Evaluation of Multi-criteria Methods

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1   Introduction

The introduction of the reference points concept in the ranking procedures of Multi-criteria Methods dates back to the early seventies. A reflection which was quickly implemented by some researchers of this time, we note in particular B.Roy [1], [2] by the proposal of Electre family methods which the use of two reference points (the concordance index and the discordance index) plays a crucial role in the definition of the best alternative as well as the total ranking. Nobody can ignore the efficiency of this approach [3], [4], [5], [6]. More especially since many multi-criteria methods constituted a satisfaction source of decision makers in various fields.

2   Topsis methods

In the same way of research, Paul Yoon and Ching-Lai Hwang [7] gave rise to the TOPSIS method in the early eighties. It is essentially based on some principles of the Multiobjective Programming. Some years later an improved version of this method, called the revised TOPSIS, was proposed by Deng and al [8].

3   Improved Topsis

In a slightly different context, we will present a personal contribution to the previous established research works, it consists in showing some weaknesses in the performance of the method TOPSIS. Indeed, a numerical example allow to call into question the use of the anti-ideal

point in the best-alternative definition will be proposed. On this basis, an improvement to this method (new proposition) will thus be introduced.

Otherwise, through a computer program developed on Matlab (a code Matlab), a comparative study between Topsis revised and the improved method is presented (a statistical study based mainly on randomly generated instances), its purpose is to show the effectiveness of the new method.

References

[1] B. Roy, D. Bouyssou (1993), Aide Multicritère à la Décision: Méthodes et Cas, Paris, Economica.

[2] J. M. Martel, B. Roy (2006), Analyse de la Signifiance de Diverses Procédures d'Agrégation Multicritère, INFOR, pp.119–215.

[3] A. Rolland (2006), Points de référence en décision multicritère, LIP6 – Laboratoire d'Informatique de Paris VI.

[4] M. Grabisch and P. Perny (2003), Agrégation multicritère, 81-120, C. Marsala (Ed);

[5] M. Grabisch (2004), A constructive approach to multi-criteria decision making, Université Paris I, Panthéon - Sorbonne, LIP6.

[6] D. Bouyssou and P. Perny (1997), Aide multicritère la décision et théorie du choix social, Nouvelles de la Science et de la Technologie, 15(4), 61-72.

[7] Hwang CL, Yoon KP (1981), Multiple attribute decision making: methods and applications. Springer, New York;

[8] Deng H, Yeh CH, Willis RJ (2000), Inter-company comparison using modified TOPSIS with objective weights. Computers & Operations Research 27: 963–973;

[9] E. Triantaphyllou and S. H. MANN, An Examination of the Effectiveness of Multi-Dimential Decision-Making Methods: A Decision-Making Paradox, Decision Support systems 5, 1989, pp. 303–312;

[10] E. Triantaphyllou, Two New Cases of Rank Reversals when the AHP and Some of its Additive Variants are Used that do not Occur with the Multiplicative AHP, Louisiana State University, Baton Rouge, LA 70803-6409.