Evaluating knowledge management capability of organizations: a fuzzy linguistic method

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Abstract

Knowledge management capability (KMC) is the source for organizations to gain the sustainable competitive advantage. KMC evaluation is a required work with strategic significance. However it still has not been addressed in the existing literatures. So the objective of this study is to investigate a fuzzy multiple attributes decision-making method (FMADM) for evaluating KMC. In this paper, a framework for evaluating KMC is presented, which includes two parts, one is an evaluation hierarchy with attributes, the other a judgment matrix model with two dimensions to identify the evaluation results of KMC. Then, a fuzzy linguistic approach is proposed to evaluate the KMC of organizations. The evaluation results of KMC obtained through the proposed approach are objective and unbiased due to two reasons. Firstly, the results are generated by a group of experts in the presence of motile attributes. Secondly, the fuzzy linguistic approach employed in this paper has more advantage to reduce distortion and losing of information than other fuzzy linguistic approaches. Through evaluation result of KMC, managers could judge the necessity to improve the KMC and determine which dimension of KMC is the most needed direction to improve. Additionally, an example is used to illustrate the availability of the proposed method.

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1. Introduction

Knowledge management (KM) has been described for its possible role in creating sustained competitive advantages for organizations (Chuang, 2004; Grant, 1996; Johannessen & Olsen, 2003; Nonaka & Takeuchi, 1995). The contributions of KM to competitive advantage may include: improved ability of innovation, improved coordination of efforts and rapid commercialization of new products. Other contributions may include: the ability to anticipate surprise, responsiveness to market change, and reduced redundancy of information/knowledge. So, many organizations are making extensive KM efforts. Unfortu-

nately, many KM projects are, in reality, information management ones. When these projects yield some consolidation of data but little innovation in products and services, the concept of KM is cast in doubt (Gold, Malhotra, & Segars, 2001). The main reason for this problem is that organizations may not identify and assess the preconditions that the efforts to KM are necessary. Therefore, organizations cannot understand the success and failure of KM within organizations. These preconditions are described broadly as 'capability' or 'resources' within the organizational behavior literature (Kelly & Amburgey, 1991; Law, Wong, & Mobley, 1998; Leonard, 1995).

There has been much research dealing with KM capability (KMC). Desouza (2003) argued that the ideal organization with well-matured KMC can ensure the identification, distribution, protection, application and destruction of knowledge. Therefore, KMC is the key to preempting an

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organizational crisis. Lubit (2001) argued that tacit knowledge and superior KMC are now the keys to sustainable competitive advantage in many industries. Liu, Wen, and Tsai (2004) examined the association between KMC and competitiveness by empirical study. The result reveals that KMC has a tremendous effect on organizational competitiveness. KMC is considered more than a catch-all for information and knowledge. It is a tool for maintaining information and knowledge that will help employees to work more efficiently (Liu et al., 2004). Collinson (2001) emphasized the significance of contextual factors for transferring some KM practices by case study. Bresnen, Edelman, Newell, Scarbrough, and Swan (2003) examined the significance of social factors in enhancing KMC in project environments by case study. Gold et al. (2001) and Chuang (2004) presented and validated the framework for analysis of KMC using different attributes. Thus, many efforts have been made to emphasize the significance of KMC, and analyze and explore the attributes of KMC. However, the evaluation of KMC with the qualitative multi-attributes has seldom been addressed.

Indeed, there are many approaches that can be used to evaluate the KMC. For example, scoring tool may be the simplest approach to evaluate the KMC. However, usually, most experts can not give exact numerical values to express their opinions based on human perception. More realistic measurement is to use linguistic assessments instead of numerical values (Beach, Muhlemann, Price, Paterson, & Sharp, 2000; Gerwin, 1993; Herrera & Herrera-Viedma, 2000; Kacprzyk, 1986; Vokurka & O'Leary-Kelly, 2000). Attributes can be measured as linguistic labels (or terms) such as 'very high', 'high', 'middle', 'low', and 'very low' (Wang & Chuu, 2004). After Zadeh (1965) introduced fuzzy set theory to deal with vague problems, linguistic labels have been used within the framework of fuzzy set theory (Zadeh, 1975a, 1975b, 1976) to handle the ambiguity in evaluation data and the vagueness of linguistic expression (Wang & Chuu, 2004).

Therefore, the purpose of this study is to establish an evaluation framework of KMC for organizations and to investigate a fuzzy linguistic approach to evaluate the KMC in a fuzzy environment. Section 2 presents an evaluation framework of KMC for organizations, in which, the dimensions and attributes of KMC are introduced and a judgment matrix model is presented. Based on the characteristics of dimensions and attributes discussed in Section 2, a fuzzy linguistic approach is then proposed to evaluate the KMC of organizations in Section 3. Section 4 illustrates the proposed method with an example.

2. An evaluation framework for KMC

In this section, we will present an evaluation framework for KMC. The framework consists of two parts, an evaluation hierarchy and a judgment matrix model for KMC. In the hierarchy, the attributes for evaluating KMC are finalized through literature review. Based on the evaluation

hierarchy, a judgment matrix model with two dimensions is constructed, one dimension is infrastructure capability and the other is process capability. The evaluation result of KMC can be visualized in the matrix model, which is convenient for managers to identify the KMC of organizations.

2.1. An evaluation hierarchy for KMC

The contents of KMC presented by Gold et al. (2001) and Chuang (2004) were expressed with two dimensions and seven attributes. One dimension is infrastructure capability, including attributes of technology, structure and culture. The other dimension is process capability, including attributes of acquisition, conversion, application and security. Gold et al. (2001) argued that knowledge capabilities were additive in nature according to the empirical research. Infrastructure capability was a sum of technological, structural and cultural capability. Likewise, process capability was an additive effect of acquisition, conversion, application and protection capability. Thus, KMC can be additively determined by its dimensions and extending attributes. For convenience, the infrastructure capability is represented as X. Its attributes are represented as X_1, X_2, and X_3 accordingly. Likewise, the process capability is represented as Y. Its attributes are represented as Y_1, Y_2, Y_3, and Y_4. The evaluation hierarchy of KMC is shown as Fig. 1. The grades of importance of these attributes depend on the industry to which an organization belongs and the strategy that the organization implements. Furthermore, in order to facilitate experts to provide precise judgments, the details on attributes of each dimension of KMC are also described in Table 1.

2.2. A judgment matrix model for KMC

From the above, it is easy to see that the KMC of organizations is related to two dimensions, infrastructure capability and process capability. Both of them are very important and any one can not be missing. More specific,
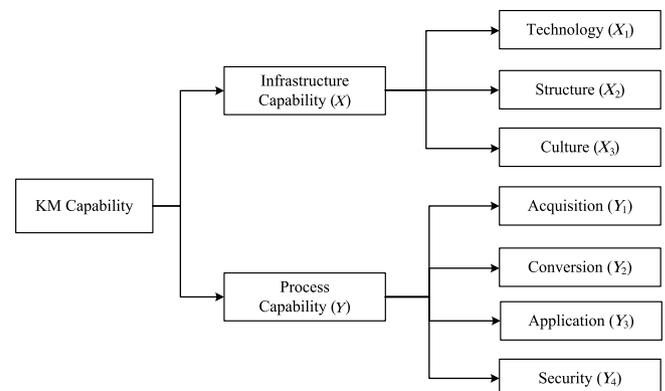

Fig. 1. The evaluation hierarchy of KMC (Chuang, 2004; Gold et al., 2001).