Multi-criteria group decision making based on bilateral agreements

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Multi-criteria group decision making based on bilateral agreements

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Abstract

In multi-criteria group decision making, a key issue is aggregating individual preference into group one. In this study, we employ a bilateral agreement to conduct group evaluation of alternatives. The bilateral agreement between a pair of individuals could be on the weight of a criterion, a criterion evaluation function, or willingness to pay. Any one of three types of bilateral agreements can derive the group utility. To express the relationship between the bilateral agreement and individual evaluations, the quasi-arithmetic mean is used, which can ensure the consistency property of the pairwise comparison matrices. The minimum requirements are explored to obtain the group preference, which shows that n-1 pairs of bilateral agreements are necessary. Finally, several examples are provided to illustrate the proposed methods.

Keywords: Multiple criteria analysis; group decision making; bilateral agreements; quasi-arithmetic mean; pairwise comparison matrix.

1. Introduction

Multi-criteria group decision making has been applied in many areas, such as consumer purchasing selection, biotechnology management, evaluating weapon systems, assessing low carbon supply chains, etc. A key problem in multi-criteria decision making is how to aggregate the individual preference into the group one. Suitable aggregation operators should be selected in specific situations. For example, as a widely used technique to express the decision makers' preference about alternatives or criteria (Rezaei and Ortt, 2013; Dong et al., 2013; Durbach et al.,

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