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The impact of information technology facilities on knowledge management lifecycle

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A B S T R A C T

During the past two decades, there have been tremendous changes on development of information technology (IT). People may do their daily activities using different IT based products such as email, search engines, video conferences, etc. This paper presents an empirical investigation to study the relationship between IT facilities and knowledge management lifecycle components including, knowledge generation, knowledge acquisition, knowledge storage, knowledge transmission and knowledge usage. The study has accomplished among 150 randomly selected people who work for social security organization in city of Esfahan, Iran. Using structural equation modeling, the study has determined that there were positive and meaningful relationship between IT facilities and all components of knowledge management lifecycle.

1. Introduction

Knowledge is a notion, which describes epistemological debate in western philosophy. There has been a growing interest in treating knowledge as a substantial organizational resource (Berg & Lune, 2004; Desouza, 2003; Fincham & Roslender, 2003; Schreiber, 2000; Richardson, 1996). Consistent with special interest in organizational knowledge and knowledge management (KM), many researchers have been promoting a class of information systems, referred to as knowledge management systems (KMS) (Chumer & Willmott, 1998; Schultze & Leidner, 2002). The primary objective of KMS is to provide support for creation, transfer, and application of knowledge within organizations (Alavi & Leidner, 2001; Delone, 2003). Anderson and Felsenfeld (2003) applied thematic analysis to receive a better understanding of the experiences of individuals who reported late recovery from stuttering. Boedker et al. (2005) traced the techniques and consulting techniques developed and deployed by an Australian project team. The framework provided a structured approach for studying organizations' intellectual capital management, measurement and reporting practices and locating and analyzing these within a strategic context.

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Bradley et al. (2006) reported the results of an investigation in which the tacit knowledge of domain experts was elicited, represented, and analyzed for validity and reported that experience alone was not an indicator of expertise and other factors, such as the cognitive capability to properly structure those experiences, must be present as well.

Butler (2003) provided some insight on the information system field's understanding of the limitations and capabilities of knowledge management systems and explained why many knowledge management systems could fail in practice. Carlucci and Schiuma (2007) presented an application of the analytic hierarchy process (AHP) methodology to provide some support for the complex decision making process associated with the development of causal models explaining how organizational knowledge assets could contribute to create company's value.

Carneiro (2001) aimed to improve understanding of the process through which knowledge acquisition, technical tools and organization actors could contribute to a firm development in developing knowledge as a systemic competitive weapon. Chen et al. (2005) developed a multi-layer reference design retrieval technology for engineering knowledge management to recommend engineering designers with easy access to relevant design and related knowledge. Choi and Lee (2003) investigated how different knowledge management styles could influence on performance of different organizations.

Currie and Kerrin (2004) examined different issues of epistemology, power and culture with respect to their effects on the implementation of information and communication technology (ICT) to manage knowledge within a firm. They reported that 'technical fixes' to knowledge management issues could merely harden existing practices and routines, rather than open up new directions. Du et al. (2007) explored the quantitative relationship between knowledge sharing and performance, with contextual factors in consideration.

Edwards et al. (2005) considered the role of technology in knowledge management in organizations, both actual and desired. They reported that some organizations had adopted a strongly technology-based "solution" to knowledge management problems. Ford and Chan (2003) reported that language differences could create knowledge blocks, and cross-cultural differences could explain the direction of knowledge flows.

Hall and Andriani (2002) described a technique for determining knowledge gaps in innovative companies. Gaps happen between existing knowledge and knowledge requirements and specifically happen when a company is attempting to introduce new processes or goods. They were involved in a knowledge management project in a UK telecoms firm and reported on a framework that they developed, which assisted in examining the dimensions of knowledge gaps so that they could be bridged. Hislop (2002) critiqued the perspective that information technology could play a central role in knowledge-sharing processes. Hornik et al. (2003) examined how communication skills of information system professionals during a development project were viewed by three various stakeholders. Johannessen et al. (2001) provided some insight about the role of tacit knowledge and to reflect on and to give guidance on how to handle the relationship between tacit knowledge and IT.

2. The propsoed study

This paper presents an empirical investigation to study the relationship between IT facilities and knowledge management lifecycle components including knowledge generation, knowledge acquisition, knowledge storage, knowledge coding, knowledge transmission and knowledge usage. The study considers the following six hypotheses,

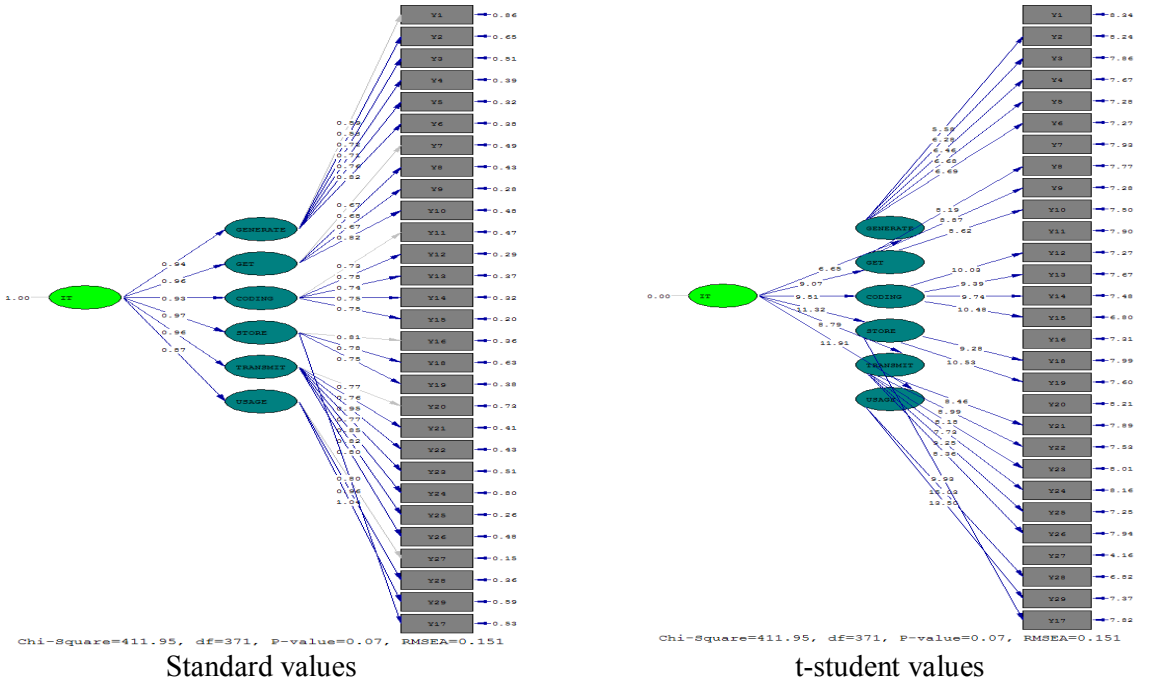
1. There is a positive and meaningful relationship between IT and knowledge generation.
2. There is a positive and meaningful relationship between IT and knowledge acquisition.
3. There is a positive and meaningful relationship between IT and knowledge coding.

4. There is a positive and meaningful relationship between IT and knowledge storage.
5. There is a positive and meaningful relationship between IT and knowledge transmission.
6. There is a positive and meaningful relationship between IT and knowledge usage.

The study designs a questionnaire in Likert scale with 29 questions, where questions 1 to 6 are associated with knowledge generation, questions 7 to 10 are related to knowledge acquisition, questions 11 to 15 are associated with knowledge coding, questions 16 to 19 are related to knowledge storage, questions 20 to 26 are related to knowledge transmission and finally questions 27 to 29 are related to knowledge usage. Cronbach alpha has been calculated as 0.98, which is well above the minimum acceptable level. Therefore, we may use structural equation modeling using LISREL software package to verify the hypotheses of the survey.

3. The results

In this section, we present details of the results of our survey associated with the implementation of LISREL software package. Fig. 1 demonstrates the results of our investigation.



Standard values t-student values

Fig. 1. The summary of the results of structural equation modeling

As we can observe from the results of Fig. 1, all components of the survey are statistically meaningful when the level of significance is five percent. In addition, Chi-Square value is 411.95, which is well above the desirable level. The positive signs of the relationships indicate that the relationships were all positive and meaningful. Table 1 demonstrates the results of our survey.

Table 1
The summary of the results of testing five hypotheses of the survey

Response variable	Independent variable	Coefficient	R^2	t-value	Interruption coefficient	t-value
Knowledge creation	IT	0.94	0.88	6.65	0.12	2.44
Knowledge acquisition	IT	0.96	0.92	9.07	0.077	1.82
Knowledge coding	IT	0.93	0.86	9.51	0.14	3.48
Knowledge storage	IT	0.97	0.95	11.32	0.05	1.38
Knowledge storage	IT	0.96	0.92	8.79	0.08	2.57
Knowledge usage	IT	0.87	0.75	11.91	0.25	5.18

As we can see from the results of Table 1, the highest sign belongs to the relationship between IT and knowledge usage, followed by the relationship between IT and knowledge coding and knowledge creation.

4. Conclusion

In this paper, we have presented an empirical investigation to study the relationship between IT facilities and knowledge management lifecycle components including, knowledge generation, knowledge acquisition, knowledge storage, knowledge transmission and knowledge usage. Using structural equation modeling the study has determined a positive and meaningful relationship between IT on one side and six components of knowledge management lifecycle. In our survey, the highest sign belongs to the relationship between IT and knowledge usage, followed by the relationship between IT and knowledge coding and knowledge creation.

The first hypothesis of the survey was associated with the relationship between IT and knowledge creation. In our survey, Internet marinated the highest impact, $\beta = 0.98$, followed by email, $\beta = 0.95$, electronic broadcasting, $\beta = 0.91$, video conferences, $\beta = 0.87$, search engines, $\beta = 0.88$ and electronic sessions, $\beta = 0.83$.

The second hypothesis of the survey was associated with the relationship between IT and knowledge acquisition. In our survey, electronic sessions, $\beta = 0.99$ maintained the highest impact followed by video conferences, $\beta = 0.97$, search engines, $\beta = 0.96$, Internet, $\beta = 0.93$, email, $\beta = 0.91$ and electronic broadcasting, $\beta = 0.84$.

The third hypothesis of the survey investigated the relationship between IT and knowledge coding. In our survey, electronic sessions, $\beta = 0.99$ maintained the highest impact followed by Internet, $\beta = 0.94$, email, $\beta = 0.92$, electronic broadcasting, $\beta = 0.91$, video conferences, $\beta = 0.90$ and search engines, $\beta = 0.86$.

The fourth hypothesis of the survey investigated the relationship between IT and knowledge storage. In our survey, video conferences, $\beta = 0.97$ maintained the highest impact followed by electronic broadcasting, $\beta = 0.96$, electronic sessions, $\beta = 0.94$, Internet as well as search engines, $\beta = 0.92$ and electronic messages, $\beta = 0.94$.

The fifth hypothesis of the survey investigated the relationship between IT and knowledge transmission. In our survey, search engines, $\beta = 1.04$ maintained the highest impact followed by Internet, $\beta = 0.93$, email as well as electronic sessions, $\beta = 0.92$, electronic broadcasting, $\beta = 0.83$, and video conferences, $\beta = 0.84$.

Finally, the last hypothesis of the survey was associated with the relationship between IT and knowledge usage. In our survey, search engines had the highest impact, $\beta = 0.91$, followed by Internet as well as electronic broadcasting, $\beta = 0.88$, electronic sessions, $\beta = 0.88$, electronic sessions, $\beta = 0.87$ and video conferences, $\beta = 0.86$.

The results of this study are consistent with findings of Khandelwal and Gottschalk (2003), Kim et al. (2003), Lin and Tseng (2005), Nonaka et al. (2005), Sabherwal and Sabherwal (2005) and Ruiz-Mercader et al. (2006).

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