Identifying and Prioritizing the Cultural Factors Affecting the Successful Implementation of Knowledge Management in the Industry of Electronic Insurance Services by Using the Fuzzy Multi-Criteria Decision-Making Method

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Abstract: Considering the use of knowledge as a strategic advantage in various service industries and the need to identify key success factors for implementing knowledge management in the industry of electronic insurance services, we performed the present study aimed at identifying and prioritizing the cultural factors effective on the successful implementation of knowledge management in the industry of electronic insurance services. After studying the subject literature of the research, we identified six main factors along with 18 sub-main factors in this regard. The study statistical population included 30 managers of companies active in the insurance industry in Iran. Followed by collecting the research data through a questionnaire distributed among the members of the statistical population, we first prioritized the six main factors based on the impact level using the fuzzy network analysis technique, which results revealed that the "knowledge creation culture" factor is ranked first. In the end, the components of each of the cultural factors affecting the implementation of knowledge management were ranked using the fuzzy TOPSIS technique. Accordingly, one can acknowledge that the cultural factors play a crucial role in determining the results of knowledge management efforts. For this reason, the organizations intending to implement knowledge management need to evaluate the cultural factors affecting the successful implementation of knowledge management.

Keywords: Cultural Factors, Knowledge Management (KM), Insurance Industry, Fuzzy Network Analysis, Fuzzy TOPSIS.

1. Introduction

Knowledge is nowadays seen as a strategic asset that can help the organizations maintain their competitive ability in a turbulent environment (Jantunen, 2005). In this regard, knowledge management can be considered as a key factor to gain benefit, make advance, and maintain the competitive advantage (Corsoa et al., 2006). Although knowledge management seems to be a business practice (commercial usage) but each organization needs to develop some strategies to capture the potential values of knowledge management (Davenport & Prusak, 2000). The foundation of organizational competitiveness in the contemporary economy has turned from physical and tangible resources to knowledge (Valmohammadi, 2010). In other words, in today's modern economy, knowledge is considered as the most important critical factor of the competitive advantage (Shirazi et al., 2011). Therefore, information resources and knowledge management have turned into a necessary and strategic weapon for organizations to become competitive. However, the creation and development of knowledge management system needs to make essential changes in the processes, management, infrastructures, culture, and other aspects that determine the organizational performance and all of these dimensions cannot be changed at once (Jucevicius & Sajeva, 2010). This requires an organization's ability to design and implement organizational systems, structures, processes, and culture and a tool to improve and support the organization's knowledge for effective decision-making (Shirazi et al., 2011). On the other hand, we witness major changes in the field of electronics technology in providing services in a variety of industries in the last decade of the twentieth century (Yousafzai et al., 2003). The impact of technology on today's markets is clear. The arrival of technology in modern markets has led to significant changes in the business activities, especially the activities related to marketing, communication, and the distribution. In particular, the use of the Internet in its commercial sense has led the organizations

to new global markets so that the firms and consumers have acquired not only the information but also all new goods, services, and opportunities for exchange (Ahonen & Jarvinen, 2003). The explosive growth of the Internet and the opportunities that it has created for the trading of goods and services along with the creation and development of business organizations have provided a highly proper ground for marketing and Internet sales of the insurance services. The use of the Internet will have a special impact on the executive procedures and practices of companies, representatives (brokers) and the supervisory authority in the future. In other words, the insurers (insurance companies) and the insured (customers) benefit equally from the advancement of electronic services. Despite the long history of the introduction of the subject of electronic insurance, the use of internet as a tool for selling insurance is still in its early stages of growth, especially in the developing countries, and the Internet is still known merely as a communicative tool in many fields, especially the life insurances (Cheng et al., 2010). The provision of electronic insurance services is the impact of the development of information by insurance companies. In other words, from the point of view of the insurance company, the use of the Internet significantly reduces the physical costs of the operation of providing insurance services and the insurance companies around the world lead their own business strategies toward new opportunities through electronic insurance since providing electronic services enables insurance companies to develop on a large scale and strategically change their behavior, which finally, will lead to the achievement of new opportunities. Therefore, due to taking advantage of knowledge as a competitive and strategic advantage in the electronic insurance industry and the need to identify key success factors for implementing knowledge management in the insurance industry, this research was designed to identify, extract, and prioritize effective cultural factors and indices of knowledge management in the industry of electronic insurance services using the fuzzy multi-criteria decision-making method.

2. Literature review

2.1. Knowledge Management

Knowledge management outstandingly focuses on the knowledge-based activities and helps create, capture, transform, and use the knowledge (Cavaleri, 2004). In addition, it is considered a very important competitive resource for organizations (Ahmad Rah et al., 2009). One therefore can say that dynamic and active knowledge management is essential for increasing organizational performance, problem-solving, and decision making (Jafari et al., 2008). The KM system is a system based on the developed information technology to support and improve the organizational processes of creating, storing, retrieving, transferring, and applying knowledge, which elements include organization, intellectual capital, information management, and the technology (Doctor & Ramachandran, 2008). These systems seek to help organizations adapt to rapid environmental changes and provide a stable level of optimal services to the customers by providing widespread access to human capital skills. In other words, the KM involves all methods of managing organizational knowledge assets and includes how to collect, store, transfer, deploy, update, and create knowledge (Wickramasinghe & Rubiz, 2007). The KM contributes to organizational development and it highly matters in this regard that the employees of each of the organization's departments know how to use knowledge in their work processes (de Barros Jerônimo et al., 2018).

2.2. The relationship between culture and knowledge management

Organizational culture is an organizational feature that is likely to affect the success of any knowledge management approach, which has an important effect on the technology implementation, comprehensive management, etc. (Stock et al., 2007). According to Volman (2007), culture is a set of behaviors and operational principles known almost by everyone but are not written. However, each organization has its own unique culture that over time reflects the organization identity on both visible and invisible dimensions (Ajmal & Petri, 2010). According to KM researchers, there is an inseparable relationship between organizational culture and knowledge management. Oulove and Liedner argue that the success of knowledge management and the

effectiveness of knowledge sharing in organizations are primarily related to organizational culture. The organizational culture is introduced as an essential component of the implementation of knowledge management that directly affects the knowledge management, and especially, the sharing of knowledge (Yazdani et al., 2011). Although focusing on organizational culture and organizational changes may delay the preparation of the knowledge management project but will bring a lot of benefits. Therefore, the organization must identify the culture's characteristics and determine which features provide an environment conducive to the creation, transmission, and use of knowledge. Organizations must also create a culture that encourages the individuals for creation and sharing of knowledge in the organization. Since the lack of knowledge sharing can lead to inefficiencies in the organization. Hence, the knowledge sharing appears to be for a knowledge management system (Ralph & Ellis, 2009). Thus, we need to create and develop a culture of knowledge sharing in the organization aimed at changing the behavior and habits of individuals and reducing the barriers. One of the biggest reasons for focusing on sharing knowledge is the fact that creating knowledge cannot lead to the organization's performance superiority on its own. Preferably, the company should create value through the use of knowledge. If the knowledge is successfully shared, it can be used and the knowledge transfer among the members of the organization is a prerequisite for the creation of knowledge (Yazdani et al., 2011). In addition, the organizations should develop an intrinsic or basic culture of education and various learning tools to be successful in creating knowledge (Lee & Choi, 2003). Since a culture that support learning will increase the ability to create new knowledge. In such a culture, logical failures and mistakes are not only tolerated but also are permissible and forgiven. Accordingly, the mistake must be considered as an investment process in individuals as it can be a key source of learning (Wong, 2005).

2.3. The key factors of knowledge management success

Organizations need to principally study the success factors for the implementation of knowledge management to become aware of the factors and indicators affecting the success of knowledge management. The lack of knowledge of important and essential factors probably delays the efforts of the organization in understanding all the benefits of KM (Wong, 2005). Hence, the organizations must develop a set of criteria. In general, the key factors for success are evaluated as an important issue during the implementing of knowledge management in each section. Given that we sought to identify and prioritize the cultural factors affecting the successful implementation of knowledge management in this research, thus, we reviewed the studies of many researchers in this regard and identified many factors in this area. The results of this study are presented in Table 1.

Table 1. The cultural criteria affecting the success of knowledge management

Effective factors	Researchers
Continuous learning	Wong (2006), Jafari et al (2007), Chong (2006), DuPlessis (2007), Akhavan et al (2006)
Culture of creation and sharing of knowledge	Wong (2005), Remus (2007), Rahnavard & Mohammadi (2009), Khatibian et al (2010)
The support by senior managers	Akhavan et al (2006), Chong & Choei (2005), Jafari et al (2007), DuPlessis (2007)
Encouragement and rewards	Wong & Aspinwall (2006), Akhavan & Jafari (2006), Khatibian et al (2010), DuPlessis (2007).
Employees' participation	Akhavan et al (2011), Chong & Choei (2005)
Organizational culture	Wong & Aspinwall (2006), Akhavan et al (2011), Bozbura (2007),Wong (2005), DuPlessis (2007)

2.4. Fuzzy multi-criteria decision-making

Decision making is the process of finding the best position among available options. The decision-maker faces difficulty in almost all decision-making issues due to the large number of criteria. Hence, for most issues, the decision maker wants to achieve more than one goal in choosing how to carry out the activities (Zeleny, 1982). The weight of the criteria is well-known in the traditional multi-criteria decision-making process, but due to the ambiguity and uncertainty in the decision maker's statements, the expression of data is definitely inappropriate. Since human judgments cannot be estimated by exact numerical values and are usually ambiguous, thus, the traditional decision-making methods cannot be used for such problems and issues. Many efforts have been made in recent years to resolve such ambiguities and uncertainties. Ultimately, the use of fuzzy sets has led to multi-criteria evaluation methods (Cheng & Hwang, 1992). The fuzzy theory has been introduced and published by Professor Lotfizadeh in 1965. This theory is suitable for variable conditions and incomparable situations. The judgments of the public are generally vague such as linguistic expressions of equal, fairly strong, very strong, extremely strong, etc. with an identical and ... importance degree. The fuzzy theory can help to resolve the obscure ambiguity in the linguistic expressions of the reviewers (Semih, 2009). The utility of options in comparison with all criteria is usually expressed as fuzzy numbers, which is called the fuzzy utility and measured by fuzzy decision-making methods. The ranking of options is done based on the comparison of relevant fuzzy utilities (Yeh & Dong, 2004). In this research, we used two analytic network process (ANP) and fuzzy TOPSIS techniques, both of which are commonly used methods in the multi-criteria decision-making, to identify the weight and prioritize the cultural factors affecting the success of knowledge management. These two techniques are described below.

2.5. Analytic network process (ANP)

ANP is one of the multi-criteria decision-making techniques (Yadegari et al., 2018). This developed technique is a hierarchical analysis technique, which improves it by replacing the hierarchy with the network. The hierarchical analysis method is based on the paired comparisons, which begins by providing a hierarchy tree. Since the factors are compared in pairs, in this model, we can determine the rationale of comparisons. In other words, we can measure the compatibility level of the comparisons made by calculating the compatibility rates (C.R). The analytic network process can be employed as a useful tool for issues and problems that the interaction is formed between the elements of the network structure system (Karsak et al., 2002). This technique is widely used to choose the optimal decision as well as the ranking of factors. Although both ANP and AHP techniques adopt the priorities by performing paired comparisons, however, there are some differences between these two techniques. The first difference is that the AHP is a special case of the process of the ANP as the ANP considers the intra-cluster dependency (internal dependency) and inter-cluster dependency (external dependency). The second difference is that the ANP has a nonlinear structure. Since in this study, we had to initially identify the weight of cultural factors affecting the knowledge management, we first used the fuzzy ANP method in ranking and determining the importance degree of each major criterion. Then, using the weights obtained by this method, we ranked all the factors by the fuzzy TOPSIS method.

2.5.1. Fuzzy ANP

The fuzzy ANP method is one of the multi-index decision-making methods that is related to the fuzzy environment (Karsak et al., 2002). In this method, the fuzzy ANP method is performed using the Super Matrix technique. The weight of the criteria can be obtained by methods such as the Chang method or the improved method. And then calculate the final weight using the ANP Super Matrix technique. It is necessary to use a network analysis method to have a sufficient understanding of the decision goal and the decision environment and all decision-making elements by the decision maker. But since this is not always sufficient knowledge of the system and the decision maker cannot judge with complete certainty in paired comparisons in general, the network

analysis model is developed to overcome this problem (Razmi, et al, 2005). A natural solution for comparisons in uncertainty situations is the use of distance or fuzzy comparisons that models ambiguous states in comparison.

2.6. Fuzzy TOPSIS

The Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS) technique was developed and presented by Hwang and Yoon in 1981. In this technique, "m" options are evaluated by "n" indices and the result is to provide an m-option classification. This technique is considered as the compensatory models among the MADM methods, which ybest option) and an ideal-negative solution (the worst option). The ideal positive solution is a solution that increases the profit benchmark and reduces the cost benchmark. Consequently, the ideal negative solution has the inversed value of the positive ideal solution. All the examined options are then compared with the best option and the worst option and the linear distance of each option is measured from the best option and the worst option. An option with the longest distance from the worst option and the shortest distance from the best option will be selected as the preferred or optimal option. In this research, we chose the Fuzzy TOPSIS method in order to rank the cultural factors affecting the successful implementation of knowledge management by considering the conditions of the research problem and similar studies and given the fact that the nature of the collected data would be fuzzy.

In this paper, the fuzzy network analysis and fuzzy TOPSIS combined approach is proposed based on the problem-related features of selection of effective cultural factors affecting the successful implementation of knowledge management. In the process of network analysis of this study, I use fuzzy numbers for more precision in the process. Simultaneous application of two Fuzzy Network Analysis Techniques and TOPSIS reduces the number of pair comparisons. The objective of TOPSIS, which uses Weighted Euclidean distance, is to rank subcultural factors that affect the successful implementation of knowledge management in the electronics industry. Since in this research we must first weigh the main factors affecting the successful implementation of knowledge management in the industry of electronic insurance services, first, the method of fuzzy network analysis process in ranking and determining the degree of importance of each of the main criteria for work and then by applying the weights obtained from the fuzzy ANP method, all the sub factors are ranked by the fuzzy TOPSIS technique.

3. Research methodology

The present research was an applied one regarding the objective and a descriptive-surveying study in terms of methodology. Since it studies a particular community, it can be also included in case studies. The study statistical population included the executives of 30 companies active in the insurance industry of Iran. Since the sample size of the research was equal to 30 subjects, we did not use a sampling method. We employed the library method to review and examine the theoretical foundations and the background of research and to get familiar with the concepts in the present study. We also used a questionnaire as the main tool for collecting data. The questionnaire consisted of six main criteria. The questionnaire was based on 6 parts and contained 18 questions about the impact of cultural factors on the successful implementation of knowledge management in the insurance services industry. The hierarchy tree of these factors is shown in Chart. 1.

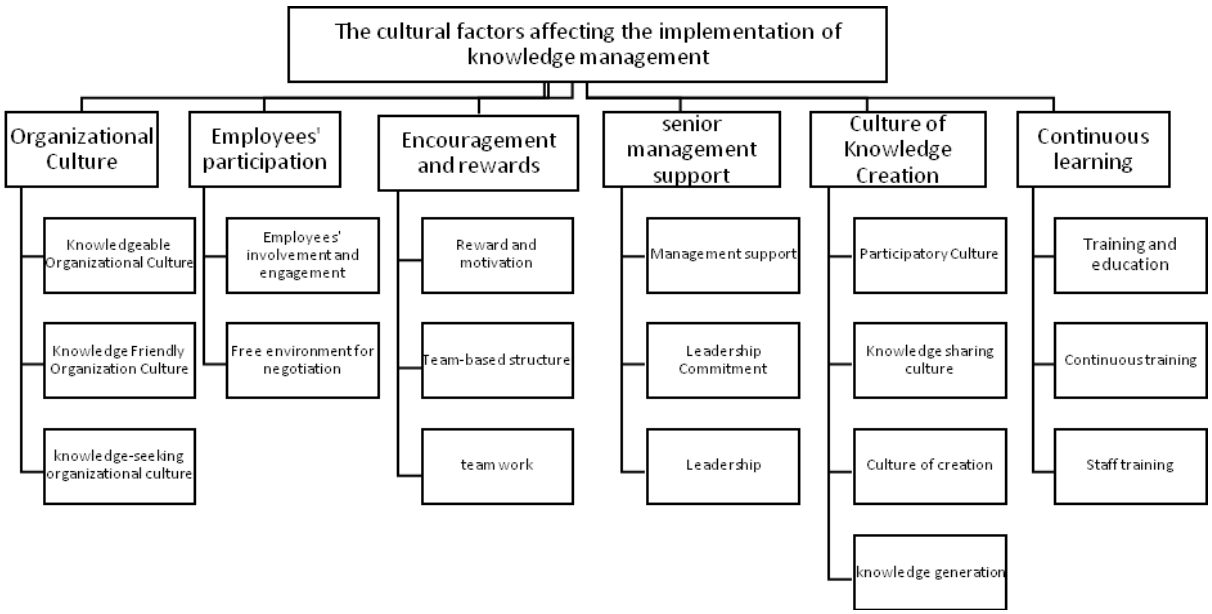

Chart (1). The hierarchical tree of cultural factors affecting knowledge management

Regarding the research goal, the ranking of these factors was done using the decision-making in the fuzzy environment. For the survey, the fuzzy numbers and the verbal phrases contained in Table 2 were used.

Table 2. The fuzzy numbers corresponding to verbal phrases (Chen et al., 2006)

Triangular fuzzy numbers	Verbal phrase
(0,0,2)	Very low
(1,2,3)	Low
(2,3.5,5)	Relatively low
(4,5,6)	Moderate
(5,6.5,8)	Relatively high
(7,8,9)	High
(8,10,10)	Very high

We used a questionnaire based on the concept of fuzzy analytical network process (ANP) in this study to determine the weight of six categories of key criteria affecting the knowledge management. The fuzzy numbers corresponding to the preferences in the paired comparisons are presented in Table (3).

Table 3. The fuzzy numbers corresponding to the preferences in the paired comparisons (Dagdeviren et al., 2008)

The inverse of triangular fuzzy numbers	Triangular fuzzy numbers	Verbal expression
(1,1,1)	(1,1,1)	Equal priority
(2/3,1,2)	(1/2,1,3/2)	Very Poor priority
(1/2,2/3,1)	(1,3/2,2)	Poor priority
(2/5,1/2,2/3)	(3/2,2,2/5)	High priority
(1/3,2/5,1/2)	(2,5/2,3)	Very high priority
(2/7,1/3,2/5)	(5/2,3,7/2)	Full priority

3.1. The validity and reliability of the questionnaire

Since the mentioned questionnaire was provided based on the factors identified in the research background and the vision of insurance companies' executives and the experts in the field of electronic insurance services, the validity of the questionnaire is confirmed by content. Another technical feature of the data collection tool (questionnaire) is reliability. In this research, the Cronbach's alpha test was used to determine the reliability and validity of the questionnaire, which value was obtained as 86%, representing the acceptable reliability of the questionnaire.

4. Data analysis

After collecting the paired comparisons questionnaires of cultural factors affecting the knowledge management, the inconsistency rate of each table was calculated for each of the directors of the companies active in the insurance industry. The questionnaires with an inconsistency rate of more than 0.1 were returned to the relevant director in order to be reconsidered. After all the questionnaires received an acceptable incompatibility rate (less than 0.1), the geometric mean of the managers' opinions was calculated for each questionnaire. Then, in order to achieve the final weight of the components, the calculation details for Table (4) were presented given the phases of the fuzzy network analysis process. Due to the similarity of the calculations method and the large volume of these calculations, the calculations similar to Table 4 for other components were not presented.

Table 4. The geometric mean matrix of the paired comparisons of major cultural factors

Main Factors	Continuous Learning	Culture of Knowledge Creation	Support from Senior Managers	Encouragement and Reward	Employees' Participation	Organizational Culture	Final Weight
Continuous Learning	(1,1,1)	(0.47,0.83,1/22)	(1,1/5,2)	(2/17,2/63,3/17)	(1/31,1/65,2)	(1,1/5,2)	0.221
Culture of Knowledge Creation	(0.92,1/32,2/15)	(1,1,1)	(0.61,1,1/36)	(1/7,2/15,2/55)	(1/29,1/66,2)	(0.81,1/30,1/79)	0.205
Support from Senior Managers	(0.50,0.70,1/22)	(0.90,1/21,1/82)	(1,1,1)	(1/5,2,2/4)	(0.61,1,1/37)	(0.88,1/33,2)	0.176
Encouragement and Reward	(0.3,0.38,0.47)	(0.68,0.90,1/2)	(0.42,0.50,0.071)	(1,1,1)	(0.57,0.82,1.55)	(0.39,0.48,0.68)	0.065
Employees' Participation	(0.75,1,1/28)	(0.75,1,1/29)	(0.88,1/21,1/84)	(0.84,1/35,1/81)	(1,1,1)	(0.88,1/22,1/82)	0.162
Organizational Culture	(0.51,0.71,1/21)	(0.57,0.82,1/55)	(0.51,0.82,1/37)	(1/50,2,2/4)	(0.98,1/31,1/70)	(1,1,1)	0.163

Step 1: Calculating the fuzzy expansion for each cultural factor:

Here:

M_g^j represents the fuzzy number.

$\sum_{j=1}^{6} M_{g_1}^j$ = (1,1,1) + (0.47,0.83,1/22) + (1,1/5,2) + (2/17,2/63,3/17) + (1/31,1/65,2) + (1,1/5,2) = (6/95,9/11,11/39)

$\sum_{j=1}^{6} M_{g_2}^j$ = (0.92,1/32,2/15) + (1,1,1) + (0.61,1,1/36) + (1/7,2/15,2/55) + (1/29,1/66,2) + (0.81,1/30,1/79) = (6/33,8/43,10/85)

$\sum_{j=1}^{6} M_{g_3}^{j}$ = (0.50,0.70,1/22) + (0.90,1/21,1/82) + (1,1,1) + (1/5,2,2/4) + (0.61,1,1/37) + (0.88,1/33,2) = (5/39,7/24,9/81)

$\sum_{j=1}^{6} M_{g_4}^{j}$ = (0.3,0.38,0.47) + (0.68,0.90,1/2) + (0.42,0.50,0.071) + (1,1,1) + (0.57,0.82,1.55) + (0.39,0.48,0.68) = (3/36, 4/08,4/97)

$\sum_{j=1}^{6} M_{g_5}^{j}$ = (0.75,1,1/28) + (0.75,1,1/29) + (0.88,1/21,1/84) + (0.84,1/35,1/81) + (1,1,1) + (0.88,1/22,1/82) = (5/1,6/8,9)

$\sum_{j=1}^{6} M_{g_6}^{j}$ = (0.51,0.71,1/21) + (0.57,0.82,1/55) + (0.51,0.82,1/37) + (1/50,2,2/4) + (0.98,1/31,1/70) + (1,1,1) = (5/1,6/7,9/2)

$\sum_{j=1}^{6}\sum_{j=1}^{6} M_{g_6}^{j}$ = (6/95,9/11,11/39) + (6/33,8/43,10/85) + (5/39,7/24,9/81) + (3/36, 4/08,4/97) + (5/1,6/8,9) + (5/1,6/7,9/2) = (32/2, 42/4,55)

$\left(\sum_{j=1}^{6}\sum_{j=1}^{6} M_{g_6}^{j}\right)^{1}$ = (0.017,0.022,0.030)

S_1 = (6/95,9/11,11/39) * (0.017,0.022,0.030) = (0.120,0.213,0.350)

S_2 = (6/33, 8/43,10/58) * (0.017,0.022,0.030) = (0.0113,0.118,0.326)

S_3 = (5/39,7/24,4/08) * (0.017,0.022, 0.030) = (0.094,0.0168,0.0304)

S_4 = (3/36, 4/08,4/97) * (0.017,0.022,0.030) = (0.058,0.095,0.168)

S_5 = (5/1,6/8,9) * (0.017,0.022,0.030) = (0.090,0.158,0.281)

S_6 = (5/1,6/7,9/2) * (0.017,0.022,0.030) = (0.089,0.156,0.288)

Here:

Continuous Learning (S1), Knowledge Creation Culture (S2), Senior Managers' Support (S3), Encouragement and Reward (S4), Employees' Participation (S5), Organizational Culture (S6)

Step 2: Calculating the degree of preference (degree of feasibility): S_i on S_k

These calculations are shown in Table (5).

Here we use convex fuzzy numbers to calculate the degree of priority and determine the feasibility of this. In fact, to calculate the degree of priority, triangular fuzzy numbers change to convex fuzzy numbers.

Table (5). Results of the calculation of the degree of priority (degree of feasibility)

$V(S_1 \geq S_2) = 1$	$V(S_2 \geq S_1) = 0.930$	$V(S_3 \geq S_1) = 0.803$
$V(S_1 \geq S_3) = 1$	$V(S_2 \geq S_3) = 1$	$V(S_3 \geq S_2) = 0.867$
$V(S_1 \geq S_4) = 1$	$V(S_2 \geq S_4) = 1$	$V(S_3 \geq S_4) = 1$
$V(S_1 \geq S_5) = 1$	$V(S_2 \geq S_5) = 1$	$V(S_3 \geq S_5) = 1$
$V(S_1 \geq S_6) = 1$	$V(S_2 \geq S_6) = 1$	$V(S_3 \geq S_6) = 1$
$V(S_4 \geq S_1) = 0.284$	$V(S_5 \geq S_1) = 0.735$	$V(S_6 \geq S_1) = 0.741$
$V(S_4 \geq S_2) = 0.346$	$V(S_5 \geq S_2) = 0.800$	$V(S_6 \geq S_2) = 0.804$
$V(S_4 \geq S_3) = 0.488$	$V(S_5 \geq S_3) = 0.938$	$V(S_6 \geq S_3) = 0.935$
$V(S_4 \geq S_5) = 0.558$	$V(S_5 \geq S_4) = 1$	$V(S_6 \geq S_4) = 1$
$V(S_4 \geq S_6) = 0.566$	$V(S_5 \geq S_6) = 1$	$V(S_6 \geq S_5) = 0.993$

Step 3: Calculating the priority degree of a convex fuzzy number S, which is greater than K convex fuzzy numbers (Si: i = 1.2, ... k).

The fuzzy values obtained represent the fuzzy evaluation K of the fuzzy expert evaluation.

$V(S_1 \geq S_2, S_3, S_4, S_5, S_6) = \min(V(S_1 \geq S_2), V(S_1 \geq S_3), V(S_1 \geq S_4), V(S_1 \geq S_5), V(S_1 \geq S_6)) = 1$

$V(S_2 \geq S_1, S_3, S_4, S_5, S_6) = \min(V(S_2 \geq S_1), V(S_2 \geq S_3), V(S_2 \geq S_4), V(S_2 \geq S_5), V(S_2 \geq S_6)) = 0.930$

$V(S_3 \geq S_1, S_2, S_4, S_5, S_6) = \min(V(S_3 \geq S_1), V(S_3 \geq S_2), V(S_3 \geq S_4), V(S_3 \geq S_5), V(S_3 \geq S_6)) = 0.803$

$V(S_4 \geq S_1, S_2, S_3, S_5, S_6) = \min(V(S_4 \geq S_1), V(S_4 \geq S_2), V(S_4 \geq S_3), V(S_4 \geq S_5), V(S_4 \geq S_6)) = 0.284$

$V(S_5 \geq S_1, S_2, S_3, S_4, S_6) = \min(V(S_5 \geq S_1), V(S_5 \geq S_2), V(S_5 \geq S_3), V(S_5 \geq S_4), V(S_2 \geq S_6)) = 0.735$

$V(S_6 \geq S_1, S_2, S_3, S_4, S_5) = \min(V(S_6 \geq S_1), V(S_6 \geq S_2), V(S_6 \geq S_3), V(S_6 \geq S_4), V(S_6 \geq S_5)) = 0.741$

Step 4: Normalizing the vector W' and obtaining the normalized vector W.

Here: W' represents a fuzzy weight vector and W_N represents the normalized vector.

$$W' = (1, 0.930, 0.803, 0.284, 0.735, 0.741)$$

$$W_N = (0.220, 0.205, 0.177, 0.061, 0.162, 0.163)$$

After calculating the geometric mean for the pairwise comparisons of the internal dependence of the main cultural factors effective on the successful implementation of knowledge management, with considering other factors, including continuous learning, knowledge creation culture, senior management support, encouragement and rewards, employees' participation, and organizational culture, which were not mentioned here due to the large volume of calculations, the factors matrix was formed using the final weight of the geometric mean matrices of the pairwise comparisons of the internal dependence of the main cultural factors affecting the knowledge management. The final weight of each major factor was obtained from the multiplication of the matrix of factors by the final weight matrix obtained from the geometric mean matrices of the pairwise comparisons of the main criteria. The calculation of the final weight of the factors is given in the following.

$$\begin{bmatrix} 1.000 & 0.388 & 0.463 & 0.124 & 0.219 & 0.129 \\ 0.403 & 1.000 & 0.363 & 0.212 & 0.072 & 0.383 \\ 0.331 & 0.210 & 1.000 & 0.843 & 0.000 & 0.255 \\ 0.000 & 0.089 & 0.057 & 1.000 & 0.000 & 0.000 \\ 0.144 & 0.199 & 0.000 & 0.243 & 1.000 & 0.225 \\ 0.116 & 0.104 & 0.108 & 0.370 & 0.703 & 1.000 \end{bmatrix} \times \begin{bmatrix} 0.220 \\ 0.205 \\ 0.177 \\ 0.061 \\ 0.162 \\ 0.163 \end{bmatrix} = \begin{bmatrix} 0.247 \\ 0.260 \\ 0.203 \\ 0.053 \\ 0.074 \\ 0.151 \end{bmatrix}$$

Therefore, the weight of each of the main criteria influencing the successful implementation of knowledge management and their ranking are presented in Table (6).

Table 6. The importance degree of the main cultural factors affecting knowledge management

Factor	The importance degree based on the FANP	Rating based on the degree of impact
Continuous learning	0.247	2
Culture of Knowledge Creation	0.260	1
Support by Senior Managers	0.203	3
Encouragement and rewards	0.053	6
Employees' participation	0.074	5
Organizational Culture	0.151	4

According to the results of Table 6, one can conclude that among the six cultural factors affecting the successful implementation of knowledge management in the electronic insurance industry, the factor of knowledge creation culture is ranked the first. Then, according to the weights obtained for each of the six cultural factors effective on the knowledge management and the scores collected based on research questionnaire, the rankings of the components of each of these main

factors are shown in Tables 8 through 13 using the fuzzy TOPSIS technique. It should be noted that sub-factors in the hierarchy tree were introduced. These sub-factors are presented in Table 7.

Table 7. Sub-factors affecting successful implementation of knowledge management

Sub-factors	Main factors
Training and education	Continuous learning
Continuous education	
Staff training	
Participatory Culture	Knowledge creation culture
Knowledge sharing culture	
Culture of Creation	
Knowledge generation	
Management support	Senior management support
Leadership Commitment	
Leadership	
Reward and motivation	Encouragement and rewards
Team-based structure	
Team work	
Employees' involvement and engagement	Employees' participation
A quiet environment for negotiation	
Knowledgeable Organizational Culture	Organizational culture
Knowledge Friendly Organization Culture	
Knowledge Seeking Organizational Culture	

The decision phases with the Fuzzy TOPSIS Technique are as follows:

Step 1: Obtain vector weights: $\tilde{w}_j$

Step 2: Normalize the matrix derived from the expert survey on options that have a new matrix as follows:

$$\tilde{R} = \left[\tilde{r}_{ij}\right]_{m\times n}$$

$B \subseteq \{1,...,n\}$ It relates to indicators that are related to the ideal option and $C \subseteq \{1,...,n\}$ It relates to indicators that are related to the ideal option.

$$\tilde{r}_{ij} = \left(\frac{a_{ij}}{d_j^*}, \frac{b_{ij}}{d_j^*}, \frac{c_{ij}}{d_j^*}, \frac{d_{ij}}{d_j^*}\right), \quad j \in B$$

$$\tilde{r}_{ij} = \left(\frac{a_j^-}{d_{ij}}, \frac{a_j^-}{c_{ij}}, \frac{a_j^-}{b_{ij}}, \frac{a_j^-}{a_{ij}}\right), \quad j \in C$$

Step 3: Calculate the weighted matrix using the following equation:

$$\tilde{v}_{ij} = \tilde{r}_{ij} \otimes \tilde{w}_j$$
$$\tilde{v} = [\tilde{v}_{ij}]_{m\times n},\ i = 1,2,...,m,\ j = 1,2,...,n$$

Step 4: Identify the Positive Ideal Fuzzy Idea (FIS) and Negative Fuzzy Idea (FNIS) through the following relationships:

$$\tilde{v}_j^* \begin{cases} \max\limits_{i=1,..,m} \tilde{v}_{ij};\ j \in B \\ \max\limits_{i=1,..,m} \tilde{v}_{ij};\ j \in C \end{cases}$$

$$\tilde{v}_j^- \begin{cases} \max\limits_{i=1,..,m} \tilde{v}_{ij};\ j \in B \\ \max\limits_{i=1,..,m} \tilde{v}_{ij};\ j \in C \end{cases}$$

$$FPIS = \{ \tilde{v}_j^* \mid j=1,...,n \}$$

$$FNIS = \{ \tilde{v}_j^- \mid j=1,...,n \}$$

Step 5: Calculate the distance intervals using the Fuzzy Euclidean Distance:

$$d(\tilde{a},\tilde{b}) = \sqrt{\frac{1}{4}\left[(a_1-b_1)^2 + (a_2-b_2)^2 + (a_3-b_3)^2 + (a_4-b_4)^2\right]}$$

Step 6: The distance between each option from positive and negative ideals using the following relationships:

$$d_i^* = \sum_{j=1}^{n} d(\tilde{v}_{ij}, \tilde{v}_j^*), i = 1,..., m$$

$$d_i^- = \sum_{j=1}^{n} d(\tilde{v}_{ij}, \tilde{v}_j^-), i = 1,..., m$$

Step 7: Calculating Proximity to the Idea and Ranking of Factors Influencing Knowledge Management:

$$C_i = \frac{d_i^-}{d_i^- + d_i^+}$$

Table 8. The ranking of components related to the continuous learning factor

Rating	Final weight	**C_i**	Distance with the negative ideal	Distance with the positive ideal	Components
2	0.092	0.675	4/89	2/32	Training and education
1	0.097	0.717	5/17	2/01	Continuous education
3	0.970	0.498	3/54	3/54	Staff training

The results of Table 8 show that among the components related to the continuous learning factor, the component of "continuous education" is ranked the first.

Table 9. The ranking of components related to the factor of knowledge creation culture

Rating	Final weight	**C_i**	Distance with the negative ideal	Distance with the positive ideal	Components
2	0.064	0.818	5/99	1/31	Participatory Culture
1	0.066	0.839	6/14	1/14	Knowledge sharing culture
3	0.056	0.724	5/17	1/94	Culture of Creation
4	0.055	0.703	5/03	2/09	Knowledge generation

The results of Table 9 show that among the factors related to the factor of knowledge creation culture, the component of "knowledge sharing culture" is ranked the first.

Table 10. The ranking of components related to the factor of senior management support

Rating	Final weight	C_i	Distance with the negative ideal	Distance with the positive ideal	Components
2	0.069	0.674	4.73	2/13	Management support
1	0.071	0.694	4.98	2/16	Leadership Commitment
3	0.065	0.632	4/55	2/62	Leadership

The results of Table 10 show that among the components related to the senior management support, the component of the "Leadership Commitment" is ranked the first.

Table 11. The ranking of components related to the factor of encouragement and rewards

Rating	Final weight	C_i	Distance with the negative ideal	Distance with the positive ideal	Components
2	0.036	0.714	5/14	2/03	Reward and motivation
3	0.035	0.683	4/87	2/23	Team-based structure
1	0.039	0.765	5/47	1/67	Team work

The results of Table 11 show that among the factors related to the factor of encouragement and rewards, the component of the "teamwork" is ranked the first.

Table 12. The ranking of components related to the factor of employees' participation

Rating	Final weight	C_i	Distance with the negative ideal	Distance with the positive ideal	Components
1	0.016	0.801	5/74	1/39	Employees' involvement and engagement
2	0.014	0.723	5/18	1/97	A quiet environment for negotiation

The results of Table 12 show that among the factors related to the employees' participation factor, the component of the "employees' involvement and engagement" is ranked the first.

Table 13. The ranking of components related to the factor of organizational culture

Rating	Final weight	C_i	Distance with the negative ideal	Distance with the positive ideal	Components
1	0.011	0.702	5/04	2/11	Knowledgeable Organizational Culture
3	0.008	0.559	4/02	3/14	Knowledge Friendly Organization Culture
2	0.010	0.679	5/19	2/42	Knowledge Seeking Organizational Culture

The results of Table 13 show that among the factors related to the factor of organizational culture, the component of "Knowledgeable Organizational Culture" is ranked the first.

5. Discussion & Conclusion

The aim of this research was to identify and prioritize cultural factors affecting the successful implementation of knowledge management in the electronic insurance industry. By reviewing and studying the research literature, we found that the successful and flawless implementation of this issue is crucial and decisive given the importance of knowledge and the creation of competitive advantage by knowledge in today's organizations. Undoubtedly, nowadays, the services companies, including the companies active in the insurance services industry, as important and influential organizations in providing insurance services, must try to implement and deploy knowledge management to create a competitive advantage and advance in the knowledge-based economy, which requires recognizing and exploring the key elements of knowledge management, and then,

doing practical measures based on the identified factors. Hence, in the present study, by identifying six main factors and nine components, we evaluated the importance of effective cultural factors affecting the successful implementation of knowledge management in the electronic insurance industry using two fuzzy analytical network and fuzzy TOPSIS techniques. The results from fuzzy analytical network process indicated out of six main factors identified, the factor of the culture of knowledge creation is of the utmost importance and is ranked the first followed by the factors of continuous learning, senior management support, organizational culture, employees' participation, and encouragement and reward as the next rankings. In the next phase, using the fuzzy TOPSIS technique, we examined the importance and place of the components of each of these cultural factors influencing the knowledge management. The results revealed that among the components of continuous learning factor, the component of continuous education out of the components of the culture of creating knowledge factor, the component of the culture of knowledge sharing out of the components of senior management support, the component of the commitment of senior executives out of the components of the factor of encouragement and reward, the component of the teamwork among the components of the employees' participation factor, the component of participation and engagement of employees among the components of organizational culture factor, the component of the knowledgeable organizational culture are ranked the first. Some studies have been conducted in the past years on the key factors in the success of knowledge management, among which, a research carried out by Fazli and Ali Shahi in 2010 can be referred to. These researchers examined the relationship between organizational factors such as strategy, structure, organizational culture, and the performance through knowledge management. The study results showed that the organizational culture and strategy have a direct impact on the performance and knowledge management and factors such as strategy and organizational culture should be considered in order to successfully implement knowledge management and improve the organizational performance. In a research in 2010, Valmohamdi explored the key factors behind the success of KM in small and medium-sized enterprises and ranked these factors were as follows after his review: Management support and leadership, organizational culture, knowledge management strategy, human resources management, organizational infrastructures, performance evaluation, training, information technology, motivation and rewards. According to the results of this study and by examining the factors identified in the studies by Fasli and Shahi (2010) and Valmohammadi (2010), one can conclude that the results of these three studies are consistent with each other. In a research, Yazdani et al. (2011) also assessed the key factors in the KM's success in manufacturing organizations, which results indicated that the culture, technology, and structure are the most important factors, respectively. In other words, the culture was identified as the most important factor in this study, which result is consistent with the results of the present study. According to the results of this research regarding the effect of the culture category on the development of knowledge management in service organizations, the results obtained are consistent with the results of studies by Roy et al. (2018) and Orly et al. (2019). In general, according to the results obtained, one can admit that the cultural factors play a crucial role in determining the results of knowledge management efforts. For this reason, the organizations intending to implement knowledge management need to evaluate the cultural factors affecting the successful implementation of knowledge management.

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