ESSENTIAL ISSUES IN KNOWLEDGE MANAGEMENT SYSTEM IMPLEMENTATION: LESSONS FROM IRANIAN IT-BASED COMPANIES

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ABSTRACT
This article aims to review and identify critical factors of the implementation of knowledge management systems (KMS) for Iranian IT based organizations and clarifying the effect of KMS in organization success. The study determines several important factors affecting the implications of the knowledge management systems such as Motivation among KMS’s users and stakeholders, Flexibility and change management, Cohesion between KMS and organization structure, senior manager’s commitment and support, Knowledge sharing culture, etc. The study also then indicates that the factors have different priorities where managerial factors are in the highest priority and financial factors are in the lowest priority. We also perform factor analysis to summarize seventeen factors into six issues: Financial and information security, Technology and management, Senior management support and strategy, Acceptance, User's motivation and culture and Project management, Change management and training. The results of this study could be useful for knowledge management planners and managers in organizations and help organization planners, to plan based on these factors.

Keywords: Knowledge management systems, information technology, Critical success factor, factor analysis

INTRODUCTION
During the past few years, knowledge management (KM) has become an important subject of study among practitioners in the field of management. KM fundamentally introduces insight in intellectual capital management (Jafari et al., 2009) to create a company with competitive advantage. Although KM requires information technology but it cannot be simply acquired through a complete software package. Successful implementation of KM needs long-term commitment from senior managers who are dedicated to train employees and managers
Nevertheless, Information technology (IT) tools play an important role in developing KM for many Iranian industries. However, it is clear that every plan has some critical factors to be considered, especially at the beginning stages of its development (Akhavan et al., 2006). In fact, any implementation of KM systems could fail if all risk factors are not carefully determined. The primary objective of this research is to identify critical factors of the implementation of KM systems. We also study different factors of the implementation of KM Iranian industries and determine the most important ones based on some statistical tests.

**Information technology (IT) and knowledge management**

Davenport et al. (1998) Considered basic components of knowledge management which include culture, process operation, policies and technology. There are normally two dimensions associated with any KM. The first dimension includes technologies and communication technologies and information, and the other one includes social systems and human resource of organizations. In fact, KM gets benefit from an interaction between communication and information technologies using social systems. The role of IT in KM is a vital aspect for any organization which intends to use the technologies for managing their knowledge. IT can provide knowledge from the mass of information stored in all parts of the organizations. In fact, conversion process of information and knowledge happens through IT which represents the external power of understanding, learning and gathering the necessary information.

IT has made it easier to acquire, store, or disseminate knowledge than ever before and many organizations are employing IT to facilitate sharing and integration of knowledge. If properly used, IT can also accelerate knowledge-sharing capabilities in both time and space dimensions. Locality, timing, and relevancy factors determine the expediency and the strength of IT's role in KM initiatives. On the other hand, due to the difficulty of incorporating most of human behavior aspects in technology, IT cannot fully put into operation many of KM's humanistic features. Therefore, IT cannot be considered the magic bullet which makes a KM initiative a complete success. Hence, IT has to be part of a balanced and integrated set of components. Too much emphasis on technology without incorporating the other critical elements could easily result in a failure of a system. Furthermore, codifying knowledge with the power of the existing IT and without the support from socio-cultural inputs will result in de-contextualization, i.e. "knowledge dilution". IT must be accompanied by social networks such as communities of practice and other human interventions to create the requisite
synergistic effects. In summary, technology is a necessity tool for handling KM (Jafari and Akhavan, 2007).

**Critical success factors of knowledge management systems**

A critical success factor is any event that must occur for the project to meet its goals and objectives, Jennex (2007) studied different critical success factors (CSF) in KM and reported that portals are an important component of a knowledge management system.

Cross and Baird (2000) in their investigation reported that KM would not improve business performance simply by using technology to capture and share the lessons of experience. In their survey, they claimed that the creation of organizational memory could improve the business performance and indicated some of the most important parameters on the success of KM as follows,

- Supporting personal relationships between experts and knowledge users
- Providing incentives to motivate users to learn from experience and to use the KMS
- Providing distributed databases to store knowledge and pointers to knowledge
- Providing work processes for users to convert personal experience into organizational learning
- Providing direction to what knowledge the organization needs to capture and learn from.

Holsapple and Joshi (2000) investigated factors that influenced the management of knowledge in organizations through the use of a Delphi panel consisting of 31 recognized KM researchers and practitioners. They found leadership and top management commitment/support to be crucial. Resource influences such as having sufficient financial support, skill level of employees, and identified knowledge sources are also important.

Koskinen (2001) investigated tacit knowledge as a promoter of success in technology firms by studying ten small technology firms. Key to the success of a KMS was the ability to identify, capture, and transfer critical tacit knowledge. A significant finding was that new members take a long time to learn critical tacit knowledge and a good KMS facilitates the transference of this tacit knowledge to new members. Jennex and Olfman (2000) studied three KM projects to identify design recommendations for building a successful KMS. These recommendations include:
• Develop a good technical infrastructure by using a common network structure, adding KM skills to the technology support skill set, using high end PCs; integrated databases; and standardizing hardware and software across the organization
• Incorporate the KMS into everyday processes and information system by automating knowledge capture
• Have a wide enterprise knowledge structure
• Have Senior Management support
• Allocate maintenance resources for KMS
• Train users on use and content of the KMS
• Create and implement a KM Strategy/Process for identifying/maintaining the knowledge base
• Expand system models/life cycles to include the KMS and assess system/process changes for impact on the KMS
• Design security into the KMS
• Build motivation and commitment by incorporating KMS usage into personnel evaluation processes; implementing KMS use/satisfaction metrics; and identifying organizational culture concerns that could inhibit KMS usage.

Jennex and Olfman (2002) performed a longitudinal study of KM on one of these organizations and found that new members of an organization do not use the computerized KMS due to a context for understanding the knowledge and the KMS. They found that these users needed pointers to knowledge more than codified knowledge. Jennex et al. (2003) investigated the requirements for having an organizational KM strategy to ensure that knowledge benefits gained from projects which are captured to use in the organization by surveying Year 2000 project leaders. They found that benefits from year 2000 projects were not being captured because the parent organizations did not have a KM strategy/process. Their conclusion was that KM in projects can exist and can assist projects in utilizing knowledge during the project. Malhotra and Galletta (2003) identified the critical importance of user commitment and motivation through a survey study of users about KMS being implemented in a health care organization. They found that using incentives did not guarantee a successful KMS. They created an instrument for measuring user commitment and motivation that is similar to Thompson et al. (1991) Perceived Benefit model but based on self-determination theory that uses the Perceived Locus of Causality. Barna (2003) studied six KM projects with various levels of success where three were successful, two failed, and one
was an initial failure turned into a success and identified two groups of factors important to a successful KMS. The main managerial success factor is creating and promoting a culture of knowledge sharing within the organization by articulating a corporate KM vision, rewarding employees for knowledge sharing, creating communities of practice, and creating of a “best practices” repository. Other managerial success factors include obtaining senior management support, creating a learning organization, providing KMS training, and precisely defining KMS project objectives. Design/construction success factors include approaching the problem as an organizational problem and not a technical one, creating a standard knowledge submission process, methodologies and processes for the codification, documentation, and storage of knowledge, processes for capturing and converting individual tacit knowledge into organizational knowledge. Also create relevant and easily accessible knowledge-sharing databases and knowledge maps. In Brian Bergeron's (2003) opinion the most important challenges in effective use of knowledge management technology is the consistency and integrity. For example, decision support tools must be identified and clarified within the work process in order to improve the work process. A successful Knowledge Management System (KMS) should perform the functions of knowledge creation, storage/retrieval, transfer, and application very well. However, some other factors can affect KMS success as well. Yu, et al. (2004) explored the linkage of organizational culture to knowledge management success. They found that KM drivers such as a learning culture, knowledge sharing intention, KMS quality, rewards, and KM team activity significantly affected KM performance. These conclusions were reached through a survey of 66 Korean firms. Uden and Naaranoja (2007) identified organizational barriers to knowledge management systems as follows,

- Senior management culture and support: Where is the return on investment?
- Identifying the knowledge base: Who really knows about this?
- Buy in from knowledge workers and employees: What’s in it for me?
- Management and distribution of relevant and accurate content: Does this really work?

Okujava and Remus (2007) in their research determined six risk factors as the most important issues which could affect the success of KMS which are summarized as General project risks, Personnel risks, Financial risks, Deadline risks, Acceptance risks, Technology risks.

Landqvist and Stenmark (2007) detected that the portal itself would be the most important CSF from an information management prospective and classified three set of critical factors for KM systems. First, without actual users it is difficult for developers to correctly identify how knowledge is being utilized across the organization. Second, portals span the entire
organization and must be based on the input from all stakeholders. Third, a portal changes the routines of the organization. To ensure the buy-in from as many users as possible, they need to be involved earlier in the development process.

In Ulrich Remus (2007) view, KMS critical success factors are classified in two groups which are organizational and Technological which are as follows,

**Organizational:** Top management support, Dedicated resources, Organizational culture, Team competencies and skills, Business process reengineering, Change management, User acceptance, Clear goals and objectives, Flexible project structure, Project management, Project monitoring and controlling, Strong communication inwards & outwards, User training and education

**Technological:** Defining the portal architecture, Requirements analysis, Process and application integration, Prototyping, Portal design, Selection of the appropriate portal package, Portal strategy Portal engineering roadmap

Hahn and Wang (2009) identified four group factors of complexity, uncertainty, ambiguity and equivocality on knowledge processes. A comprehensive survey of all existing issues affecting KM is summarized in Table 1. Next sections devoted to an empirical investigation to determine the effects of these seventeen factors on Iranian industries.

**RESEARCH METHODOLOGY**

In order to determine the most important affecting issues on the implementation of KM in Iranian industries, some factors were gathered from papers and summarized in seventeen factors, then a questionnaire were designed and distributed among two hundred experts and the results and data obtained from the returned questionnaires were extracted and statistically analyzed. The sample size was chosen from customers of Corporate IT based companies. We used Likert Scale ordering numbers from 1 to 5 where 1 was representative for the lowest rate of importance and 5 was the greatest rate of importance. To determine the reliability of questionnaires, Cronbach's alpha method was used which was equal to 79.21 percent. We also designed three questioned to determine the effect of knowledge management systems on organizational success; the three questions were about Y1- innovation improving, Y2- productivity improving and Y3- organizational learning improving. So after factor analysis, we perform a regression between mean of three organizational success factors(Ymean) and six factors gained from factor analysis. Then we can allocate the most important factors from knowledge management systems for organizational success.
Table 1: Categories researchers' opinion in the field of knowledge management system CSFs.

<table>
<thead>
<tr>
<th>No</th>
<th>CSF</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Information overcrowd and content management</td>
<td>Uden and Naaranoja (2007), Landqvist and Stenmark (2007)</td>
</tr>
<tr>
<td>3</td>
<td>Project management</td>
<td>Remus (2007), Okujava and Remus (2007)</td>
</tr>
<tr>
<td>4</td>
<td>Training</td>
<td>Okujava and Remus (2007), Holsapple and Joshi (2000)</td>
</tr>
<tr>
<td>9</td>
<td>Flexibility and change management</td>
<td>Remus (2007), Landqvist and Stenmark (2007)</td>
</tr>
<tr>
<td>13</td>
<td>Economic efficiency</td>
<td>Okujava and Remus (2007)</td>
</tr>
<tr>
<td>16</td>
<td>Systems to measure the effectiveness of KMS</td>
<td>Jennex and Olfman (2000), Barna (2003)</td>
</tr>
<tr>
<td>17</td>
<td>Security and protection of information and knowledge</td>
<td>Jennex and Olfman (2000)</td>
</tr>
</tbody>
</table>

Source: Akhavan et al. (2010)
DATA ANALYSIS

Factor analysis

Factor analysis generates a table in which the rows are the observed raw indicator variables and the columns are the factors or latent variables which explain as much of the variance in these variables as possible. Table 2 summarizes the results for KMO and Bartlet test.

Table 2: KMO and Bartlett's Test

<table>
<thead>
<tr>
<th>Kaiser-Meyer-Olkin Measure of Sampling Adequacy.</th>
<th>0.522</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bartlett's Test of Sphericity</td>
<td></td>
</tr>
<tr>
<td>Approx. Chi-Square</td>
<td>569.024</td>
</tr>
<tr>
<td>df</td>
<td>136</td>
</tr>
<tr>
<td>Sig.</td>
<td>0</td>
</tr>
</tbody>
</table>

As we can observe, the significant level of our test is almost zero which indicates that this test can be used. Table 3 summarizes the results of categorized seventeen items in six classified items. In this table, the suggested title for each factor has been presented too.

Multiple regression analysis

Linear regression is used to model the value of a dependent variable based on its linear relationship to one or more predictors. The authors first used the average mean of Y1, Y2 and Y3 as a dependent variable to carry out regression analysis with the six critical factors. It was observed that there is a linear relationship between the dependent variable and the extracted critical factors. This was confirmed through using scatter plot. “R,” the multiple correlation coefficient, is the correlation between the observed and predicted values of the dependent variable and ranges from 0 to 1. Larger values of R indicate stronger relationships. The values of R2 range from 0 to 1. Small values indicate that the model does not fit the data well; R2 is the proportion of variation in the dependent variable explained by the regression model. Based on model summary of the regression, the values of R and R2 for our model were 0.936 and 0.876, respectively. As a whole, the regression was appropriate for modeling. Nearly, half of the variations in dependent variable are explained by the model.
Table 3: Final test results from factor analysis

<table>
<thead>
<tr>
<th>Row</th>
<th>Classified Factor</th>
<th>Suggested Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Security and protection of information and knowledge, Financial and budget, KMS Portal technology infrastructure, Economic efficiency.</td>
<td>Financial and information security</td>
</tr>
<tr>
<td>2</td>
<td>Technical complexity of KMS, Cohesion between and organization structure, Mass information and content management</td>
<td>Technology and management</td>
</tr>
<tr>
<td></td>
<td>Systems to measure the effectiveness of KMS, senior manager’s commitment and support, Organizational strategy</td>
<td>Senior management support and strategy</td>
</tr>
<tr>
<td>3</td>
<td>Technology acceptance among employees, Acceptance of KMS.</td>
<td>Acceptance</td>
</tr>
<tr>
<td>4</td>
<td>Motivation among KMS’s users and stakeholders, knowledge sharing culture, Project management.</td>
<td>User's motivation and culture, Project management</td>
</tr>
<tr>
<td>5</td>
<td>Flexibility and change management, Training.</td>
<td>Change management and training</td>
</tr>
</tbody>
</table>

*Source: Akhavan et al. (2010).*

The results of the model analysis of variance showed that the P-value of the F-test was less than 0.05, which was significant and made the six factors valid for predicting the suitability of extracted critical factors towards organizational success. The residual is the difference between the observed values of the dependent variable and the value predicted by the regression model. Residuals are estimates of the true errors in the model. If the model is appropriate for the data, the residuals should follow a normal distribution. Similarly, standardized residuals are ordinary residuals divided by the sample standard deviation of the residuals and have mean equal to 0 and standard deviation equal to 1. In this way, based on results from regression model, it is discovered that the distribution of model residuals is normal. Also it is delineated that the variance of the error term is constant across axes of independent variables in the model, and the value of the error term is independent from the
variables in the model. So, based on above explanations, the regression model is accurate and reliable for our reasoning.

Table 4: Final test results from regression

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
</tr>
<tr>
<td>(Constant)</td>
<td>3.526</td>
<td>0.021</td>
<td>167.745</td>
<td>0.00</td>
</tr>
<tr>
<td>Factor 1</td>
<td>0.454</td>
<td>0.021</td>
<td>0.725</td>
<td>21.497</td>
</tr>
<tr>
<td>Factor 2</td>
<td>0.203</td>
<td>0.021</td>
<td>0.325</td>
<td>9.619</td>
</tr>
<tr>
<td>Factor 3</td>
<td>0.211</td>
<td>0.021</td>
<td>0.337</td>
<td>9.983</td>
</tr>
<tr>
<td>Factor 4</td>
<td>0.138</td>
<td>0.021</td>
<td>0.22</td>
<td>6.532</td>
</tr>
<tr>
<td>Factor 5</td>
<td>-0.051</td>
<td>0.021</td>
<td>-0.081</td>
<td>-2.395</td>
</tr>
<tr>
<td>Factor 6</td>
<td>-0.172</td>
<td>0.021</td>
<td>-0.276</td>
<td>-8.168</td>
</tr>
</tbody>
</table>

a Dependent Variable: YMEAN

Considering the results of multiple regression analysis, and significant coefficient for Factors 1, 2, 3 and 4 on regression model, “Financial and information security,” “Senior management support and strategy,” “Technology and management” and “Acceptance,” have a high effect on organizational success.

CONCLUSION

This study attempted to confirm KM ability for organizational success in an IT based organizations in Iran. Iran is a developing country and the topics such as knowledge management and information technology which are discussed during the past few years attract more organizations to their side. This causes the studies and research in this field become important and the results of these studies can play an important role for the implementation and use of knowledge management systems. This study summarized all success factors in seventeen factors and then break them down into 6 major factors, as the result this study determined that 4 success factors “Financial and information security,” “senior management support and strategy,” “Technology and management” and “Acceptance,” have a high effect on organizational success.
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