



## Prioritization of Critical Success Factors in Knowledge-Management Using the AHP Method

Farnaz ZEİDİ<sup>1,\*</sup>, Masoumeh MİR AHMADİ BABAHEİDARİ<sup>1</sup>

<sup>1</sup>Payame Noor University of Khorasgan,

Received: 01.02.2015; Accepted: 05.05.2015

**Abstract.** Knowledge Management (KM) plays an important role in today's enterprise management and implementation of KM takes a considerable time and resources from the organization. Therefore, it is essential that critical success factors (CSFs) of KM are identified and prioritized. According to what was said, the main purpose of this paper is: Identification and prioritization of CSFs in the KM in small and medium-sized enterprises (SMEs) in Iran. According to this objective, two steps are provided: in the first step the authors initially use a related topic of CSFs in KM implementation, which aims at identifying and investigating factors that result in more successful KM systems implementation that generate higher levels of value for organizations. By integrating insights drawn from these studies, the authors proposed a set of 12 CSFs which is believed to be more suitable for SMEs. Then, in the second step, these factors will be prioritized by analytic hierarchy process (AHP).

**Keywords:** Critical success factors, Knowledge management, Small to medium-sized enterprises, Analytic hierarchy process, Iran.

### 1. INTRODUCTION

Knowledge management (KM) is an integrated, systematic approach to identify, manage, and share all of the department's information assets, including databases, documents, policies and procedures, as well as previously unarticulated expertise and experience resident in individual officers [1].

KM is also known as a systematic, goal-oriented application of measures to steer and control the tangible and intangible knowledge assets of organizations, with the aim of using existing knowledge inside and outside of these organizations to enable the creation of new knowledge, and generate value, innovation and improvement [2].

For a deeper understanding of the KM processes, an attempt to express the hidden meaning of data, information and knowledge is necessary. Data means a set of discrete and objective facts concerning events. Therefore, they can be construed as a structured record of transactions within an organization. Information is data with attributes of relevance and purpose, usually having the format of a document or visual and/or audible message. Knowledge is linked to the capacity for action. It is intuitive, therefore, hard to define. It is linked to the users' values and experience, being strongly connected to pattern recognition, analogies and implicit rules [2].

Nowadays, many organizations are exploring the field of KM in order to improve and sustain their competitiveness. The need for a more systematic and deliberate study on the critical success factors (CSFs) for implementing KM is crucial. Organizations need to be cognizant and aware of the factors that will influence the success of a KM initiative. Ignorance and oversight

\*Corresponding author. Email address: F.zeidi@ustmb.ac.ir

of the necessary important factors will likely hinder an organization's effort to realise its full benefit [3].

Initially, KM appeared to be adopted only in large, multinational and international companies and hence, research work on CSFs has been largely centred on them. Most of these studies have not considered the differences of company size as well as the specific features of small and medium enterprises (SMEs) that could affect KM [3].

In this paper was tried to specify and prioritize CSFs differences in KM implementation, in Iranian SMEs. Therefore, two steps will be presented: In the first step, all the mentioned CSFs in different papers were identified that the result of this step is 12 CSFs. In the second step: By analytic hierarchy process (AHP), these CSFs will be prioritized according to Iranian SMEs.

### 1.1. First step: CSFs in KM implementation

The authors have investigated and classified literatures on the failure of KM projects. Based on an extensive literature review along with discussion sessions with experts from both Iranian SMEs managers and specialists in KM, 12 CSFs have been identified: Management leadership and support, Organizational culture, Information technology, KM strategy, Performance measurement, Organizational infrastructure, Processes and activities, Rewarding and motivation, Resources, Training and education, Human resource management and Benchmarking.

The result is summarized in "Table 1" and will be discussed in the following subsections.

**Table 1.** KM CSFs

<b>KM CSFs</b>	<b>Reference</b>
1-Management leadership and support	[2] [3] [4] [5] [11] [14] [15]
2-Organizational culture	[2] [4] [5] [10] [11] [14] [16]
3-Information Technology	[2] [4] [5] [10] [11] [14] [17]
4-KM strategy	[2] [4] [5] [14] [18]
5-Performance measurement	[4] [5] [10] [11] [14]
6-Organizational infrastructure	[2] [3] [4] [5] [14]
7-Processes and activities	[2] [3] [4] [5] [19]
8-Rewarding and motivation	[2] [4] [5] [12] [14] [20]
9-Resources	[2] [3] [4] [5] [14]
10-Training and education	[2] [3] [4] [5] [10] [11] [12]
11-Human resource management	[4] [5] [11] [12] [13] [14]
12-Benchmarking	[2] [4] [6] [7] [8] [9] [10] [11]

#### *1-Management leadership and support*

Management leadership plays a key role in influencing the success of KM [15]. Leaders are important in acting as role models to exemplify the desired behaviour for KM. They should for example, exhibit a willingness to share and offer their knowledge freely with others in the organisation, to continuously learn, and to search for new knowledge and ideas. It is vital that they model their behaviours and actions through deeds, not just words. By doing so, they can further influence other employees to imitate them and increase the propensity of employees to participate in KM. Other leadership competencies that would be important include steering the change effort, conveying the importance of KM to employees, maintaining their morale, and creating a culture that promotes knowledge sharing and creation. In essence, leaders establish the necessary conditions for effective KM [3].

## *2-Organizational culture*

Organizational culture is another imperative factor for successful KM [14, 16]. It defines the core beliefs, values, norms and social customs that govern the way individuals act and behave in an organization. In general, a culture supportive of KM is one that highly values knowledge and encourages its creation, sharing and application. The biggest challenge for most KM efforts actually lies in developing such a culture. A survey result reported by Chase (1997) affirmed that culture was the largest obstacle faced by organisations in creating a successful knowledge-based enterprise [3].

## *3-Information Technology*

It is indisputable that one of the key enablers for implementing KM is IT. Its capability has evolved from merely being a static archive of information to being a connector of a human to information and of one human to another[3]. IT can enable rapid search, access and retrieval of information, and can support collaboration and communication between organisational members. In essence, it can certainly play a variety of roles to support an organisation's KM processes [17]. However, it is noteworthy to recognise that IT is only a tool not an ultimate solution [5].

## *4-KM strategy*

One of the means for driving the success of KM is to have a clear and well-planned strategy [3]. This provides the foundation for how an organisation can deploy its capabilities and resources to achieve its KM goals. While several strategies for implementing KM have been suggested in the literature [7], a suitable one should be well adjusted to the situation and context of the organisation in hand. In order to attach more significance to a KM strategy, it should support an imperative business issue of an organisation. There seems to be common agreement in the literature that it has to be linked or integrated with the enterprise business strategy [18].

## *5-Performance measurement*

Measurement acts like a data collection system that gives useful information about a particular situation or activity. An initiative like KM will suffer the risk of becoming just another management fad, if it is left unmeasured. Sayings like “you cannot manage what you cannot measure” and “what is measured is what gets done” certainly hold true for KM [3].

## *6-Organizational infrastructure*

Another central aspect for implementing KM is the development of an appropriate organizational infrastructure. This implies establishing a set of roles and teams to perform knowledge-related tasks [14]. Despite the fact that some existing functions within an organization such as HRM and IT have already been working with knowledge issues, establishing a group of people with specific and formal responsibilities for KM is crucial. Roles within this team can either be devolved to existing positions or to new ones [3].

## *7-Processes and activities*

A KM process refers to something that can be done with knowledge in the organisation [3]. Processes that can possibly characterise the KM discipline are numerous. Many authors have suggested a number of activities or processes associated with KM [5,19]. For example, four main processes were discerned by Alavi and Leidner (2001): creation, storage/retrieval, transfer and application. The execution of KM processes lies at the heart of creating a successful knowledge-based enterprise. Thus, it is important that organisations adopt a process-based view to KM [3].

### *8- Rewarding and motivation*

There is a saying that “you can lead a horse to water, but you cannot make it drink”. Successful KM requires the development of a “grass root desire among employees to tap into their company’s intellectual resources” [20]. If individuals are not motivated to practise KM, no amount of investment, infrastructure and technological intervention will make it effective. Hence, one of the important factors is to establish the right incentives, rewards or motivational aids to encourage people to share and apply knowledge. Giving incentives to employees helps to stimulate and reinforce the positive behaviours and culture needed for effective KM [3].

### *9- Resources*

Successful KM implementation is dependent upon resources. Financial support is inevitably required if an investment in a technological system is to be made. Human resources are needed to coordinate and manage the implementation process as well as to take up knowledge-related roles. Time is also a consideration; organisations have to free up time for their employees to perform KM activities such as knowledge sharing. Similarly, providing time and opportunities for people to learn is important [3].

### *10- Training and education*

For spreading knowledge policies and totality of knowledge in the organization, employees should become completely and deeply familiar with knowledge concepts. So, training programs are very important for an organization which is to conduct KM [2].

### *11- Human resource management*

Certainly, KM practitioners cannot afford to ignore the value that can be gained from HRM. After all, people are the sole originators of knowledge. As stated by Davenport and Volpel (2001), “managing knowledge is managing people; managing people is managing knowledge” [3]. The significance and roles of HRM in KM have been discussed by a number of authors [21]. While it is vital to KM for many reasons, the main focus here is on the issues of employee recruitment, development and retention [3].

### *12- Benchmarking*

Benchmarking factor is one of important techniques for measuring company’s performance towards its strategic goals, but as this technique is not broadly employed by Iranian SMEs which stems from the lack of necessary knowledge on KM programs in their organizations, so the respondents perceived low ranking for this CSF. Chong (2006) states, only organizations which have implemented KM programs realize the importance of benchmarking [4].

## **1.2. Second step: Research methodology**

In second step, the declared CSFs should be prioritized by AHP and will be discussed in the following subsections. CSFs will be prioritized by interviewing with 20 senior executives, professionals and experts according to Iranian SMEs.

### **A. The analytic hierarchy process**

The Analytic Hierarchy Process (AHP) is a multi-criteria decision-making approach and was introduced by Saaty [22]. The AHP has attracted the interest of many researchers mainly due to the nice mathematical properties of the method and the fact that the required input data are rather easy to obtain. The AHP is a decision support tool which can be used to solve complex decision problems. It uses a multi-level hierarchical structure of objectives, criteria, subcriteria, and alternatives. The pertinent data are derived by using a set of pairwise comparisons. These comparisons are used to obtain the weights of importance of the decision criteria, and the

relative performance measures of the alternatives in terms of each individual decision criterion. If the comparisons are not perfectly consistent, then it provides a mechanism for improving consistency [23].

**B. Pairwise comparisons**

The first step in the AHP is the estimation of the pertinent data. That is, the estimation of the  $a_{ij}$  and  $W_j$  values of the decision matrix. This is described in the next sub-section and is shown in “Table 2”. According to this scale, the available values for the pairwise comparisons are members of the set: {9, 8, 7, 6, 5, 4, 3, 2, 1, 1/2, 1/3, 1/4, 1/5, 1/6, 1/7, 1/8, 1/9} [24].

**Table 2.** Scale of Relative Importances [24].

<b>Intensity of Importance</b>	<b>Definition</b>	<b>Explanation</b>
1	Equal importance	Two activities contribute equally to the objective
3	Weak importance of one over another	Experience and judgment slightly favor one activity over another
5	Essential or strong importance	Experience and judgment strongly favor one activity over another
7	Demonstrated importance	An activity is strongly favored and its dominance demonstrated in practice
9	Absolute importance	An activity is strongly favored and its dominance demonstrated in practice
2,4,6,8	Intermediate values between the two adjacent judgments	When compromise is needed
Reciprocals of above nonzero	If activity i has one of the above nonzero numbers assigned to it when compared with activity j, then j has the reciprocal value when compared with i.	

**C. Decision-making software & Reliability**

Expert Choice (EC) is decision-making software that is based on multi-criteria decision making. Expert Choice implements the AHP. Therefore, this paper uses EC to prioritize CSFs by AHP method. Moreover, Inconsistency Ratio (I.R) is used for validation of result. I.R shows how priorities can be trusted and the maximum acceptable I.R is 0.1, otherwise the comparisons must be revised [22].

**2. RESULTS AND ANALYSIS**

The results are as follows:

**A. Pairwise comparisons matrix**

According to “Table 2”, pairwise comparisons matrix is identified for KM implementation through interviewing with 20 senior executives and KM experts that are working in SMEs. The results are shown in “Table 3”.

Table 3. Pairwise comparisons in KM implementation.

KM CSFs		C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
Training and education	C1	1	1/9	1/7	3	1/4	3	1/3	2	4	1/3	2	3
Management leadership and support	C2		1	6	5	4	5	4	3	2	4	4	2
Organizational culture	C3			1	8	7	5	6	9	8	7	9	8
Processes and activities	C4				1	2	3	4	7	4	3	5	3
KM strategy	C5					1	2	3	8	6	5	7	8
Resources	C6						1	6	8	9	8	7	6
Benchmarking	C7							1	9	1/7	1/6	5	4
Performance measurement	C8								1	1/7	1/6	1/5	1/3
Human resource management	C9									1	3	6	7
Organizational infrastructure	C10										1	8	4
Information Technology	C11											1	3
Rewarding and motivation	C12												1

B. Results of CSFs Prioritization

According to results of pairwise comparisons matrix and by using EC software, results of CSFs prioritization are shown in “Figure 1”.

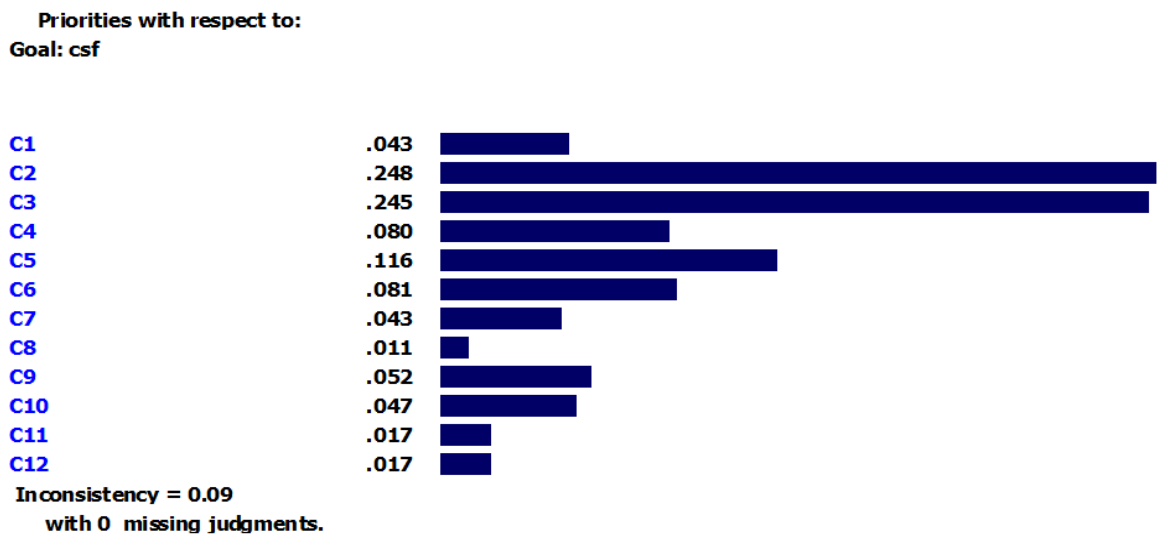


Figure 1. CSFs prioritization in KM implementation.

According to the above the following results can be concluded: “Management leadership and support” by a result of 0.248 is in top of ranking in priority, after that “Organizational culture” has a second position with 0.245 and “KM strategy” is in third position with 0.116. Finally, the “Resources” and “Processes and activities” with a 0.081 and 0.08 have fourth and fifth position. These factors affect on the successful KM implementation (77%) more than other CSFs. The prioritize results are shown in “Table 4”:

**Table 4.** The degree of importance of KM CSFs.

<b>KM CSFs</b>	<b>Priority</b>
Management leadership and support	0.248
Organizational culture	0.245
KM strategy	0.116
Resources	0.081
Processes and activities	0.080
Human resource management	0.052
Organizational infrastructure	0.047
Performance measurement	0.043
Training and education	0.043
Information Technology	0.017
Rewarding and motivation	0.017
Benchmarking	0.011

Moreover, the inconsistency ratios for CSFs prioritization is 0.09 that this number indicates the validity and reliability of results.

### 3. CONCLUSIONS

The main objective of this study was “Prioritization of CSFs in KM implementation in SMEs in Iran”. Researchers provided two steps to achieve this purpose. These two steps are: 1-First step: Identify CSFs in KM implementation using literatures on the failure of KM projects that 12 CSFs have been identified: Management leadership and support, Organizational culture, Information technology, KM strategy, Performance measurement, Organizational infrastructure, Processes and activities, Rewarding and motivation, Resources, Training and education, Human resource management and Benchmarking. 2- Second step: Prioritize CSFs in KM implementation that in this step, CSFs are prioritized by AHP method and pairwise comparisons matrix is identified for KM implementation through interviewing with 20 senior executives and KM experts that are working in SMEs. Finally, this paper used EC software to prioritize CSFs by AHP method that “Management leadership and support” by a result of 0.248 is in top of ranking in priority, after that “Organizational culture” has a second position with 0.245 and “KM strategy” is in third position with 0.116.

There are some suggestions for future research: according to studies, vendors and consultation believed that it is necessary that a revolutionary approach in implementation of KM should be presented. So, it is better to provide the life-cycle of KM implementation that CSFs should be allocated to it. Also, in order to purchase KM, there is a need to the decision model to evaluate providers (vendors KM) and select the best of them. In that model, the KM providers will be evaluated by the various aspects such as: Farsi Supporting, previous experiences, the specific limitations of the trading system in Iran and the others features.

### REFERENCES

- [1] Jones, D. , 2003. Knowledge management and technical communication: a convergence of ideas and skills.
- [2] Akhavan, P., Jafari, M., & Fathian, M. ,2006 , Critical success factors of knowledge management systems: a multi-case analysis. European business review, 18(2), 97-113.

- [3] Yew Wong, K. ,2005 , Critical success factors for implementing knowledge management in small and medium enterprises, *Industrial Management & Data Systems*, 105(3), 261-279.
- [4] Valmohammadi, C. ,2010, Identification and prioritization of critical success factors of knowledge management in Iranian SMEs: An experts' view. *African Journal of Business Management*, 4(6), 915-924
- [5] Yew Wong, K., & Aspinwall, E. ,2005, An empirical study of the important factors for knowledge-management adoption in the SME sector. *Journal of knowledge management*, 9(3), 64-82.
- [6] Drew, S. A. ,1997, From knowledge to action: the impact of benchmarking on organizational performance. *Long range planning*, 30(3), 427-441.
- [7] O'Dell, C. S., & Essaides, N. ,1998, If only we knew what we know: The transfer of internal knowledge and best practice: Simon and Schuster.
- [8] Day, J. D., & Wendler, J. C. ,1998, Best practice and beyond: Knowledge strategies. *The McKinsey Quarterly*, 1, 19-25.
- [9] Moffett, S., McAdam, R., & Parkinson, S. ,2002, Developing a model for technology and cultural factors in knowledge management: a factor analysis. *Knowledge and Process Management*, 9(4), 237-255.
- [10] Hung, Y.-C., Huang, S.-M., Lin, Q.-P., & -Tsai, M.-L. ,2005, Critical factors in adopting a knowledge management system for the pharmaceutical industry. *Industrial Management & Data Systems*, 105(2), 164-183.
- [11] Choy Chong, S., 2006, KM critical success factors: a comparison of perceived importance versus implementation in Malaysian ICT companies. *The learning organization*, 13(3), 230-256.
- [12] Yahya, S., & Goh, W.-K. , 2002, Managing human resources toward achieving knowledge management. *Journal of knowledge management*, 6(5), 457-468.
- [13] Brelade, S., 2000, Using human resources to put knowledge to work. *Knowledge Management Review*, 26-29.
- [14] Davenport, T. H., & Völpel, S. C. , 2001, The rise of knowledge towards attention management. *Journal of knowledge management*, 5(3), 212-222.
- [15] Horak, B. J. ,2001, Dealing with human factors and managing change in knowledge management: a phased approach. *Topics in health information management*, 21(3), 8-17.
- [16] Martensson, M. ,2000, A critical review of knowledge management as a management tool. *Journal of knowledge management*, 4(3), 204-216.
- [17] Lee, S. M., & Hong, S. , 2002, An enterprise-wide knowledge management system infrastructure. *Industrial Management & Data Systems*, 102(1), 17-25.
- [18] Maier, R., & Remus, U. ,2002, Defining process-oriented knowledge management strategies. *Knowledge and Process Management*, 9(2), 103-118.
- [19] Alavi, M., & Leidner, D. E. ,2001, Review: Knowledge management and knowledge management systems: Conceptual foundations and research issues. *MIS quarterly*, 107-136.
- [20] Hauschild, S., Licht, T., & Stein, W. ,2001, Creating a knowledge culture. *The McKinsey Quarterly*, 74.
- [21] Robertson, M., & O'Malley Hammersley, G. ,2000, Knowledge management practices within a knowledge-intensive firm: the significance of the people management dimension. *Journal of European Industrial Training*, 24(2/3/4), 241-253.
- [22] Saaty, T. L. ,2008, Decision making with the analytic hierarchy process. *International journal of services sciences*, 1(1), 83-98.
- [23] Triantaphyllou, E., & Mann, S. H. ,1995, Using the analytic hierarchy process for decision making in engineering applications: some challenges. *International Journal of Industrial Engineering: Applications and Practice*, 2(1), 35-44.
- [24] Saaty, T. L. ,1990, An exposition of the AHP in reply to the paper "remarks on the analytic hierarchy process". *Management science*, 36(3), 259-268.