ABSTRACTS

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1. MCDA theory and practice

1.1. MCDA theoretical foundation I.

Family of criteria
BISDORFF Raymond

In this communication we intend to discuss the methodological requirement of the underlying family of criteria to be consistent as promoted in the scope of the Electre multi-criteria aggregation approach. This consistency property, as proposed by Bouyssou & Roy, is at the base of the additive construction of their out-ranking index. Or, the recent discussion about the perspective of non additive preference aggregations as proposed by Grabisch & Roubens, directly challenges this methodological requirement and thereby the core of the Electre global preference aggregation approach. We will explore the cognitive, logical and operational foundations of this consistency property and eventually show some non-additive generalization of the Electre aggregation methods.

From verbal judgements to scores: a new look on Saaty's approach
BANA E. COSTA C. - VANSNICK J-C.

Lots of articles have been devoted to critical analysis of Saaty's method, from various perspectives. However, as far as we know, none of those articles addresses explicitly what we consider to be a fundamental problem (probably, the most basic one) in Saaty's quantification procedure: its violation of elementary and common-sense measurement conditions. This paper is devoted to this core subject, and it also discusses the significance of Saaty's Inconsistency Ratio.

On the entropy of non-additive weights
MARICHAL Jean-Luc - ROUBENS Marc

We consider a Choquet capacity, that is a set function which describes the importance of every subset of criteria in a MCDA problem. The following question is approached : what is the generalized counterpart of the Shannon entropy (defined for a probabilistic measure) for such a capacity? The extension that is proposed depends on the scale type.
In the cardinal case, the entropy is defined in terms of the first derivatives of the non-additive measures.
In the ordinal case, it refers to the cardinality of the scale values that appear in the set of all capacities.
Both generalized entropies are symmetric functions of the capacities and their extreme values (max entropy and min entropy) are characterized.
An application to the determination of weights is given when interactive criteria are considered.

1.2. MCDA theoretical foundation II.

Robustness of choice function regarding weights of criteria
DURAND Sylvian J. - TRENTESAUX D.

We discuss the robustness of two classical choice functions (Maximin and Borda) regarding a variation of the weights of the criteria. The main aim is the validation of a hypothesis often met, but never proved, in the literature, and according to which Maximin would be more robust than Borda's. After a few recalls, we shall present simple similar indicators (one for each function) that allow the measurement of the 'local' robustness of the functions, i.e. for one given function, the comparison of the robustness in two different points. These local indicators induce the principle of a global indicator, the value of which can be evaluated through a class of random profiles. The results thus obtained validate the hypothesis and suggest extensions to other choice functions like the 'min in favor' choice.

Normalization of attributes affects the results of MADM methods
PAVLICIC Dubravka

This article deals with the effects which simple-linear (SN), Nijkamb's (NN) and vector (VN) normalization procedures have on the final choice of MADM methods. We made the following conclusions: 1) MADM methods based on SN or VN violate the condition of value invariability, i.e. affine transformations of empirical values could change the final rankings. If some quantitative attribute is measurable with interval scale, then the very choice of its measurement unit could determine the final results. The same applies to qualitative attributes, as being measurable with Likert type scales, which are considered to be interval scales. 2) MADM methods based on SN, NN or VN violate the condition of descriptive invariability. It means that the framing of attributes (whether an attribute is represented in its benefit form or in costs form, if both forms are possible) could affect the result. 3)MADM methods based on SN or VN violate the condition of contraction consistency, a, and the condition of expansion consistency, b'. Condition a: if alternative X is the best in the set S of all alternatives, then it has to be the best in every proper subset A which belongs to S. Condition b': if alternative X is the best in every subset A of S, than it has to be the best in set S. The violation of a and b implies that exclusion or inclusion of irrelevant alternatives could change the final choice.

1.3. MCDA preference modelling I.

Nontransitive decomposable conjoint measurement as a general framework for decision
BOUYSSOU Denis - PERNY Patrice - PIRLOT Marc

Conjoint measurement may be seen as the building block of most decision models under uncertainty and, in particular, Subjective Expected Utility. Traditional

STREAM: A	Session N° 1	MCDA THEORETICAL FOUNDATION I

Invited session organised by J.P. BRANS, M. ROUBENS and Ph. VINCKE

Chairman: **Ph. VINCKE**

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Keywords: Multi-criteria analysis, Fuzzy sets, Decision support systems

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Title: From verbal Judgements to scores: A new look on Saaty's approach

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Title :   On the entropy of non-additive weights

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