International Scholars Journals

Global Journal of Business Management ISSN 6731-4538 Vol. 5 (11), pp. 001-010, November, 2011. Available online at www.internationalscholarsjournals.org © International Scholars Journals

Full Length Research Paper

Identification and prioritization of critical success factors of knowledge management in Iranian SMEs: An experts' view

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Accepted 16 July, 2011

This paper aims to identify and prioritize the importance of critical success factors (CSFs), which have been proposed in the form of empirical and theoretical studies by different authors and scholars. Through an in-depth and comparative study twelve CSFs along with their related elements were identified and an instrument then was developed to collect the views of knowledge management (KM) experts on the perceived importance of CSFs. Through statistical analysis tests, reliability and validity including construct validity of the instrument was approved by factor analysis. The analysis of these CSFs showed that leadership and support of top management and organizational culture factors were perceived to be the most important factors, whereas rewarding and motivation and benchmarking factors were the least. Since companies may not be able to manage all aspects of knowledge at the same time, an ordered list of CSFs will provide a clue to Iranian organizations, particularly SMEs which are keen to implement KM initiative to prioritize and adjust their knowledge practices. The research adds knowledge in the field of KM within the context of developing countries and gives a particular focus on the Iran SMEs; as a review of literature has identified no studies that have undertaken a comprehensive analysis of KM practices in the Iranian context. Also this study has the potential to enhance the understanding of KM practices amongst researches and practitioners.

Key words: Critical success factors, knowledge management, small to medium sized enterprises, factors analysis, Iran.

INTRODUCTION

The foundation of organizational competitiveness in the contemporary economy has shifted from physical and tangible resources to knowledge. The key focus of information systems has also changed from the management of information to that of knowledge. Businesses that can efficiently capture the knowledge embedded in their organizations and deploy it into their operations, productions and services will have an edge over their competitors. Many organizations are increasingly viewed as knowledge-based enterprises in which formal knowledge management is essential. Nowadays, KM is rapidly becoming an integral business activity for organizations as they realize that competitiveness pivots around the effective management of knowledge (Grover and Davenport, 2001). According to the definition of American productivity and quality center (APQC), knowledge Management (KM) is a kind of strategy that delivers the right knowledge to the right persons at the right time. It can also help members share information, and turn this sharing into actions that improve organizational effectiveness. It can then bring the collective intelligence influence ability into full play using knowledge sharing, and further increase the response and innovation abilities of an organization. KM has been considered to be an important resource in competitive advantage (Ho, 2009).One of the key concerns that emerge in KM is how to accomplish it. Many companies that are attempting to initiate KM are unsure of the best approach to adopt (Moffett et al., 2002). There seems to be general agreement in the literature that a combined social and technological approach is ideal (Wong and Aspinwall, 2005).So, the way forward will be paved if organizations are aware of the key factors that will make its adoption successful. On the other hand, as SMEs play

a very important role in the economic growth, employment and sustainable development of countries, for instance in Iran SMEs constitute 90 percent of all enterprises (Bayati and Taghavi, 2007).Therefore, it is crucial to identify these factors as well as to investigate them by empirical means. In this study the author tries to answer the two main questions of this research, which are:

- Based on the context of SME sector, what are the CSFs of knowledge management of SMEs?
- Do these CSFs have equal prioritization from Iranian experts' point of view?

Based on the two aforementioned questions the purpose of this study is to help Iranian organizations particularly SMEs to be introduced to CSFs of KM and also to identify the prioritization of these CSFs from experts' point of view, so the Iranian organizations by concentration and investment on these factors could increase the likelihood of successful KM implementation. The remainder of the paper is structured as follows. The next section presents the literature on the various KM CSFs. The methodology employed for conducting the survey follows. Then, results and discussion section on CSFs is presented. The paper wraps up with the conclusion drawn and recommendation for future research.

LITERATURE REVIEW

A broad range of factors that can influence the success of KM implementation has been mentioned in the literature. For example, much has been stated about culture, information technology (IT) and leadership as important considerations for its accomplishment. However, no systematic work exists on characterizing a collective set of CSFs for implementing KM in the SME sector. An appropriate set of CSFs which are relevant for SMEs will help them to keep in mind the important issues that should be dealt with when designing and implementing a KM initiative (Wong, 2005). Saraph et al. (1989) viewed CSFs as those critical areas of managerial planning and action that must be practiced in order to achieve effectiveness. Wong (2005) states, In terms of KM, they can be viewed as those activities and practices that should be addressed in order to ensure its successful implementation. These practices would either need to be nurtured if they already existed or be developed if they were still not in place. Based on the above definition, CSFs in this study are treated as those internal factors which are controllable by an organization. External factors such as environmental influences are not taken into account since organizations have little control over them when implementing KM. To answer the first question and based on the characteristics of SME scoter an in- depth review of literature was performed, leading to the identification of 12 CSFs, which is shown in Table 1 with their resources.

Having enumerated the CSFs, a number of representative measurement elements or items were then carefully formulated on the basis of pertinent studies to reflect the meaning and scope of each. A total of 69 elements were assigned to them (details are provided in the Appendix). This resulted in a survey instrument for measuring the relevance of the CSFs for implementing KM in the SME sector. This instrument was repeatedly checked and evaluated, and alterations were made before it was finalized. Its reliability and validity will be discussed later in the paper.

DATA COLLECTION AND ANALYSIS

Since the aim of this study was to use the experiences and perceptions of experts to gauge the importance of a set of CSFs for adopting KM, a questionnaire was developed. The questionnaire in the first section was aimed at exploring their general demographic information. The questionnaire investigated the 12 CSFs and their elements that were derived from the literature. Respondents were asked to rate the level of the perceived importance on each element using a six-point Likert scale from 1 – not important at all to 6 – extremely important). Due to the limitation of experts on KM in Iran the author tried to identify all experts in this field in the country and distribute the questionnaire to them. In the end, 44 academics, consultants and practitioners who had the experience of teaching KM, presentation of papers in international conferences and consulting was identified. Then whether by directly referring to them or by email and explaining the aim of the study, they were asked to response the questionnaire. 37 of 44 distributed questionnaires were returned and used for statistical analysis.

Reliability

The internal consistency method works quite well in field studies because it requires only one administration. Further, it is the most general form of reliability estimation. The internal consistency of a set of measurement items refers to the degree to which items in the set are homogeneous. Internal consistency can be estimated using a reliability coefficient such as cronbach's alpha (Saraph et al. 1989).In this research cronbach's alpha was calculated separately for each criterion of the questionnaire. The results are shown in Table 2. Generally, alpha values greater than 0.7 are regarded as sufficient (Nunnally, 1994), although a cut-off value of 0.6 was used by researchers such as Black and Porter (1996).

Content validity

The validity of a measure refers to the extent to which it measures what is intended to be measured.

Content validity is not evaluated numerically, it is subjectively judged by the researchers (Kaplan, 1987). It can be argued that because the measurement items were based on an extensive review of the literature on Knowledge management the twelve measures of the critical factors of knowledge management developed in this study have content validity.

Criterion – related validity

Criterion – related validity, sometimes called predictive validity or external validity, is concerned with extent to which a measuring

Table 1. List of KM success factors.

Researchers	CSFs
Skyrme and Amidon (1997), Holsapple and Joshi (2000), Davenport et al. (2001), Liebowitz (1999), Hassanali (2002), American Productivity and Quality Center (APQC) (1999), Ribiere and Sitar (2003), Wong and Aspinwall (2005), Al-Busaidi and Olfman (2005), Chong (2006), Akhavan and Jafari (2006), Akhavan et al. (2006), Jafari et al. (2007), du Plessis (2007)	Management leadership and support
Skyrme and Amidon (1997), Davenport et al. (1998), Liebowitz (1999), (APQC) (1999), McDermott (2001), Hassanali (2002),), Wong and Aspinwall (2005), Al-Busaidi and Olfman (2005), Wong and Aspinwall (2005), hung et al. (2005), Akhavan et al. (2006), Chong(2006), Bozbura (2007),du Plessis (2007)	Organizational culture
Skyrme and Amidon (1997), Davenport et al. (1998), (APQC) (1999), Alavi and Leidner (2001), All-Buaidi and Olfman (2005), hung et al. (2005), Wong and Aspinwall (2005), Akhavan et al. (2006), Akhavan and Jafari (2006), Chong (2006),du Plessis (2007)	Information technology
Skyrme and Amidon (1997), Davenport et al. (1998), Liebowitz (1999), (APQC) (1999), Zack (1999), Wong and Aspinwall (2005), Akhavan et al. (2006),Bozbura (2007),du Plessis (2007)	KM strategy
Davenport et al. (1998), (APQC) (1999), Holsapple and Joshi (2000), Hassanali (2002), Hung et al. (2005), Wong and Aspinwall (2005), Chong (2006),du Plessis (2007)	Performance measurement
Davenport et al. (1998), Liebowitz (1999), Hassanali (2002), All-Buaidi and Olfman (2005), Wong and Aspinwall (2005), Akhavan et al. (2006), Akhavan and Jafari (2006), Jafari et al. (2007),du Plessis (2007)	Organizational infrastructure
Skyrme and Amidon (1997), Davenport et al. (1998), Holsapple and Joshi (2000), Bhatt (2000), Wong and Aspinwall (2005), Akhavan and Jafari (2006)	Processes and activities
Davenport et al. (1998), Liebowitz (1999), Yahya and Goh (2002), Al-Busaidi and Olfman (2005), Wong and Aspinwall (2005), Akhavan and Jafari (2006),du Plessis (2007)	Rewarding and motivation
Mentzas (2001), Yahya and Goh (2002), Wong and Aspinwall (2005), Hung et al. (2005), Akhavan et al. (2006),Chong (2006), Akhavan and Jafari (2006), Bozbura (2007),du Plessis (2007), Jafari et al. (2007)	Training and education
Holsapple and Joshi (2000), Davenport and Volpel (2001), McDermott and O'Dell (2001), Wong and Aspinwall (2005), Chong (2006)	Removal or resource constraints
Brelade and Harman (2000), Yahya and Goh (2002), Wong and Aspinwall (2005)	Human resources management
Drew (1997), O'Dell and Grayson (1998), Day and Wendler (1998), Moffet et al. (2003), Hung et al. (2005), Chong (2006) Akhavan and Jafari (2006).	Benchmarking

Table 2. Results of reliability analysis.

Factors	No. of items	Alpha
Management leadership and support	7	0.7223
Organizational culture	8	0.8321
Information technology	6	0.8114
KM strategy	6	0.8433
Performance measurement	4	0.7421
Organizational infrastructure	5	0.8576
Processes and activities	10	0.7843
Rewarding and motivation	5	0.7411
Removal of Resources constraint	5	0.8453
Training and education	6	0.8835
Human resource management	4	0.7965
Benchmarking	3	0.8379

instrument is related to an independent measure of the relevant criterion (Kaplan, 1987).Taking into consideration that this instrument was to measure the importance of a set of CSFs towards adopting and effective implementation of KM, thus it is expected that as a result of successful implementation of KM in Iranian SMEs as Hung et al. (2005) showed, organizational performance and sustainable competitive-ness of Iranian SMEs would improve. Therefore, a question included in the instrument that required respondents to indicate that to what extent the adoption and implementation of CSFs of KM could improve organizational performance and sustainable competitive-ness of Iranian SMEs on a scale from 1 to 6 (1=not at all, 6=extremely). Multiple regression analysis was then employed to determine the extent of the relationship between the ''average importance score'' for each factor, given by the individual respondents (12 independent variables or predictors) and their score reflecting the level of improvement of organizational performance and sustainable competitiveness of Iranian SMEs (dependent variable). The assumptions made in the multiple regression analysis – normality, constant variance, linearity and independency were examined and the results showed no violation. The adjusted R square value obtained for the regression model was 0.730. It can be inferred that all the factors when taken together do have a reasonable degree of predictive capability.

Construct validity

A measure has construct validity if it measures the theoretical construct or trait that it was designed to measure (Saraph, et al., 1989).Factor analysis is a procedure that relies on the use of correlations between data variables. In this study the construct validity of each construct measure was evaluated separately to check for ''unifactoriality'' or ''unidimensionality''. A factor is ''unifactorial'' if all its items estimate only one construct. The number of cases in this study was rather small to perform a good factor analysis. In this respect, many arbitrary ''rules of thumb'' exist that specify the required number of cases, but there is however, no absolute scientific answer to this issue (Edari, 2004). Nonetheless, the authors felt that conducting the factor analysis was better than not performing any in order to give an indication of the construct validity of the CSFs. The Kaiser-Meyer-Olkin (KMO) value was used to determine the appropriateness of the data sets for the factor analysis; a value greater than 0.5 represents an acceptable condition (Field, 2000; Black and Porter, 1996). The results showed that all of the items had factor loadings that were greater than 0.50 on one factor. Factor loadings greater than 0.30 are considered significant, loading of 0.40 are considered very significant (Hair et al., 2005) . In this study, a factor loading of 0.50 was used as cut – off point. Hair et al. (2005) describe three techniques for factor extraction: latent root criterion or eigenvalue; percentage of variance and scree test. Among the three techniques, latent root criterion or eigenvalue is the most commonly used technique for factor extraction. Factors having eigenvalues greater than one are considered significant and all other factors with eigenvalues less than one are considered insignificant and are disregarded. The other two techniques, percentage of variance and scree test are considered too subjective (Zhang et al., 2000) and it is not uncommon in social sciences to consider a solution that accounts for 60 percent of the total variance (and in some instances even less) as a satisfactory solution (Hair et al., 2005). As can be seen in Table 3, this requirement was met by all the factors. The results obtained from the first trial of the factor analysis were satisfactory, and all 12 factors were shown to be ''unifactorial'. Also, more than 57 per cent of the variance of each set of items was accounted for by its respective factor. In essence, all the tests conducted above proved that the CSFs developed in this study were both reliable and valid.

Importance and priority of the CSFs

In order to determine the importance and priority of the 12 CSFs from experts' point of view, mean score of the perceived importance and priority by experts, for each factor was calculated. Table 4 shows the mean and standard deviation scores of the perceived importance and priority of the CSFs.

The average mean factor and standard deviations score for the degree of importance held by respondents for all the KM factors is 4.599 and 0.874, respectively. All factors scored above the average means scores, except information technology (M = 4.107), rewarding and motivation (M = 3.688), and benchmarking (M = 3.788), which scored below the average mean factor scores with standard deviations scores of 1.022, 1.046, 1.082, respectively. This proves that respondents have various opinions and perspectives on these CSFs. Next is the analysis and investigation of the CSFs based on the importance CSFs scored.

RESULTS AND DISCUSSION ON THE CSFS

Based on qualitative observations of KM projects in large organizations as well as intuitive feeling, Davenport et al. (1998) hypothesized that the most important factors were culture, organizational infrastructure, motivational aids and management support. But, in this study the findings revealed some differences, that is rewarding and motivation and benchmarking scored lower, whereas benchmarking had not been considered in Davenport et al. (1998) study at all. Also, other CSFs that is, Removal of resource constraints, education and training, human resource management in this study were perceived much more importance, whilst (Wong and Aspinwall, 2005) in their study on large organizations concluded that these CSFs are of less importance. It proves the fact that respondents realized the importance of these CSFs for successful implementation of KM in SME sector compared to large organizations. unlike other change initiatives, successful KM requires proactive enterpreneurial

Table 3. Results of factor analysis.

Factors	KMO value	Factor loading	Eigen value	Percentage variance explained
Management leadership and support	0.534	0.616 - 0.818	3.520	62.675
Organizational culture	0.723	0.706 - 0.907	4.121	59.176
Information technology	0.682	0.739 - 0.827	3.346	63.805
KM strategy	0.627	0.556 - 0.909	3.851	60.154
Performance measurement	0.811	0.818 - 0.908	3.871	77.102
Organizational infrastructure	0.721	0.756 - 0.906	2.783	68.578
Processes and activities	0.591	0.615 - 0.815	3.674	60.341
Rewarding and motivation	0.720	0.568 - 0.851	2.989	59.649
Removal of Resource constraints	0.611	0.729 - 0.894	3.189	62.145
Training and education	0.802	0.719 - 0.834	3.557	70.084
Human resource management	0.644	0.741 - 0.877	2.894	68.489
Benchmarking	0.586	0.669 - 0.811	3.406	69.311

Table 4. Means factor scores for the degree of importance of KM factors.

Factors	Mean	SD
1. Management leadership and support	5.243	0.773
2. Organizational culture	5.064	0.822
3. KM strategy	4.901	0.877
4. Removal of resource constraints	4.874	0.885
5. Processes and activities	4.744	0.744
6. Human resource management	4.702	0.849
7. Organizational infrastructure	4.668	0.832
8. Performance measurement	4.611	0.735
9. Training and education	4.611	0.799
10. Information technology	4.107	1.022
11. Rewarding and motivation	3.882	1.046
12. Benchmarking	3.788	1.082
Average mean factor scores	4.599	0.874

support and leadership from top management. Besides its importance, the fact that this factor was ranked the highest probably means that it should be addressed first, before dealing with the other CSFs. Top management or leaders should devote themselves to promoting a corporate mindset that emphasizes co-operation and knowledge sharing across the organiza-tion. The second most important factor, organizational culture, indicates that a knowledge-friendly cultural foundation is certainly more important than the deploy-ment of information technology in KM. In fact, it has been asserted that the success of KM is 90 per cent dependent on building a supportive culture (Liebowitz, 1999). Important facets of a knowledge-oriented culture include such attributes as trust, collaboration and openness, to name but a few (Wong and Aspinwall, 2005). Another important criterion for effective KM is to have a clear strategy. A rational strategy helps to clarify the business case for pursuing KM, and steer the company towards becoming knowledge-based. In addition, it provides the essential focus, as well as values for everyone in the organization .Prior to the explanation on the forth factor it should be noted that as Organization for Economic Co-operation and Development (2002) ascertains SMEs differ from large companies, because in general, they suffer from resource scarcity. The term “resources” is considered both in terms of personnel, including also managerial time, and financial stability and security. In addition also skills are limited, not only among staff , but also owner-managers often do not have enough managerial expertise or organizational capabilities and this implies poor strategic business planning and human resource management (Cocca and Alberti, 2010). So, efforts to remove resource constraints as well as their proper allocation and management are of prime importance for SMEs in adopting KM. This point alone is sufficient to

justify the high ranking of resources as a CSF. Processes and activities were ranked fifth in the list of CSFs. A KM process refers to something that can be done with knowledge in the organization (Johannes, 2000). Many authors have suggested a number of activities or processes associated with KM.

For example, four main processes were discerned by Alavi and Leidner (2001): creation, storage/retrieval, transfer and application. Wong (2005) believes that the execution of KM processes lies at the heart of creating a successful knowledge-based enterprise. Thus, it is important that organizations adopt a process-based view to KM. Human resource management was ranked sixth, considering characteristics of SMEs that was mentioned earlier, this factor can play a pivotal role in successful implementation of KM. Also, Salleh and Goh (2002) in their study on Malaysian ICT companies state that the human resource department of these companies should take the responsibility for teaching the change in mindset required to implement KM. Therefore perception of importance of this CSF through the experts is justifiable. Management of organizational infrastructure with a mean of 4.668 was ranked seventh. In the implementation of KM, the organizational infrastructure is the basic organizational elements that assist in the implementation and use of these systems. This means establishing roles and tasks for skilled employees to continuously handle the KMS project implementation. For example, it involves establishing the roles of Chief Knowledge (CKO) and knowledge reporters (Al-Busaidi and Olfman, 2005). Wang and Aspinwall (2005) in their study found that SMEs are not so keen to develop organizational infrastructure due to financial constraint. But receiving a relatively high importance ranking of this CSF in this study indicates that based on the characteristics of SMEs the respondents perceived that this factor could be implemented with lesser working groups and experts and therefore it incurs less cost and time to the organizations. Performance measurement and education and training were commonly ranked eighth. Measurement of the knowledge management program as well as the resulting efficiencies attained in processes and practices are essential (du Plessis, 2007). Ernst and Young (1999) indicates that the performance of the overall initiative needs to be measured, as well as the management of the knowledge itself. The performance measurement may include reviews of the knowledge repository and giving visible rewards to those who show commitment to the knowledge management program. There are various education and training programs on KM which organizations could provide to their employees. For instance, employees could be trained and educated in using the KM system and other technological tools for managing knowledge. Also, du Plessis (2007) argues that employees have to have an in- depth understanding of how the program works, as well as in-depth training on the technology based system, to enable successful participation in the program. So the importance and rakings of these factors ate justifiable. Finally, the least important factors in this study are; information technology, rewarding and motivation and benchmarking. Although, information technologies such as document management systems, information retrieval engines, relational and object databases, Group wares and work flow systems, push technologies and agents, and data mining tools that facilitate KM implementation but technology should not be seen as an absolute answer to KM, since it is only as tool (Wong and Aspinwall, 2005).Therefore, low rank perceived by the respondents is justifiable. It is quite surprising to find that rewarding and motivation was not rated as a more important CSF by the respondents, especially when incentives are needed to encourage people to exemplify positive knowledge oriented behaviors. It may be that incentives to employees can be provided at a later stage in the adoption process, when many of the more critical issues of KM have been addressed (Wong and Aspinwall, 2005). This finding is consistent with the finding of AL-Bosaide and Olfman (2005) where they found no significant correlation between reward policy and KMS success in Omani surveyed organizations. The same rationale can be brought about on benchmarking factor, that is benchmarking, though, is one of important techniques for measuring companyÁs 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.

CONCLUSION AND RECOMMENDATION

In this research based on an in-depth study of KM CSFs which have been offered by various authors both theoretically and empirically, 12 factors along with related elements was developed and considered in the survey instrument which was shown to be both reliable and valid. Data were extracted from experts who have a very well-established background in the field. Through a questionnaire, data were sought from experts in the field of KM in Iran. The importance as well as the rankings of the CSFs was analyzed. It was found that management leadership and support and organizational culture were perceived to be the most critical factor, whereas rewarding and motivation and benchmarking were the least. Since companies may not be able to manage all aspects of KM at the same time, an ordered list of CSFs will provide a clue to SMEs to priorities and adjust their KM practices accordingly. The instrument developed in this study provides a realistic checklist to, for example, assess the perceptions of KM within an organization, or

measure the level of understanding among the workforce. It could also be used as an assessment tool to evaluate the status of KM implementation and thus, help to identify areas for improvement. Academics could use it to better understand KM practices and to build models that would further expand the domain. Finally, it is hoped that this study will provide the momentum for future research aimed at gaining a better understanding of the CSFs for KM adoption in SMEs. In the end it is recommended in order to develop the results of this research and remove its main limitation which is only based on the perception of experts, as the number of interested organizations to implement KM increase in the country, further studies to be done to use the perceptions of managers and employees of Iranian SMEs, so the results of these surveys and comparison of perceptions of these two groups could lead to the identification of any possible gaps and pave the way for employing suitable strategies for improvement of KM programs and right decision making for managers of Iranian SME sector.

REFERENCES

Akhavan P, Jafari M (2006). "Critical success factors of knowledge management implementation at a national level", VINE: The journal of information and knowledge management systems 36(1): 52-66.

Akhavan P, Jafari M, Fathian M (2006). "Critical success factors of knowledge management systems: A multi-case analysis", Eur. Bus. Rev., 18(2): 97-113.

Alavi M, Leidner DE (2001). "Review: knowledge management and knowledge management systems: conceptual foundations and research issues", MIS Q. 25(1): 107-36.

Al-Busaidi KA, Olfman L (2005). "A Investigation of the Determinants of knowledge management systems success in Omani organizations", J. Global Info. Technol. Manage., 8(3): 6-27.

APQC (1999). "Knowledge Management: Executive Summary", Consortium Benchmarking Study Best Practice Report, American Productivity and Quality Center, available at www.apac.org, (accessed 10 October 2003).

Bayati A, Taghavi A (2007). "The impacts of acquiring ISO 9000 certification on the performance of SMEs in Tehran", The TQM Magazine 19(2):140-149.

Bhatt GD (2000). ''Organizing knowledge in the knowledge development cycle'', J. Knowl. Manage., 4(1): 15-26.

Black SA, Porter LJ (1996). "Identification of the critical factors of TQM", Decis. Sci., 27(1): 1-21.

Bozbura FT (2007). "Knowledge management practices in Turkish SMEs", J. Enterprise Info, 2(2): 209-221.

Brelade S, Harman C (2000). "Using human resources to put knowledge to work", Knowl. Manage. Rev., 3(1): 26-29.

Chong SC (2006). "KM critical success factors: A comparison of perceived importance versus implementation in Malaysian ICT companies", learn Organ., 13(3): 230-256.

Cocca P, Alberti M (2010). "A framework to assess performance measurement systems in SMEs", Int. J. Prod. Perf. Manage., 59(2): 186-200.

Davenport TH, Volpel SC (2001). "The rise of knowledge towards attention management", J. Knowl. Manage., 5(3): 212-221.

Davenport TH, De Long DW, Beers MC (1998). ''Successful knowledge management projects'', Sloan Manage. Rev. 39(2): 43-57.

Day J, Wendler J (1998). "Best practice and beyond: knowledge strategies", The McKinsey Quality, 1: 19-25.

Drew S (1997). "From knowledge to action: the impact of benchmarking on organizational performance', Long Range Planning, 30(3): 427-441.

du Plessis M (2007). "Knowledge management: What makes complex implementations successful?", J. Knowl. Manage., 11(2): 91-101.

Edari RS (2004). ''Factor analysis'', available at: www.uwm.edu/, edari/methstat/factor.htm.

Ernst J, Young M (1999). ''Choosing your spots for knowledge management'', available at: www.ey.com/ global/gcr.nsf/International/International_Home.

Field AP (2000). Discovering Statistics Using SPSS for Windows: Advanced Techniques for the Beginner, Sage, London.

Grover V, Davenport TH (2001). ''General perspectives on knowledge management: fostering a research agenda'', J. Manage. Inf. Syst., 18(1): 5-21.

Ho CT (2009)." The relationship between knowledge management enablers and performance", Ind. Manage. Data Syst. 109(1): 98-117.

Hair JF, Anderson RE, Tatham RL, Black W (2005). "Multivariate Data Analysis", 6th ed., Prentice-Hall, Upper Saddle River, NJ. Access factors of knowledge management", available at: www.kmadvantage.com/docs/km_articles/Critical_Success_Factors_ of_KM.pdf , (accessed 20 November, 2003).

Holsapple CW, Joshi KD (2000). "An investigation of factors that influence the management of knowledge in organizations", J. Strat. Info. Syst., 9(2/3): 235-261.

Hung YC, Huang SM, Lin QP, Tsai ML (2006). "Critical factors in adopting a knowledge management system for the pharmaceutical industry", Industrial Manage. Data Syst., 105(2): 164-183.

Jafari M, Fathian M, Akhavan P, Hosnavi R (2007). "Exploring KM and learning in Iranian SMEs", VINE: J. Info. Knowl. Manage. Syst., 37(2): 207-218.

Johannsen CG (2000). "Total quality management in a knowledge management perspective", J. Doc., 56(1): 42-54.

Kaplan RM (1987). "Basic Statistics for THE BEHAVIORAL SCIENCES", Allyn and Bacon.

Liebowitz, J (1999). "Key ingredients to the success of an organization's knowledge management strategy", Knowl. Proc. Manage., 6(1): 37-40.

McDermott R, O'Dell C (2001). "Overcoming cultural barriers to sharing knowledge", J. Knowl. Manage., 5(1): 76-85.

Mentzas G (2001). ''A holistic approach to realizing the full value of your knowledge assets'', Knowl. Manage. Rev., 4(3): 10-11.

Moffett S, McAdam R, Parkinson S (2002). ''Developing a model for technology and cultural factors in knowledge management: a factor analysis'', Knowl. Proc. Manage., 9(4): 237-255.

Moffett S, McAdam R, Parkinson S (2003). ''An empirical analysis of knowledge management applications'', J. Knowl. Manage., 23(3): 6-26.

Nunally J (1994). Psychometric Theory, McGraw-Hill New York, NY.

O'Dell C, Grayson J (1998). "If only we knew what we know: Identification and transfer of internal best practices", California Manage. Rev., 40(3): 154-165.

Organization for Economic Co-operation and Development (2002). "OECD Small and Medium Enterprise Outlook, OECD, Paris.

Ribiere VM, Sitar AS (2003). "Critical role of leadership in nurturing a knowledge-supporting culture", Knowl. Manage. Res. Practice, 1(1): 39-48.

Salleh Y, Goh WK (2002). "Managing human resources toward achieving knowledge management", J. Knowl. Manage., 6(5): 457-468.

Saraph JV, Benson PG, Schroeder RG (1989). "An instrument for measuring the critical factors of quality management', Decis. Sci., 20(4): 810-829.

Skyrme D, Amidon D (1997). "The knowledge agenda", J. Knowl. Manage., 1(1): 27-37.

Wong KY (2005). "Critical Success Factors for implementing knowledge management in small and medium enterprises", Ind. Manage. Data Sys., 105(3): 261-279.

Wong KY, Aspinwall E (2005). "An empirical study of the important factors for knowledge-management adoption in the SME sector", J. Knowl. Manage., 9(3): 64-82.

Yahya S, Goh WK (2002). "Managing human resources toward achieving knowledge management", J. Knowl. Manage., 6(5): 457-468.

Yahya S, Goh WK (2002). "Managing human resources toward achieving knowledge management", J. Knowl. Manage., 6(5): 457-468. Zack MH (1999). "Developing a knowledge strategy", California Manage. Rev., 41(3): 125-145.
Zhang Z, Waszink A, Wijngaard J (2000). “An instrument for measuring TQM implementation for Chinese manufacturing companies”, Int. J. Qual. Reliab. Manage., 17(7): 730-755.

Appendix. Questionnaire

The 69 items of twelve factors were used to ask respondents to describe based on their experiences and perceptions to what extent the related elements of the CSFs of KM indentified in this study for Iranian SMEs are important and to give feedback on a six-point Likert scale (1 – not important at all, 2 – slightly important, 3 – moderately important, 4 – important, 5 –very important, 6 – extremely important).

Factor 1: Management leadership and support

- Leaders act as catalysts for KM.
- Management establish the necessary conditions for KM.
- Management act as role model to exhibit the desired behavior.
- Leaders encourage knowledge creation, sharing and use.
- Management recognize KM as important to business success.
- Management demonstrate commitment and support for KM.
- Organizational change management toward adoption of KM through employees.

Factor 2. Organizational culture

- Having a culture that values knowledge seeking and problem solving.
- High level of trust among employees important in sharing knowledge.
- Sharing of mistakes openly by employees important without the fear of punishment.
- The collaboration among employees important.
- Encouragement of teamwork among employees.
- Empowerment of employees to explore new possibilities.
- Encouragement of individuals to ask.
- Acceptance of knowledge sharing (not hoarding) as strength.

Factor 3. Information technology

- The use of an appropriate KM system.
- The application of technological tools (collaborative tools, knowledge bases, searching tools, document management systems, intelligent systems etc).
- Utilization of the intranet or internet.
- Appropriate knowledge structures or categories for a repository.

- Ease of use of the technology
- Suitability of the KM system to users' needs

Factor 4. KM strategy

- Having a common vision that people support?
- To develop a KM strategy?
- Having clear objectives and goals for KM?
- To align KM strategy with the business strategy?
- That a KM strategy to support a vital business issue?
- The identification of the potential value to be achieved?

Factor 5. Performance measurement

- Measurement of the benefits of a KM initiative.
- Track the progress of a KM initiative.
- Evaluation of the impact of KM on financial performance.
- Development of indicators (both hard and soft) for measuring KM.
- Measurement of the value of intellectual capital.

Factor 6. Organizational infrastructure

- Appointment of a knowledge leader (knowledge officer or manager, etc.)..
- Establishment of a knowledge team or group
- Specification of roles and responsibilities for performing KM tasks.
- Clear ownership of a KM initiative..
- Having an organizational flat structure

Factor 7. Processes and activities

- To what extent is it important to create new ideas and knowledge.
- Documentation of key knowledge and lessons learned.
- Having efficient processes for classifying and storing knowledge.
- Having efficient processes for finding the required knowledge.
- Sharing knowledge using both electronic and face-to-face approaches.
- Effective communication among employees.
- Application of the best knowledge to an organization's products and services.
- Encouragement of continuous learning at all levels.

- Protection of knowledge assets from unauthorized exposure or being stolen.
- Validation and relevancy of knowledge.

Factor 8. Rewarding and motivation

- Provision of the right incentives to encourage the behavior for KM
- Motivation of employees to seek for knowledge
- Visibly rewarding employees who share and use knowledge
- Rewarding employees with an emphasis on group performance
- Tying motivational approaches to job performance assessment system

Factor 9. Removal of resource constraints

- Considering resources availability when investing in KM
- Proper budgeting and allocation of resources for KM
- Sufficient financial resources for building a technological system
- Sufficient human resources to support a KM initiative
- Provision of time to employees to perform knowledge related activities

Factor 10. Training and education

- Training on the concepts of knowledge and KM
- Building awareness of KM among employees through training
- Training on using the KM system and tools
- Training for individuals to take up knowledge related roles
- Training in skills development such as creative thinking, problem solving, communication, soft networking, team building, etc.
- Encouragement of employees to participate in internal and external new learning opportunities such as conferences, training seminar, university courses, etc.

Factor 11. Human resource management

- Recruitment of employees to fill knowledge gaps
- Hiring people who have a positive orientation to knowledge
- Professional development activities for employees
- Retention of employees to work for the company?
- Provision of career advancement opportunities to employees.

Factor 12. Benchmarking

- Provision of guidelines to operate a benchmarking system..
- Encouragement of employees to benchmark other organizationÁs best practices.
- Establishment of internal benchmark on coordination of strategy, budget, and HR systems.

Question to measure the criterion - related validity

To what extent the adoption and implementation of CSFs of KM could improve organizational performance and sustainable competitiveness of Iranian SMEs?