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Fuzzy Logic Model for Benchmarking Knowledge Management Performance of AEC Firms

Serdar Kale, Erkan Karaman
Balikesir University, Balikesir, 10145, Turkey
skale@balikesir.edu.tr, ekaraman@balikesir.edu.tr

Abstract
Knowledge management is rapidly becoming a key capability for creating competitive advantage in the construction industry. The emergence of knowledge management as a key capability for creating competitive advantage poses enormous challenges to executives of construction firms. This paper proposes a model for benchmarking knowledge management performance of AEC firms that can guide construction business executives to meet these challenges. The proposed model incorporates benchmarking and knowledge management concepts with fuzzy set theory to adequately handle imprecision, vagueness and uncertainty that prevail in this process. It uses the fuzzy-weighted average (FWA) algorithm to benchmark the knowledge management performance of AEC firms. It is an internal reporting model that can guide executives of AEC firms to benchmark and evaluate their firm's ability to achieve their strategic objectives and to pinpoint their firm's strengths and weaknesses in order to neutralize threats and to exploit opportunities presented by today's construction business environment. A real-world case study is presented to illustrate the implementation and utility of the proposed model.

Keywords
Knowledge management, Benchmarking, Performance, Fuzzy set theory

1. Introduction

There is increasing recognition that knowledge management is a key capability for AEC firms in today's business environment (e.g., Kululanga and McCaffer 2001; Egbu 2004). Therefore, AEC firms should develop and/or adopt tools and techniques that can enable them to evaluate their knowledge management performance. Performance measurement models provide construction business executives with meaningful tools and techniques to evaluate their knowledge management performance. These tools and techniques would allow construction business executives to understand, evaluate and improve their knowledge management performance. Several performance measurement models have been set forth to evaluate performance of firms. Yet benchmarking stands out in this respect. It is one of the most powerful performance modeling approaches. Benchmarking provides a systematic framework for identifying, classifying, and in turn evaluating firms' processes, activities and performances. The primary objective of benchmarking is continuous improvement through observing activities of other firms (Camp 1989). Benchmarking has been a popular performance modeling approach in the construction management literature. It has been used for evaluating the success of selected design and build projects (Lam *et al*., 2004), improving total quality management initiatives of AEC firms (Sommerville and Robertson, 2000), assessing construction safety management programs (Fang *et al*., 2004), and improving project management performance (Luu *et al*., 2008). Only a few research studies focused on evaluating knowledge management performance of AEC firms in the construction management literature (e.g., Kululanga and McCaffer, 2001; Egbu, 2004). This succinct review of the construction management literature highlights the fact that evaluating knowledge management performance of AEC firms by using benchmarking remains an unexplored research area. The paper presented herein focuses on this unexplored research area. It presents a simple framework for evaluating knowledge management performance of AEC firms. The proposed framework is a synthesis of benchmarking and knowledge management (KM) models and fuzzy set theory (FST). The main impetus for using fuzzy set theory in the proposed framework comes from the fact that developed knowledge management performance evaluation models use crisp values to evaluate knowledge management performance. Yet the process of evaluating knowledge management performance takes place under ambiguities, uncertainties and vagueness. This challenge calls for a model that can cope with inexact information. Fuzzy set theory uses approximate rather than exact modes of reasoning. Therefore, it is a convenient and flexible tool for dealing with ambiguity, uncertainty, and vagueness. The main objectives of the proposed framework are (1) to assist executives of construction firms to identify basic components of knowledge management, (2) to provide a foundation on which systems and processes for effective knowledge management practices can be built, (3) to provide executives of construction firms an internal reporting tool to evaluate and benchmark their firm's knowledge management.

2. Knowledge Management: Conceptual Foundations

The concept of knowledge management has been at the central stage of management literature for more than a more than a decade. Ngai and Chan (2005) suggest that knowledge management refers to the set processes or practices for developing in an organization the ability to create, acquire, capture, store, maintain and disseminate the organization's knowledge. The primary objective of knowledge management is to harness the knowledge resources and knowledge capabilities of the firm in order to enable the organization to learn and adapt to its changing environment (Auster and Choo, 1995). Most of the early research studies on knowledge management have been primarily driven by technical perspective. Technical perspective primarily focuses on technical aspects (i.e., processes, tasks, and technology) of knowledge management. Subsequent recent research studies have shifted their focus from technical aspects of knowledge management to social aspects (i.e., relationships among people, attributes of people reward systems, and authority structures) of knowledge management. The contemporary research studies on knowledge management (Lee and Choi, 2003; Chuang, 2004) build on social-technical perspective (i.e., a synthesis of social and technical perspectives). They predominantly focus on identifying major elements of knowledge management. The major elements of KM emerged from contemporary research studies include (1) *knowledge management process* and (2) *knowledge management enablers*.

Knowledge management process refers to the acquisition (i.e., capturing knowledge), *conversion* (i.e., making captured knowledge available), *utilization* (i.e., degree to which knowledge is useful), and *protection* (i.e., security of the knowledge) of knowledge (Gold *et al*., 2001). *Knowledge management enablers* are tools, techniques, social mechanisms, and activities used for fostering knowledge consistently which stimulates knowledge management process (i.e., creation, conversion, utilization and protection of knowledge) (Lee and Choi, 2003). They provide a foundation on which effective knowledge management can be built. Chuang (2004) decomposes knowledge management enablers into two groups: *technical knowledge management enablers* and *social knowledge management enablers*. Technical knowledge enablers include information and communication technologies used by the firm for business intelligence, collaboration, distribution, knowledge discovery, and knowledge mapping. ICT enables firms to (1) facilitate rapid collection, storage, and exchange of knowledge, (2) integrate fragmented flows of knowledge and (3) converse knowledge and create new knowledge (Chuang, 2004). It also enables a firm to generate new knowledge, allow employees to collaborate, to find new knowledge and to effectively track the source of knowledge. The term s*ocial knowledge management enablers* refers the sum of the actual and potential resources available that derive from the relationships possessed by a human or in a social unit (Nahapiet and Ghoshal, 1998). Previous research studies (Gold *et. al*, 2001; Lee and Choi, 2003; Chuang, 2004) reveal that the most important social knowledge management enablers include organizational culture and organizational structure. *Organizational culture* incorporates a set of shared values, norms and beliefs, mainly implicit, that the members of an organization possess.

Organizational cultural is argued to be the most significant input to effective knowledge management because it determines values, beliefs, and work systems that could encourage or impede knowledge management activities. Organizational culture that encourages strong collaboration and mutual trust among employees positively influences knowledge management activities. Such an organizational culture eliminates common barriers to knowledge exchange by reducing fear and increasing openness in teams and facilitates substantive and influential knowledge exchange among employees. *Organizational structure* can be considered as a social architecture of roles and flows of authority, work materials, information and decision processes) that make up an organization (Pennings, 1992). The purpose of organization structure is to provide a framework for the functioning of the firm (i.e., transforming inputs into outputs) in order to achieve its purposes. Therefore, organization structure may encourage or inhibit knowledge management activities and in turn knowledge management performance. Organization structure of construction firm should encourage sharing and collaboration across boundaries. It should also motivate and rewards workers to create and share their knowledge. The effectiveness of knowledge management activities, and by extension, of knowledge management performance, depends upon having an organization structure that facilitates the creation and the discovery of new knowledge, and rewards employees for knowledge sharing. Previous research studies have provided strong empirical support that a firm's knowledge management enablers and knowledge management processes positively influence its knowledge management performance (e.g., Gold *et al*., 2001; Lee and Choi, 2003).

3. A Fuzzy Logic Model for Benchmarking KM Performance

The fuzzy logic model for benchmarking knowledge management performance of AEC firms presented in this paper builds on the concepts that have been set forth by benchmarking models (e.g., Camp, 1989) knowledge management frameworks (e.g., Gold *et al*., 2001; Lindsey, 2002) and fuzzy set theory (e.g., Zadeh 1965; Kao and Liu 2001). It involves a six-step procedure for benchmarking knowledge management performance of AEC firms. These steps are as follows: *Step 1*. Identifying evaluation criteria for evaluating knowledge management performance. *Step 2*. Constructing the hierarchical structure for the evaluation criteria. *Step 3*. Determining importance weights of the evaluation criteria. *Step 4*. Rating knowledge management enablers and processes of AEC firms. *Step 5*. Computing a fuzzy knowledge management performance of AEC firms. *Step 6*. Ranking knowledge management performance of AEC firms.

Step 1. Identifying the evaluation criteria for evaluating KM performance

The first step in benchmarking knowledge management performance of AEC firms is developing a set of evaluation criteria C_i ($i=1, 2….n_i$). Different knowledge management frameworks (e.g., Gold *et al*., 2001; Lindsey, 2002) have been set forth in the literature. A succinct review of these proposed frameworks reveals that the set of benchmarking criteria should include (1) knowledge management enablers (i.e., technical KM resource, structural KM resource, cultural KM resource) and (2) knowledge management processes (i.e., knowledge acquisition, knowledge conversion, knowledge application, application and protection).

Step 2. Constructing the hierarchical structure for the evaluation criteria

The second step is constructing a hierarchical structure for benchmarking knowledge management performance of AEC firms. The developed knowledge management frameworks (e.g., *Gold et al*., 2001; Lindsey, 2002) propose a two level hierarchical structure for measuring knowledge management performance (Figure 1). *Level 1* decomposes knowledge management performance into two criteria C_i ($i=1, 2$): knowledge management enablers (C_1) and knowledge management processes (C_2). *Level 2* includes a set of sub-criteria C_{ij} ($j=1, 2,…n_j$) where n_j denotes the number of sub-criteria for measuring each main criterion (C_i).

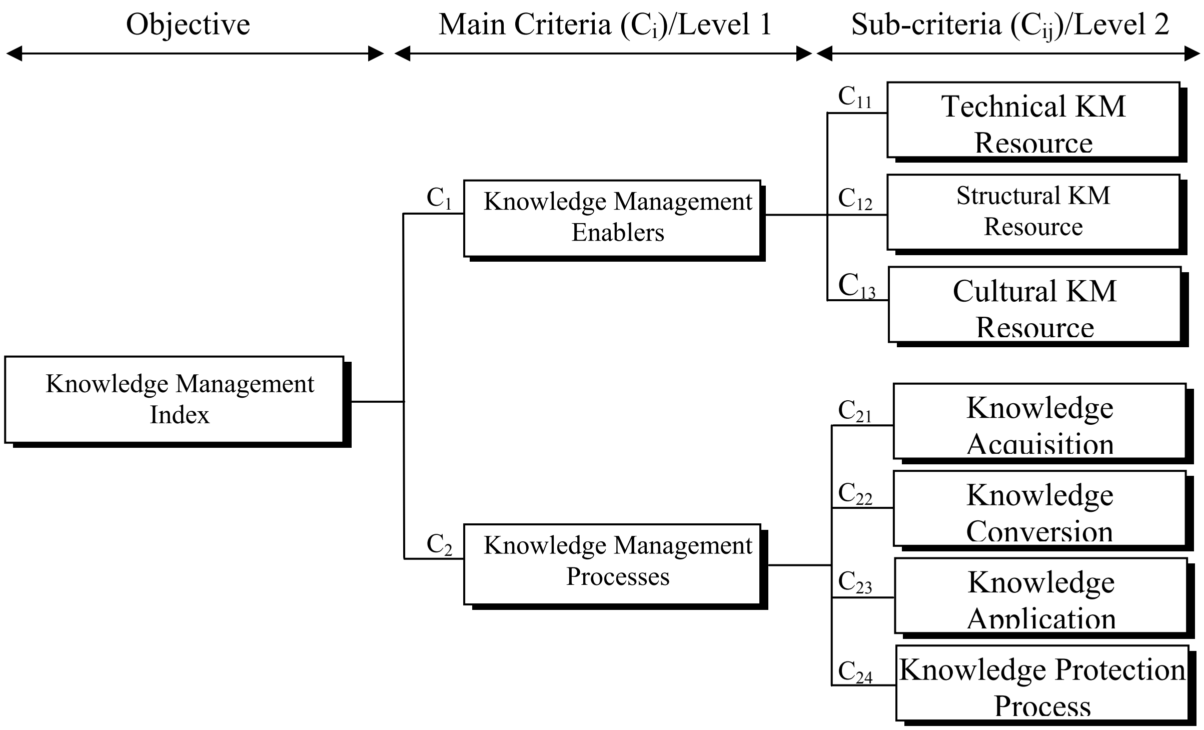

Figure 1: Hierarchic Framework for Measuring Knowledge Management Performance

Step 3. Determining the importance weights of the evaluation criteria

The third step involves identifying the importance weight of each criterion. The most common approach used in determining the importance of each criterion is judging its importance with linguistic variables (e.g., *low importance*, *moderate importance*, *very strong importance*) (e.g. Kao and Liu, 2001). These linguistic variables can be appropriately represented by using fuzzy triangular numbers. Therefore these linguistic terms are then transformed into fuzzy triangular numbers. Let $W_i = (l_i, m_i, u_i)$ be the fuzzy triangular numbers representing the linguistic importance of each criterion in the evaluation set C_i assigned by the evaluator.

Step 4. Rating Knowledge Management Enablers and Processes of AEC Firms

The fourth step is rating knowledge management enablers and processes of AEC firms. A construction firm's knowledge management enablers and processes can be evaluated by using a two-stage process: (1) developing a set of multi-item scales for measuring each sub-criterion and (2) rating the construction firm's achievement on each item by using linguistic variables. Using multi-item scales to measure each sub-criterion enhances reliability of the rating process. Linguistic variables used for a rating construction firm's achievement on each item are then transformed into fuzzy triangular numbers. Let $R_{iq} = (l_{iq}, m_{iq}, u_{iq})$ be triangular fuzzy numbers representing ratings of achievement with respect to each item and q (q=1, 2, ….,s) is number of items used for each sub-criterion. The fuzzy average score of sub-criterion can be derived by using the following equation:

$$R_i = (1/s) \otimes (R_{i1} \oplus R_{i2}, \dots, \oplus R_{is}), \quad (1)$$

where ⊗ is the fuzzy multiplication operator, ⊕ is the fuzzy addition operator, R_i is the average fuzzy performance rating of sub-criterion i.

Step 5. Computing the firm's knowledge management performance

Knowledge management performance is a function of Level 1 criteria (main criteria) and Level 2 criteria (sub-criteria). Therefore, it requires consolidation of fuzzy weights and ratings of *Level 1* and *Level 2* criteria presented in Figure 2. This consolidation process starts from the sub-criteria level (*Level 2*) and proceeds to the main-criteria level (*Level 1*). The consolidation of average fuzzy importance weights (W_{ij}) and the average fuzzy performance ratings (R_{ij}) of *Level 2* criteria (C_{ij}) provides fuzzy-weighted average performance ratings (R_i) for *Level 1* criteria (C_i). Similarly, consolidation of the average fuzzy importance weights (W_i) and the fuzzy-weighted-average performance ratings (R_i) of *Level 1* criteria (C_i) provides the Fuzzy Knowledge Management Performance Index (FKMPI) of a construction firm.

The fuzzy-weighted average (FWA) method is used to aggregate the average fuzzy importance weights and the average fuzzy performance ratings of *Level 1* and *Level 2*. The fuzzy-weighted average (FWA) method for measuring fuzzy knowledge management performance index (FKMPI) of a construction firm can be defined as:

$$R_i = \sum_i^n R_{ij} \otimes W_{ij} \Big/ \sum_i^n W_{ij} \qquad (2)$$

$$FKMPI = \sum_i^n R_i \otimes W_i \Big/ \sum_i^n W_i \qquad (3)$$

The above formulation is difficult to solve because it contains fuzzy numbers and fuzzy arithmetic operations (i.e., addition, multiplication, and division). Fuzzy arithmetic operations on fuzzy numbers, particularly the division operation, are difficult to carry out. Different algorithms (e.g., Guh *et al.*, 2001; Kao and Liu 2001) have been proposed to facilitate the fuzzy arithmetic operations and to compute the *fuzzy- weighted average* presented in Eqs. 2 and 3. The knowledge management performance evaluation model presented in this paper uses Kao and Liu's (2001) algorithm as it is the most efficient algorithm. This algorithm involves transforming the α-cut solution of a fuzzy-weighted average to a linear fractional program and solving it by linear programming techniques.

Step 6. Ranking Knowledge Management Performance of AEC Firms

The final step in benchmarking knowledge management performance of AEC firms is ranking AEC firms based on their Fuzzy Knowledge Management Performance Index (FKMPI). FKMPI is a fuzzy expression. Several ranking methods (e.g., Chen, 1985; Chen and Klein, 1997) prevail in the literature for ranking fuzzy expressions. The model presented in this paper uses fuzzy ranking method proposed by Chen and Klein (1997). This method is based on α-cuts. Let *h* denote the maximum height of μ_{FKMPIj} ,j=1, 2,…, m. Assume h is equally divided into n intervals such that α_i = ih/n, i=0,….n.

$$I_j = \sum_{i=0}^{n}((FKMPI_j)_u^{\alpha_i} - c) \Big/ \left[\sum_{i=0}^{n}((FKMPI_j)_u^{\alpha_i} - c) - \sum_{i=0}^{n}((FKMPI_j)_l^{\alpha_i} - d)\right], \quad n \to \infty, \qquad (4)$$

Where; $c = \min_{j,i}\left\{(FKMPI_{j,i})_l^{\alpha_i}\right\} and\ d = \max_{j,i}\left\{(FKMPI_{j,i})_u^{\alpha_i}\right\}$. The larger the ranking index, the more preferred knowledge management performance is.

4. A Case Study

The case study approach was adopted in this study to illustrate the use of the proposed model for benchmarking knowledge management performance of AEC firms, because this is a common research approach used in previous performance measurement modeling studies in the construction management domain (e.g., Bassioni *et al*., 2005; Robinson *et al*., 2005). In this case study Construction Firm A (i.e., case firm) was benchmarked against its two primary rivals: Construction Firm B and C. The case firm (Construction Firm A) is located in İstanbul, Turkey. It has more than 155 full time employees. Its turnover is over $25 million in 2007. It generally undertakes infrastructure and general building projects. Construction firm B and C are located İstanbul and have 250 and 80 fulltime employees respectively.

The key informants in this case study were top executives of the construction firms. These individuals were considered to be the most knowledgeable persons regarding their firm's knowledge management enablers and processes and knowledge management strategies. Knowledge Management Performance Evaluation Instrument (KMPE-I) was prepared based on a succinct review of previous research studies on knowledge management (e.g., Gold *et al*., 2001; Lee and Choi, 2003). KMPE-I consists of two parts. The first part of the KMPE-I Instrument includes a series of questions that identify the importance of each criterion. In this part, evaluators were asked to rate the importance of each main criterion (i.e., knowledge management enablers and knowledge processes) and each sub-criterion regarding their firm's long-term knowledge management strategy by using linguistic variables that ranged from "*totally unimportant*," "*quite unimportant*" "*unimportant*" "*barely important*" "*moderately important*," "*very important*" to "*extremely important*." The second part of KMPE-I included a set of items for evaluating construction firms' knowledge management enablers and processes. In the second part of the evaluation form, evaluators were instructed to rate to what extent they agree with each item by using linguistic variables that ranged from "strongly disagree" to "strongly agree".

Each evaluator's linguistic responses regarding the importance weight assigned to each criterion and the level of agreement with each item were transformed into triangular fuzzy numbers. The triangular fuzzy numbers associated with the linguistic terms used to measure relative importance of each criterion were set as (0,0,0.2), (0,0.2,0.4), (0.2,0.35,0.5), (0.3,0.5,0.7), (0.5,0.65,0.8), (0.6,0.8,1) and (0.8,1.0,1.0). Similarly, the triangular fuzzy numbers associated with the linguistic terms used to measure the agreement with each item were set as (0,0,0.2), (0,0.2,0.4), (0.2,0.4,0.6), (0.4,0.6,0.8), (0.6,0.8,1.0), (0.8,1.0,1.0). Fuzzy triangular numbers representing each evaluator's subjective judgments regarding the performance ratings of each criterion were then aggregated by using Eq. 1. The rationale behind this process was to obtain the average fuzzy performance ratings corresponding to each sub-criterion. Tables 1-3 present the fuzzy average weights and the fuzzy average performance ratings of construction firms A, B and C respectively.

FKMPI represents a construction firm's overall knowledge management performance. Therefore, it requires a two-stage consolidation of the fuzzy weights and ratings of *Level 1*, and *Level 2* criteria (Tables 1-3) of each construction firm. The commercial optimization software LINGO 9.0 was used in this process. The first stage consolidated the average fuzzy importance weights (W_{ij}) and the average fuzzy performance ratings (R_{ij}) of Level 2 criteria by using Eq. 2. This consolidation process involved converting Eq. 2 into two linear programming models and solving them at two different α-cuts (α = 0.00 and 1.00). The fuzzy-weighted average performance ratings (R_i) of *Level 1* criteria (C_i) of each construction are presented in Tables 1-3. The second stage calculated the Fuzzy Knowledge Management Performance Index (FKMPI) of each construction firm by converting Eq.3 into linear programming models and solving at two different α-cuts (α = 0.00, and 1.0). The FKMPI of three construction firms are presented in Table 4. For possibility level α =0, the knowledge management performance of construction firm A ranges from 0.3390 to 0.8161. This range points out that the knowledge management performance of the construction firm A would not be higher than 0.8161 and lower than 0.3390. It highlights the degree of uncertainty regarding the knowledge management performance of the firm. For the possibility level α =1.00, the knowledge management performance of construction firm A is 0.5777. This represents the most possible value of knowledge management performance for construction firm A. The final stage in benchmarking process is ranking FKMPI of the construction firms. The FKMPI of three construction firms were ranked by using Eq. 4. Table 4 presents FKMPI, ranking index and rank of each construction firm. The case firm, construction firm A, ranked the second among three construction firms (I_A=0.60). Construction firm C has the highest ranking index (I_C=0.68). Construction firm B has the lowest ranking index (I_B=0.30).

Table 1: Fuzzy Average Ratings and Weights of Construction Firm A

Criteria	Fuzzy Average Ratings (R_i)	Fuzzy Average Weights (W_i)	Fuzzy Average Ratings (R_{ij})	Fuzzy Average Weights
C_1	(0.5561,0.6439,0.8515)	(0.5000,0.6500,0.8000)		
$C_{1.1}$			(0.4955,0.6773,0.8636)	(0.6000,0.8000,1.000)
$C_{1.2}$			(0.4818,0.6727,0.8273)	(0.5000,0.6500,0.8000)
$C_{1.3}$			(0.2750,0.4167,0.5917)	(0.0000,0.2000,0.4000)
C_2	(0.2725,0.4916,0.7217)	(0.3000,0.5000,0.7000)		
$C_{2.1}$			(0.4250,0.6125,0.8000)	(0.2000,0.3500,0.5000)
$C_{2.2}$			(0.3000,0.4700,0.6400)	(0.3000,0.5000,0.7000)
$C_{2.3}$			(0.1625,0.3250,0.5125)	(0.6000,0.8000,1.000)
$C_{2.4}$			(0.5100,0.6950,0.8800)	(0.3000,0.5000,0.7000)

Table 2: Fuzzy Average Ratings and Weights of Construction Firm B

Criteria	Fuzzy Average Ratings (R_i)	Fuzzy Average Weights (W_i)	Fuzzy Average Ratings (R_{ij})	Fuzzy Average Weights
C_1	(0.0833,0.2181,0.420)	(0.2000,0.3500,0.5000)		
$C_{1.1}$			(0.1182,0.2182,0.4091)	(0.0000,0.2000,0.4000)
$C_{1.2}$			(0.1273,0.2500,0.4455)	(0.0000,0.2000,0.4000)
$C_{1.3}$			(0.0833,0.2083,0.4000)	(0.5000,0.6500,0.8000)
C_2	(0.175,0.3879,0.6437)	(0.3000,0.5000,0.7000)		
$C_{2.1}$			(0.3250,0.5000,0.6750)	(0.2000,0.3500,0.5000)
$C_{2.2}$			(0.1300,0.2850,0.4600)	(0.3000,0.5000,0.7000)
$C_{2.3}$			(0.3300,0.5150,0.7000)	(0.3000,0.5000,0.7000)
$C_{2.4}$			(0.0625,0.1313,0.3250)	(0.0000,0.2000,0.4000)

Table 3: Fuzzy Average Ratings and Weights of Construction Firm C

Criteria	Fuzzy Average Ratings (R_i)	Fuzzy Average Weights (W_i)	Fuzzy Average Ratings (R_{ij})	Fuzzy Average Weights
C_1	(0.5403,0.7416,0.8909)	(0.6000,0.8000,1.000)		
$C_{1.1}$			(0.4909,0.6818,0.8545)	(0.5000,0.6500,0.8000)
$C_{1.2}$			(0.5091,0.6818,0.8364)	(0.6000,0.8000,1.000)
$C_{1.3}$			(0.6583,0.8500,0.9417)	(0.6000,0.8000,1.000)
C_2	(0.3588,0.5422,0.7328)	(0.5000,0.6500,0.8000)		
$C_{2.1}$			(0.3875,0.5750,0.7625)	(0.5000,0.6500,0.8000)
$C_{2.2}$			(0.3500,0.5300,0.7100)	(0.5000,0.6500,0.8000)
$C_{2.3}$			(0.3700,0.5450,0.7300)	(0.3000,0.5000,0.7000)
$C_{2.4}$			(0.3375,0.5000,0.6750)	(0.2000,0.3500,0.5000)

Table 4: FKMPI, Ranking Index and Rank of Construction Firms

	Construction Firm		
	A (Case Firm)	B (Rival 1)	C (Rival 2)
FKMPI	(0.3390,0.5777,0.8161)	(0.1177,0.2173,0.5940)	(0.4366,0.6522,0.8382)
Ranking Index (I_j)	0.60	0.30	0.68
Rank	2	3	1

These results suggest that construction firm C has the best knowledge management performance while construction firm B has the poorest knowledge management performance. Knowledge management performance of construction firm A is closer to that of construction firm C. Yet there is a room for the case firm to improve its knowledge management performance. Therefore, the case firm should focus on improving its knowledge management enablers and processes because its ratings (R_1 and R_2) on both of these issues are lower than those of construction firm C. Furthermore, Tables 1-3 reveal that the case firm places less importance on cultural aspects of knowledge management than the benchmarked firms (i.e., Firm B and C). The case firm should also revise its thinking about role of culture on culture on knowledge management. It appears that importance of culture was de-emphasized by the case firm. In addition to this result, Table 4 also reveals potential improvement areas for the case firm. Applying the ranking method (Eq. 4) to fuzzy weighted averages of knowledge management enablers of the case firm suggests that the fuzzy weighted average of knowledge application process ($W_{2.3}$= 0.57, 0.77, 0.90) is higher than the average fuzzy weights of other knowledge management processes ($W_{2.1}$, $W_{2.2}$, $W_{2.4}$) (Table 1). Similarly applying the ranking method (Eq. 4) to fuzzy average performance rating of knowledge management enablers of the case firm reveals that fuzzy average performance rating of knowledge application process ($R_{2.3}$) is lower than the fuzzy weighted average performance ratings of other knowledge management processes ($R_{2.1}$, $R_{2.2}$, $R_{2.4}$) (Table 1). It appears that the case firm is experiencing difficulties in knowledge application process. These findings jointly indicate that the case firm should focus on improving its knowledge application process capability and revise its thinking about the role of culture on knowledge management activities.

5. Conclusions and Implications

There is increasing recognition that knowledge management is a key capability for AEC firms in today's business environment. AEC firms should develop or adopt models, tools, and techniques that can enable them to evaluate and improve their knowledge management skills. The research presented here proposes a performance benchmarking model in order to address this issue. It builds on benchmarking and knowledge management models and fuzzy set theory. The model proposed in this paper can be used by AEC firms as an internal performance measurement tool to evaluate their knowledge management performance and in turn evaluate their ability to achieve their strategic knowledge management objectives. The iterative process of identifying, rating and weighting knowledge management criteria helps strategic leaders to understand which knowledge management enablers and processes are important and how knowledge management processes and enablers are linked to their firm's knowledge management strategy.

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