An Extensive Group Decision Methodology for Alliance Partner Selection Problem in Collaborative Networked Organisations

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ABSTRACT

More and more companies address collaborations and cooperation as strategic topics to build competitive networks and broaden the global competences provided by the community thus created. These companies can cooperate with partners to share resources, competences, risks, or costs. Besides, penetrating new markets can be easier when associating new partners. The selection process of an adequate partner considered for a specific objective is a key success factor. This paper proposes an evaluation methodology for selecting an alliance partner in the case of a network of enterprises, manufacturing high precision mechanical components. An extensive group decision methodology is developed using both quantitative data and qualitative judgments in the evaluation of criteria. Since some performances cannot be represented with crisp numbers, the proposed methodology allows experts to use linguistic variables to express their judgments for the assessment of qualitative criteria. Two main phases are integrated in this methodology. In the first phase, criteria and experts weightings are calculated to determine the criteria importance using fuzzy the analytical hierarchy process. In the second phase, a technique for order preference by similarity to ideal solution is proposed to rank the different alternatives, corresponding to the alternative partnerships.

Keywords: Analytical Hierarchy Process (AHP), Fuzzy Logic, Group Decision Making, Partner Selection, Topsis

INTRODUCTION

As global economy has become a reality, firms wishing to remain competitive and continue generating profits, but without building new core competences, need to look for potential partners to strengthen their positions on the market. In this context, alliance partners could be one of the possible solutions. The ultimate motivation of firms participating in such
strategic alliances is their aspiration to create value that the firm would not have been able to create alone (Hajidimitriou & Georgiou, 2002). Alliance partner selection is a strategic decision intended to evaluate and select the best enterprise among potential partners for a specific or general purpose. This determines the mix of skills, knowledge, and resources, its operating policies and procedures, and its vulnerability to indigenous conditions, structures, and institutional changes (Child & Faulkner, 1998; Wu, Shih, & Chan, 2009).

On the other side, evaluating alternatives from a set of criteria is a complex process. The considered alternatives have to be evaluated under conflicting criteria to find the optimal partnership. To address these problems, multi-criteria decision-making (MCDM) methods are formal approaches to structure information and decision evaluation in problems with multiple and conflicting goals. Indeed, MCDM techniques can help users understand the results of integrated assessments, including tradeoffs among policy objectives, and can use those results in a systematic and defensible way to develop policy recommendations (Wang, Cheng, & Kun-Cheng, 2009).

On the one hand, exact data may be difficult to be precisely determined since human judgments are often vague under many conditions (Chen & Tsao, 2008). To address the vagueness, ambiguity and subjectivity of human judgment, Zadeh (1965) introduced the fuzzy sets theory to express the linguistic terms in decision-making (DM) processes. The linguistic expressions in fuzzy theory are considered as natural representations of preferences or judgments. Each linguistic variable can be assigned to one or more linguistic values, which are in turn connected to a numeric value through the mechanism of membership functions. Fuzzy set theory aids in measuring the ambiguity of concepts associated with subjective human judgments. To that extent, fuzzy MCDM theory can strengthen the comprehensiveness and reasonableness of the decision-making process (Wang, Cheng, & Kun-Cheng, 2009). On the other hand, in real evaluation and decision making problems within industrial contexts, it is important to involve several experts from different functional areas in the decision making process. It is common for some groups to constantly make complex decisions within organizations. However, in order to use a MCDM technique, it is usually assumed that the needed information for the process is provided in advance by a team or a task group (Roghanian, Rahimi, & Ansari, 2010; Shih, Shyur, & Lee, 2007). The decision-making process related to the choice of an alliance partner has been studied from several theoretical points of view relating to the context, the knowledge-based view, the competence-based view of the enterprise, game theory perspective, the organizational learning perspective, the resource perspective, transaction costs and the trust and commitment between partners (Bierly & Gallagher, 2007; Solesvik & Encheva, 2010). Most of the time, researchers transform the considered criteria into a global function that allows dealing with a single criterion (Wu & Su, 2005). In our work, the focus is put only on multi-criteria decision making or multi-attributes decision making techniques. With this respect, Hajidimitriou and Georgiou (2002) present a quantitative model, based on a goal programming technique, which uses appropriate criteria to evaluate potential candidates and leads to the selection of the optimal partner. Fuqing and Dongmei (2006) used a multi-objective optimization model to select partners. However, they integrate the notion of schedule and inefficient enterprises for a considered objective. They developed a genetic algorithm in order to select the best candidate according to the calculation of a probability to succeed. Among the other formal techniques that addressed the problem, the formal concept analysis consists of a method to visualize data and its inherent structures, implications and dependencies. The approach was used to select the best potential partner in horizontal collaboration in ship design, where the data set related to information on characteristics of potential partner’s firms, are converted into a concept lattice for a subsequent analysis (Solesvik & Encheva, 2010).