the decision process.

Contact: stiglmayr@uni-wuppertal.de

Delias, P., Doumpos, M., Grigoroudis, E., Matsatsinis, N. (2023). Improving the non-compensatory trace-clustering decision process. *International Transactions in Operational Research*, 30, 1387-1406.

https://onlinelibrary.wiley.com/doi/epdf/10.1111/itor.1306 2

One of the main functions of process mining is the automated discovery of process models from event log files. In flexible environments, such as healthcare or customer service, delivering comprehensible process models can be very challenging, due to the diversity of the registered logs. A popular response to this problem is trace-clustering, i.e., grouping the diverse process behavior, and discovering a distinct model per group.

propose In this we novel tracepaper, а clustering technique inspired from the outranking relations theory. The proposed technique can handle multiple criteria with heterogeneous scales and it allows a noncompensatory logic to guide the creation of a similarity metric. To this end, we use three key components: (a) we separate factors that are in favor of the similarity from those that are not, through discrimination thresholds, (b) we provide non-concordant factors with a "veto" power, and (c) we aggregate all factors into an overall metric. We also add some elements to make the trace-clustering process more accessible to the DMs and enhance the understandability of the analysis: DMs can guide the clustering process by allowing reinforced or counterveto effects and pairwise constraints. Moreover, DMs can handle outliers through a trimming approach based on an integer linear program.

Our approach provides good performance in the most spotlighted functions of the trace-clustering methods: variant identification, and complexity reduction of the discovered models. In addition, the proposed similarity metric can be used (with some adjustments) to problems such as merging processes, facilitating process reuse, or controlling the compliance with normative models.

Finally, it should be emphasized that although the proposed method returns a similarity score, the goal is to deliver groups of traces. Therefore, this score can be seen as the "voting power" for two traces to get clustered together. An outranking approach is suitable for this task.

Contact: mdoumpos@tuc.gr

Kazibudzki, P.T. (2022). On estimation of priority vectors derived from inconsistent pairwise comparison matrices. *Journal of Applied Mathematics and Computational Mechanics*, 21(4), 52-59.

https://doi.org/10.17512/jamcm.2022.4.05

Kazibudzki PT. On estimation of priority vectors derived from inconsistent pairwise comparison matrices. Journal of Applied Mathematics and Computational Mechanics. The Publishing Office of Czestochowa University of Technology; 2022; 21(4): 52-59. Available from: https://doi.org/10.17512/jamcm.2022.4.05

DESCRIPTION OF THE CONTRIBUTION

The most critical and purely heuristic assumption about PV estimation on the basis of pairwise comparisons is that which states a positive relationship between a consistency of decision makers' judgments and the quality of estimates of their priorities i.e. belief in the truth of the statement: "better consistency of PCM leads to better PV estimates". However, it turns out that such an assumption is not entirely true for every known measure of PCM consistency. Hence, the relationship between variability of different measures of PCM inconsistency, i.e. various Consistency Indices (CI), and estimation errors of PVs is of particular interest for some authors. The issue also constitutes the area of interest of the Multi-Criteria Decision Making (MCDM) theory in relation to AHP, why it's examined in this paper from the perspective of a new measure of PCM consistency that is proposed herein i.e. Index of Square Logarithm Deviations (ISLD). It needs to be emphasized that similar problems of applied mathematics have already been studied and their examinations let discover interesting relations between selected CI and PVs errors. Hence, this paper proposes a new measure of PCM consistency which presents very attractive features in relation to its association with possible estimation errors of PV (both absolute and relative). The research outcome provides an added value for other examinations focusing on ways of PV credibility verification within the AHP.

Contact: p.kazibudzki@po.edu.pl

Pereira, A. A. & Pereira, M. A. (2023). Energy storage strategy analysis based on the Choquet multi-criteria preference aggregation model: The Portuguese case. *Socio-Economic Planning Sciences*, 85, 101437.

https://www.sciencedirect.com/science/article/pii/S003801 2122002385 doi: 10.1016/j.seps.2022.101437

The rise in the generation of renewable energy and its associated output issues begs for the implementation of storage systems capable of addressing them. Indeed, grasping the potential of such technologies regarding both the sector and its tiers is crucial for the sake of policymaking. Accordingly, we have designed a multi-criteria decision-aiding framework to rank energy storage technologies across several levels of the market in collaboration with experts and policymakers from each level. In particular, we have resorted to the Choquet multi-criteria preference aggregation model to account for interactions between pairs of criteria, which resulted in an original application in the energy storage sector. Using Portugal as a generalisable case study, chemical storage solutions (e.g., hydrogen, methane) and electrochemical batteries (e.g., lithium-based, nickel-based) were ranked as distinctive solutions. In fact, the former showed to be suitable for the 'Long-term grid' tier, while the latter exhibited top performances in the 'Microgrid' and 'Mobility' tiers. There were no striking solutions in the 'Short-term grid' tier. Politically, chemical storage and electrochemical solutions, as well as hot water technology, emerged as the most exciting technologies. In the end, after conducting a scenario analysis, we not only proved that criteria interactions had a significant impact on the assessment, but we also explored interesting

perspectives to aid governmental decision-making in light of an energy sustainable development.

Contact: <u>miguel.a.pereira@inesctec.pt</u>

García-Lapresta, J.L., Marques Pereira, R.A. (2022). An extension of Majority Judgment to non-uniform qualitative scales. *European Journal of Operational Research*, 301, 667–674. https://doi.org/10.1016/j.ejor.2021.11.002

The general context is that of social choice with individual evaluations of the alternatives expressed over an ordered qualitative scale. The original proposal of the paper is to extend the framework of Majority Judgment to the case of ordered qualitative scales which are not necessarily uniform. Each of these non-uniform ordered qualitative scales is described by an ordinal proximity measure. Given an ordered qualitative scale and its ordinal proximity measure, the central construct in our model is a weak order defined over multisets of ordinal proximity degrees. On the basis of this weak order, the profile of each alternative can be represented by an ordinal mean, corresponding to the ordinal evaluation which balances the multisets of ordinal proximity degrees associated with the upper and lower ordinal evaluations. Then, the procedure for ranking the alternative profiles consists primarily in comparing their ordinal means, plus a tie-breaking scheme in which the weak order plays once more an important role.

Contact: <u>ricalb.marper@unitn.it</u>



Articles Harvest

(This section is prepared by He Huang he.huang@vub.be)

Abdel-Basset, M., Mohamed, R., Jameel, M., Abouhawwash, M., 2023. Nutcracker optimizer: A novel nature-inspired metaheuristic algorithm for global optimization and engineering design problems. *Knowledge-Based Systems* 262, 110248.

Abdin, A., Fang, Y.P., Caunhye, A., Alem, D., Barros, A., Zio, E., 2023. An optimization model for planning testing and control strategies to limit the spread of a pandemic – the case of covid-19. *European Journal of Operational Research* 304, 308–324.

Abdul-Hamid, A.Q., Ali, M., Osman, L., Tseng, M.L., Lim, M., 2022. Industry 4.0 quasi-effect between circular economy and sustainability: Palm oil industry. *International Journal of Production Economics* 253, 108616.

Abolghasemi, R., Khadka, R., Lind, P., Engelstad, P., Viedma, E., Yazidi, A., 2022. Predicting missing pairwise preferences from similarity features in group decision making. *Knowledge-Based Systems* 256, 109860.

Abouelrous, A., Gabor, A., Zhang, Y., 2022. Optimizing the inventory and fulfillment of an omnichannel retailer: a

stochastic approach with scenario clustering. *Computers* and Industrial Engineering 173, 108723.

Abu-Marrul, V., Martinelli, R., Hamacher, S., Gribkovskaia, I., 2023. Simheuristic algorithm for a stochastic parallel machine scheduling problem with periodic re-planning assessment. *Annals of Operations Research* 320, 547–572.

Ackermann, F., Howick, S., 2022. Experiences of mixed method or practitioners: moving beyond a technical focus to insights relating to modelling teams. *Journal of the Operational Research Society* 73, 1905–1918.

Adak, S., Mahapatra, G., 2022. Effect of reliability on multi-item inventory system with shortages and partial backlog incorporating time dependent demand and deterioration. *Annals of Operations Research* 315, 1551–1571.

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Contributions should be sent to:		
Salvatore Corrente		
Department of Economics and Business		
Corso Italia 55		
95120 Catania Italy		

95129, Catania, Italy E-mail: <u>salvatore.corrente@unict.it</u>