

Editorial

**Constantin Zopounidis · Theo J. Stewart ·
Michael Doumpos**

Received: 7 September 2007 / Accepted: 13 September 2007 / Published online: 18 October 2007
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The complexity of real-world problems continuously creates new challenges for decision analysts, management scientists and operations researchers. “Traditional” methodologies based on a single criterion, such as profit maximization, provide a convenient and often straightforward approach in decision-making. In a realistic context, however, this is rarely the best approach, and there are numerous counterexamples where multiple (conflicting) criteria related to environmental, socio-economic and technological factors need to be simultaneously taken into consideration.

Multiple criteria decision making (MCDM) has evolved over the past decades as a significant field of operations research, dealing with such kinds of problems. Both the theory and practice of MCDM have evolved significantly, focusing on issues such as: (1) the resolution of the conflicting nature of the criteria, (2) the modeling of the decision-makers’ preferences, (3) the identification of compromise solutions and the analysis of their consequences, and (4) the development of decision-making models and paradigms.

The International Society on Multiple Criteria Decision Making has played a crucial role in the development of this field. One of the most important activities of the Society, is the organization of the international MCDM conference. Since the first conference in 1975, the conferences played an important role in bringing together MCDM researchers and facilitating the communication of results in the field. The 18th conference was held in Chania, Greece, during June 19–23, 2006.

C. Zopounidis (✉) · M. Doumpos
Department of Production Engineering and Management, Financial Engineering Laboratory,
Technical University of Crete, University Campus, Chania 73100, Greece
e-mail: kostas@dpem.tuc.gr

M. Doumpos
e-mail: mdoumpos@dpem.tuc.gr

T. J. Stewart
Department of Statistical Sciences, University of Cape Town, Building 28 (PD Hahn), Room 307,
Rondebosch 7701, South Africa
e-mail: theodor.stewart@uct.ac.za

This special issue has been prepared with papers presented at the conference. After a rigorous reviewing process, nine papers were finally selected for publication in this issue. These papers cover a variety of theoretical disciplines of MCDM, including multiobjective mathematical programming, outranking methods, as well as AHP. Several application areas are also considered in the selected papers, such as location problems, agricultural management, telecommunications, and credit risk analysis.

The special issue begins with two papers on the theory of multiobjective optimization. The first paper by Engau presents an approach to model variable preferences for multicriteria optimization and decision-making problems. The underlying preference model is derived as a variable domination structure that is defined by a collection of ideal-symmetric convex cones. Necessary and sufficient conditions for nondominance are established, and the problem of finding corresponding nondominated solutions is addressed and solved on examples. In the second paper, Nishizaki and Notsu consider multiobjective two-person nonzero-sum games in extensive form, and provide necessary and sufficient conditions for nondominated equilibrium solutions. Based on the derived conditions, a mathematical programming problem is formulated for obtaining nondominated equilibrium solutions. The next two papers present solution methodologies for multi-objective location problems. Dias, Captivo and Clímaco develop a memetic algorithm for dynamic location problems, combining genetic procedures and local search. The algorithm is able to solve capacitated and uncapacitated multi-objective single or multi-level dynamic location problems. An interactive procedure is also proposed for the implementation of the algorithm in co-operation with the decision-maker. Karasakal and Nadirler consider facility location problems with interaction between the facility and the demand points, assuming that a facility might be “semi-desirable” based on its undesirable and desirable effects. They consider a bi-objective formulation using as objectives the distance of the facility from the closest demand point and the service cost. A three-phase interactive branch and bound algorithm is proposed to find the most preferred efficient solution. The next paper by Rocha and Dias is related to outranking sorting methods. The authors present an algorithm based on an ELECTRE-type method to aid a decision-maker to progressively sort a set of alternatives into a set of ordered categories, following a consistency principle. The implementation of this methodology in an aggregation/disaggregation context is presented and the relationships with ELECTRE TRI are discussed. The next three papers are related to the theory of pairwise comparisons and real-world applications of the Analytic Network Process (ANP). Bozóki and Rapcsák present some theoretical and numerical properties of Saaty’s and Koczkodaj’s inconsistencies of pairwise comparison matrices (PRM). By statistical analysis, the empirical distributions of the maximal eigenvalues of the PRM depending on the dimension number are obtained. Finally, the inconsistency of asymmetry is dealt with, showing a different type of inconsistency. In the next paper, García-Melón, Ferrís-Oñate, Aznar-Bellver, Aragonés-Beltrán and Poveda-Bautista present an application of ANP to farmland appraisal. The proposed methodology addresses some shortcomings of traditional appraisal methods, which cannot deal with partial information and/or qualitative variables. The ANP approach is applied to a case study of a farm located in Spain, using both quantitative and qualitative variables. The following paper by Tosun, Gungor and Topcu uses ANP in telecommunications. Based on a survey conducted in Turkey, the authors apply ANP in order to measure the consumers’ preferences for Turkish mobile telecommunication providers and to assess the relative importance of the factors influencing the preferences of the consumers. The special issue closes with the paper of Marinakis, Marinaki, Doumpos, Matsatsinis and Zopounidis on the use of metaheuristic algorithms for feature selection in credit risk assessment with nearest neighbor classifiers. The performance of tabu search, genetic algorithms and ant colony optimization is tested for the selection of the most relevant

credit rating criteria (features) that optimize the predictability of the resulting models. A comparison with multicriteria and other non-parametric methods, illustrates the potential of metaheuristics in this field.

Sincere thanks must be expressed to all the authors whose contributions have been essential in creating this special issue. We also owe a great debt to those who worked long and hard to review all the submitted papers and contributed to the achievement of this special issue's high standard.