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Optimizing partners' choice in IS/IT outsourcing projects: The strategic decision of fuzzy VIKOR

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ABSTRACT

The decision of strategic information system/information technology (IS/IT) outsourcing requires close attention to the evaluation of supplier/vendor selection process because the selection decision involves conflicting multiple criteria and is replete with complex decision-making problems. Selecting the most appropriate suppliers/vendors is considered an important strategic decision that may impact the performance of outsourcing engagements. The purpose of this study is to provide a more efficient delivery approach for evaluating and assessing possible suppliers/vendors. Using the fuzzy VIKOR method, this study provides a rational and systematic process for developing the best alternative and compromise solution under each of the selection criteria. The study's finding offers an important reference for resolving fuzzy multi-criteria decision-making problems.

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1. Introduction

In recent years, advances in technology have forced firms to develop their core competencies through the outsourcing of strategic information system/information technology (IS/IT). Dhar and Balakrishnan (2006) indicated that IS/IT outsourcing is a way to transfer some or all of IS/IT-related decision-making rights, business processes, internal activities, and services to external providers, which can more effectively manage time and costs as well as improve productivity, quality, and customer satisfaction. Consequently, many organizations seek to improve their competitiveness, reduce costs, focus more of their internal resources on core activities, and sustain their competitive advantage by engaging in IS/IT outsourcing (Parry et al., 2006).

IS/IT outsourcing, and facilities management in particular, is growing dramatically and continues to be a tempting strategy by which organizations can leverage their specialized technologies and core competencies. In conceptual and empirical studies, the concept of transaction cost economics (TCE) and resource-based view (RBV) have emerged as theoretical approaches explaining the choice of a strategy in the IS/IT outsourcing decision-making process (Cao and Wang, 2007; Williamson, 1985). TCE is concerned with discovering the most efficient arrangement for an economic transaction in regard to which a firm must basically choose between carrying out the transaction itself, engaging in an externalized transaction, or collaborating with a third party (Gemser et al., 2004). In general, TCE has provided firms with the greatest efficiency in terms of cost minimization and has identified organizational capabilities for improving competence and sustained performance (Santos and Eisenhardt, 2005). From the RBV standpoint IS/IT outsourcing provides an alternative strategy that gives firms the ability to effectively leverage knowledge transfer capabilities in which knowledge is a potential source of competitive advantage (Bourlakis and Bourlakis, 2005). Thus, firms have the competitive advantage when they possess capabilities, processes, and/or knowledge that help them

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differentiate the value that they provide their customers from that provided by their competitors (Collins and Hitt, 2006).

Firms seek to capitalize on and increase their capabilities and endowments, and interfirm cooperation allows firms to share resources and, thereby, overcome resource-based constraint to growth (Halawi et al., 2006). Recent studies have focused on the capability of partnerships to create significant competitive advantages in a complex environment. Having a long-term relationship with a well-chosen supplier can reduce the cost of material and improve corporate competitiveness. Many research results have indicated that the decision involved in selecting suppliers becomes the most important activity of an outsourcing process (Aissaoui et al., 2007). In the management of IS/IT outsourcing activities, supplier/vendor selection decisions are an important component of the IS/IT outsourcing process, where the firm has to choose between a number of distinct IS/IT suppliers/vendors (Araz and Ozkarahan, 2007; Xia and Wu, 2007). In general, selecting the right supplier/vendor is always a difficult task for decision-makers; in particular, the trend of IS/IT outsourcing activities requires close attention to the outsourcing contract selection process because the process of selection decisions is replete with complex decision problems (Almeida, 2007), especially in uncertain situations involving multiple and possibly conflicting criteria or objectives and including a variety of preferences among decision makers. Therefore, the decision to outsource IS/IT projects should be weighed carefully, as an effective decision is critical to the company's future success.

In the supplier/vendor evaluation process, the strategic decision often incorporated critical product- and service-related decision criteria, such as price, delivery performance, and quality (Opricovic, 1998; Amid et al., 2006). Dickson (1966) identified 23 supplier/vendor selection criteria that provided a framework for the evaluation of the supplier/vendor selection process. Weber et al. (1991) proposed that supplier/vendor selection is a multi-criteria decision-making process since supplier/vendor selection is a multi-criteria problem that includes both tangible and intangible criteria (Demirtas and Üstün, 2008). Ellram (1990) presented three dimensions of selection criteria, which emphasized the financial stability of the supplier/vendor, the organizational culture and strategic fit of supplier/vendor, as well as the technological capabilities of the supplier/vendor. In other studies, Grupe (1997) and Akomode et al. (1998) determined several criteria to which firms must pay close attention during the outsourcing process because the selection of an available supplier/vendor is critical to the success of an outsourcing relationship.

Decision making, however, is the procedure of seeking the best solution among a set of feasible alternatives in the presence of multiple criteria. Firms are faced with complex and multi-criteria decision-making problems in selecting IS/IT suppliers/vendors, and the inherently subjective nature of human judgments may not always be realistic or feasible in dealing with the complexity and uncertainty involved in real-world decision-making problems (Yu, 1973; Opricovic, 1998; Wadhwa and Ravi Ravindran, 2007). An effective tool is needed to help firms prequalify their suppliers/vendors based on their overall performances in order to adequately exploit and evaluate the outsourcing decision (Talluri and Narasimhan, 2004; Bottani and Rizzi, 2008). In choosing an analytical method, such as mathematical, statistical, or theoretical models for dealing with imprecise, uncertain, and complex decision-making problems, researchers have proposed several effective tools connected with fuzzy set applications and different multi-criteria decision-making (MCDM) approaches, such as the technique for order preference by similarity to ideal solution (TOPSIS). Further studies have extended MCDM in a fuzzy environment by using a fuzzy multi-criteria decision-making (FMCDM) method or other advanced techniques, such as the VlseKriterijumska Optimizacija I Kompromisno Resenje (VIKOR) method, to solve the problem for the supplier/vendor selection.

Fuzzy logic, or fuzzy set theory, was proposed by Zadeh (1965) in 1965 as a mathematical concept to deal with decision-making problems in which the phenomena are imprecise, and uncertain, with conflict of preferences involved in the selection process. Zadeh's fuzzy set theory offers a mathematical system form and helps to reduce the complexity of modeling nonlinear problems by using linguistic variable or fuzzy numbers to identify the conditions in the system and reduce them to a rule base that gives varying responses to varying multiple inputs (Opricovic and Tzeng, 2007; Bellman and Zadeh, 1970). MCDM is a complex, dynamic process in which the ratings and the weights of criteria are measured in crisp numbers. The classical MCDM method, TOPSIS, was first developed by Yoon and Hwang (1985) as a multiple-criteria decision-making method that viewed a multi-attribute decision-making (MADM) or a MCDM problem with m alternatives as a geometric formula with m points in k-dimensional space (Chen, 2000). The basic principle of this method is that the chosen alternative should have the shortest possible distance from the positive ideal solution (PIS) and the farthest possible distance from the negative ideal (NIS). With this characteristic, the process is employed to obtain crisp performance values for determining the rank order of all alternatives and identifying solutions from a finite set of alternatives by two reference points based on the shortest distance from the PIS and the farthest from the NIS or nadir using these two reference points (Dweiri and Kablan, 2006; Chen et al., 2006). Thus, MCDM establishes preferences for evaluating, ranking problems, and selecting available alternatives from a set of alternatives in the presence of multiple (usually conflicting) criteria (Gomes et al., 2008). Specifically, MCDM methods generally required the definition of quantitative weights for the criteria among the feasible alternatives and established criteria.

Moreover, Bellman and Zadeh (1970) manipulated the fuzzy set concept and the MCDM method to consider the fuzziness in the decision data and group decision-making process. They proposed a FMCDM process based on the incorporated efficient fuzzy model and concepts of positive and negative ideal points for solving

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