The Effects of IT on Organizational Knowledge Management
Case study: Iran Central Bank

Baharak Mahini, Nastaran Hajiheydari

Abstract— Information technology is one of the key and central issues in knowledge management and organizational knowledge studies. The last 3-5 years have been featured with more attention on knowledge management and IT so that it is estimated that about 70% of knowledge management studies have been on IT design. Knowledge management, theoretically speaking, is a multidisciplinary topic, while in practice the practitioners in organizations only experience dealing with IT functions in data and information management. The present paper is an attempt to survey the effect of IT on knowledge management among the employees of Iran Central Bank. Totally, 223 questionnaires were returned completed and used as the basis for testing the hypotheses. The results revealed that all the factors in utilization of IT in the bank – except for external texture- were at acceptable condition. The external texture aspect encompasses indices such as government support of utilizing IT, access to IT services outside the organization and availability of long-range and wide band communication infrastructures, which of course needs more attention. The results of structural equations showed that all the estimated coefficients were significant. Thus, the effect of utilizing IT on knowledge management was supported.

Index Terms— Utilization of It, Employees Knowledge Management, Structural Equations Modeling

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1 INTRODUCTION

TURN of the 21st century, which is the age of information, has its serious challenges and worries so that none of the development plans and modern technologies of the 20th century have managed to find a definite solution to solve the challenges and the consequences. Many scholars, theoreticians, and policy makers believe that IT revolution can be used as a basis to deal with such challenges. (Thomson and Niekerk, 2012) Frank Webster and Kevi Robbins in "The age of technological culture; from information society to virtual society" discuss the social and cultural meanings of modern technologies regarding inevitability of modern life style of human in which information and technological information and communication grounds are considered as the key indicators of development. (Cunha, 2013)

Throughout the history of different forms of technology, no technology has made such a deep and profound effect on other disciplines as the IT did. IT as interdisciplinary field affects all other fields of science by proving fast and easy access to information (Peeraer and Petegem, 2012). The modern age after the industrial ageis called the age of information. Naturally, information and knowledge are the key assets for the human and human societies in this age, which is featured with fast development of IT. It encompasses all aspects of our life and it is known as one of the main elements in development in this world. IT development plans in many countries are classified as one of the key infrastructural development (Hamidi et al. 2011). Nowadays, people, thanks to the Internet and other new information technologies, can have access to and share the lasted information at any time and place. On the other

hand, IT is much valuable to collect real time information from the employees, a process thatis called knowledge management. (Ahmed etal., 2007)

Knowledge management is a set of orderly and systematic organization activities to reach higher value using the accessible knowledge (e.g. experience and knowledge of the employees, documents, and reports). It is, actually, a novel approach to the resources and elements of the power of the organization, which relies on value of human forces and their capacity for innovation and creativity. From this angle, the main concern of the management is to create and collect organizational knowledge, keep and saving the knowledge, sharing the knowledge, put it to use, and finally develop and complete the knowledge (Nayir and Uzuncarsili, 2008). IT in knowledge management and organizational knowledge is a key and central concern. A recent wave of concentration on IT and its relationship with knowledge management has been started in the last 3-5 years and it is estimated that about 70% of publication in knowledge management have been on IT. Knowledge management, in its theoretical form is an interdisciplinary issue and in practice it is mainly about IT and its tasks for managing data and information. Although, knowledge is not the exclusive product of IT, it has an undeniable role in creating and managing knowledge since the early years of introduction of the idea. Nowadays, knowledge management is mainly a task of IT as it is the key in collecting, transforming, and transferring the knowledge and information. Knowledge management in practice is a mixture of business, culture, and technology leadership, which are delicately interconnected. Neither the mere technology nor a mere commercial-cultural approach can achieve an effective knowledge management program (Gogan, 2006). The role of IT in sharing knowledge has been long a debate. Many researchers believe that IT is a strategic element that determines the scope of the businesses, whichare defined in geographical borders (Kane andAlani, 2007; Zack, 2005;

- *Department of Management, Executive Branch, University of Tehran, Tehran, Iran.Email:hg_mahini@yahoo.com*
- *Department of Management, Executive Branch, University of Tehran, Tehran, Iran,Email:nheidari@ut.ac.ir*

Argoteetal. 2003). This introduction emphasizes the necessity of IT for the organizations and especially those that are in charge of supervising tasks. These organizations can enjoy advantages of IT to document knowledge of their employees. In this regard, the present study surveys the effect of using IT on knowledge management of the employees in Central Bank of Iran. The authorities of the bank can use the results in their decision-making.

Literature review

Like computer and communication technologies such as optical fibers, satellite communication, and cable TV, the aim of IT technology is to facilitate transfer of knowledge. In fact, the mixture of computer and communication technology results to IT, which is aimed to create a system (software and hardware) that fits well with human needs to information (Kane and Alavi, 2007). In spite of relative advantage of IT regarding academic, social, economic, political, and cultural aspects, what concerns is the negative consequences such as imbalance distribution, generation, and utilization of information between societies (Zandi and Tavani, 2011). It is notable that the new technology is a valuable opportunity for lower cost and faster production in the developed countries. However, it appears that in spite of many advantages of IT that the developed countries have enjoyed, the less developed countries have been left behind and the technological gap known a digital divide is widening between the countries of the north hemisphere and the south hemisphere. While, many developed countries are accelerating their information technologies, many developing countries still dream about reaching outdated technologies. However, there is still time to deal with the problem by planning for identifying the effect of IT. (Chao and Chandra, 2012)

Knowledge management is a set of systematic and organized measures to reach higher value using the available knowledge (knowledge of the employees, and all the documents and records). Organizational knowledge management in fact is a novel approach toward resources and the elements of organizational sources of power, which put emphasis on the value and role of human sources and their creativity. Therefore, creating and acquiring, keeping and saving, sharing and distribution, using and developing the knowledge are the main challenges of management of the organization (Chen and Huang, 2007).

Yang et al. (2012) surveyed the effect of IT in success of product through knowledge management. They proposed followed hypothesis:

1. IT is effective on knowledge management level in the pro Ject.
2. IT has positive effect on project performance.
3. Knowledge management has positive effect on project Performance.
4. Project management has positive effect on project.
5. Relationship between IT and project management is Influenced by knowledge management.

The results of analysis on the data collected from construction projects in Taiwan showed that IT tools are considerably effective on knowledge management. The extent to which IT tools are used depends on knowledge management level. The study defined information tools as document management system, email, AUTOCAD, search engines, and data/text mining techniques. They also concluded that using IT results in reduction in cost, improvement of quality and shortening project term.

Vahedi and Nejadhaji (2011) stated regarding IT and knowledge management that the best way to us IT in knowledge management task is to combined two factors:

1. Knowledge about IT and that IT is useless unless it is harmonized with organizational and world culture.
2. Information technologies must be specifically designed for the purpose of knowledge management.The question of the study was "whether IT can help development and strengthen of knowledge-based organization?"

Their answer was positive provided that cultural organization and knowledge management process be integrated into each other.

Revilla et al. (2009) surveyed IT as one of the empowering factors of knowledge management in development of new products. They divided IT into balanced IT, divergent-based IT, and convergent-based IT.

Convergent-based IT facilitates inter-personnel communication, communication among product development team members, unity in the team, removal of time and place limitations – video conference, email, work management systems, and virtual spaces.

Divergent-based IT, one the other hand, facilitates communication among the staff for knowledge explicit making – to have fast and easy access to information-, development of knowledge center, saving information, and using electronic library, the Internet, and intranet.

Furthermore, balance IT is a combination of divergent-based and convergent-based ITs.

Divergent-based IT emphasizes on extracting and explicit making the knowledge through attenuating divergence in designing new product, while convergent-based IT puts emphasis on discovering knowledge by the way of creating innovation and change – not highly effective in short-run. Researchers believe that a mixture of divergent and convergent IT – balanced IT- must be utilized in designing and developing products. Teseng (2008) surveyed the effect of IT on knowledge management systems. First, 4 gaps ahead of implementation of knowledge management systems were spotted and, then, the gaps were bridged based on IT and the approaches it prescribes. The data in the study was collected through literature review, interviewing with experts and data analyses. Finally, a model was proposed regarding the critical factors in quality implementation of knowledge management systems using IT tools.

Mohamed et al. (2006) explained the new viewpoints regarding the role of IT on knowledge management. They highlighted the positive and negative effects of IT on knowledge management. They argued that to be effective on knowledge management, IT must leave its bi-capacity logic and start learning through a spectrum. The authors held that the key to achieve harmony between IT and knowledge management is to know the following principles:

There are cases that technology outperforms the man and vice versa.

The main cause of fraction between IT and knowledge management is their overlaps.

Knowledge management and IT must be bridged rather than being mixed and IT must be used in its proper places throughout the process.

Huange et al. (2006) surveyed several American and Taiwanese large companies and organizations and concluded that IT is a key tool for knowledge management, saving, and knowledge explicit making in knowledge-based organizations with great deal of information and knowledge. Thus, such organizations tend to pay more attention on IT management. The authors recommended that to become a knowledge-based organization, information must be permanently accessible as updated knowledge is one of the key features of such organizations. They maintained that except for moral and security concern, any other limitations on access to knowledge delays development of a knowledge-based organization.

2 METHODOLOGY

The study was conducted as an analytical-survey study and data gathering was done using a mixture of library and field studies. The former was mainly done for literature review and to learn about experiences about implementation of IT and knowledge management. Afterward, the indices of IT were extracted (Alidousti, 2010); and the current level of utilization of IT in the organization understudy was determined based on opinions of the managers and the experts of the central bank in Tehran city, current status questionnaire, and Student's t-test (data distribution was normal). Afterward, status of each indices of knowledge management in the organization was determined (Brander, 2001); and based on the obtained score about the current status, the structural relationship between the aspects of IT and knowledge management was determined using structural equations. The research model is pictured in figure 1.
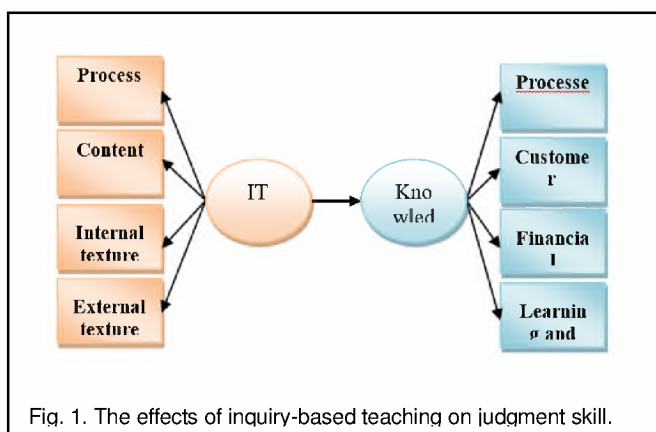

Fig. 1. The effects of inquiry-based teaching on judgment skill.

The data were mainly analyzed in SPSS and Lisrel for hypotheses testing. The sample size and other regression computations were also done using the software. The structural equation model was drawn in Lisrel and to have more accurate results, the questionnaire was designed based on Likert's 7 points scale. Considering the large number of managers and experts of the organization in Tehran, participants were selected using limited society sampling method. With 3200 members in the study population, pilot sampling was carried out to determine standard deviation. To collect the questionnaires from the managers and the experts, random sampling was performed. To this end, the pilot questionnaire was distributed among 36 participants.

$$n = \frac{N \times Z_{\alpha/2}^2 \times \delta^2}{\varepsilon^2 (N-1) + Z_{\alpha/2}^2 \times \delta^2} \quad \Rightarrow \quad n = \frac{3200 \times (1.96)^2 \times 0.416^2}{0.05^2 (3199) + (1.96)^2 \times 0.416^2} = 246$$

Standard deviation was obtained based on the pilot study (Max Std. deviation = 0.416). Therefore, maximum sample group size with error level of 5% was 246 individual and finally the analyses were carried out using 223 questionnaires.

3 FINDINGS

Before conducting statistical tests, normality of the data distribution was ensured. To this end, Kolmogrov Smirnov (KS) test was used. The result showed that with sig = 0.117, the data distribution for IT questionnaire was normal and parametric tests were adopted.

TABLE 1
KS TESTS ON IT CURRENT STATUS QUESTIONNAIRE ONE-SAMPLE KOLMOGOROV-SMIRNOV TEST

		OI Data
N		223
Normal Parameters[a]	Mean	2.7162
	Std. Deviation	.54672
Most Extreme Differences	Absolute	.4637
	Positive	.438
	Negative	-.11
Kolmogorov-Smirnov Z		2.325
Asymp. Sig. (2-tailed)		.117
a. Test distribution is Normal.		

Sample hypothesis: the elements of IT concerning the aspect process are at good condition in the Central Bank.

$H_o : \mu \leq 4$ The elements of IT concerning the aspect process are not at good condition in the Central Bank.

$H_1 : \mu > 4$ The elements of IT concerning the aspect process are at good condition in the Central Bank.

TABLE 2
CONDITION OF ELEMENTS OF IT

	t	df	Sig. (2-tailed)	Test Value = 4 Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Process	6.727	222	.000	1.25347	.8786	1.6283
Content	5.943	222	.003	1.25417	.8296	1.6787
Internal texture	7.580	222	.015	1.44048	1.0582	1.8228
External texture	-7.069	222	.064	-1.30833	-.9360	-1.6807

Hypotheses tests revealed that all the factors in utilizing IT tools in the Central bank, except for external texture, are at good condition. The aspect external texture covers indices such as government support of using utilizing IT, access to IT services outside the organization and long-range/ wide band communication infrastructure; which all need more attention.

TABLE 3
KS TEST ON THE QUESTIONNAIRE OF KNOWLEDGE MANAGEMENT STATUS
ONE-SAMPLE KOLMOGOROV-SMIRNOV TEST

		VAR00001
N		223
Normal Parametersa	Mean	3.8444
	Std. Deviation	1.07239
Most Extreme Differences	Absolute	.084
	Positive	.047
	Negative	-.084
Kolmogorov-Smirnov Z		1.037
Asymp. Sig. (2-tailed)		.219

a. Test distribution is Normal.

Student's t-test was used to survey status of implementation of knowledge management in the Central Bank; further explanation are skipped.

As an example, one of the hypotheses is tested for each one of the four aspects of knowledge management. (Table 4)

Sample hypothesis: the factors of implementation of knowledge management regarding the aspect process are at good condition in the Central Bank.

$H_o : \mu \leq 4$ The factors of implementation of knowledge management regarding the aspect process are at good condition in the Central Bank.

$H_1 : \mu > 4$ The factors of implementation of knowledge management regarding the aspect process are at good condition in the Central Bank.

TABLE 4
CONDITION OF ELEMENTS OF KNOWLEDGE MANAGEMENT

Aspect	T	df	Sig. (2-tailed)	One-Sample Test Test Value = 4 Mean Difference	95% Confidence Interval of the Difference		
					Lower	Upper	
Process	1.42	22	.00	.1374	.328	.053	
Customer	2.93	22	.06	-.2889	-.483	-.094	
National	1.77	22	.00	.1785	.377	.020	
arning and innovation	.90	22	.00	.0844	-.269	.100	

The table above indicates that the aspects with sig. > 0.05 are not at good condition; thus, the aspect customer is not at good condition. Having the condition of the variables of the study, the relationship between the two variables are discussed below; to this end, structural equation technique was used in Lisrel.

The effects of utilization of IT on knowledge management are the question in the main research model. The results fitness of the main model or research with standard coefficients frame is pictured below (Lisrel).
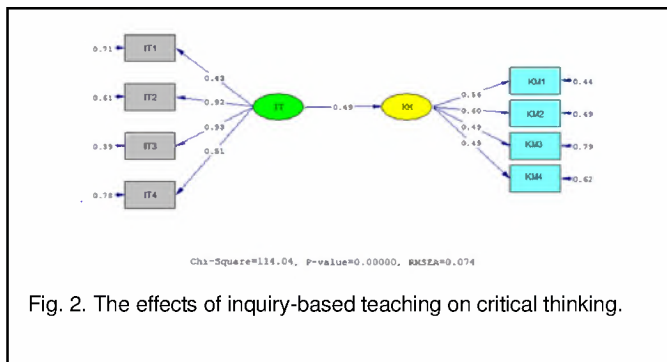

Fig. 2. The effects of inquiry-based teaching on critical thinking.

As pictured above, the coefficients are significant, thus the effective of utilization of IT on knowledge management is supported. The fitness indices of the model are listed in the table below. Given the results and comparing the acceptability

Figure 3 illustrates the results of computations of significance of the coefficients above.
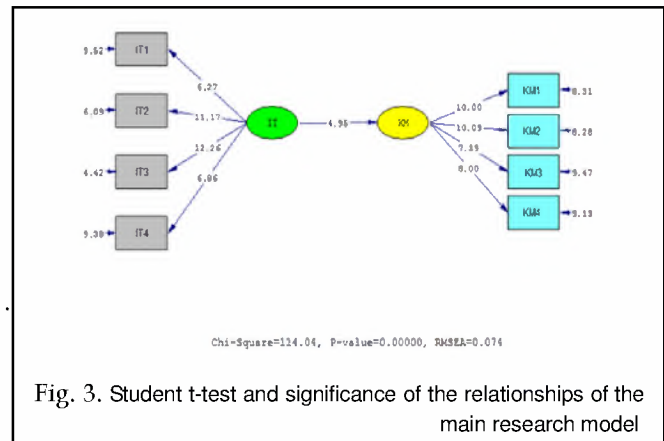

Fig. 3. Student t-test and significance of the relationships of the main research model

range, clearly, all the indices of fitness are at acceptable condition. Therefore, the data fit with the model and fitness of the model is supported.

TABLE 5
FITNESS INDICES OF THE RESEARCH MODEL

CFI	NNFI	NFI	AGFI	GFI	RMSEA	SRMR	χ^2/df	Fitness
$\succ 0.9$	$\succ 0.9$	$\succ 0.9$	$\succ 0.9$	$\succ 0.9$	$\prec 0.1$	$\prec 0.05$	$\prec 5$	Rational range
0.96	0.95	0.94	0.94	0.93	0.074	0.026	1.699	Result

4 CONCLUSION

All the aspects of IT were effective on knowledge management, which is consistent with Yang et al. (2012), Revilla et al. (2009), and Teseng (2008). The first step to be taken toward improvement of knowledge management is, therefore, to improve the aspects of IT which are not at good condition – external texture and provision of required software and hardware.

One of the effective factors on knowledge management was the positive attitude of the top management of the organization regarding IT; so that resistance to change must be attenuated to observe improvement in this regard. Following are few recommendations to eliminate the causes or sources that result in resistance to change:

Provision of facilities: something must be given before cutting advantage as valuable as the advantage was or the expected benefits must be mentioned to the staff. A great deal of resistance to change can be solved by showing the advantages of IT to the managers.

Cooperation: by participating and motivating the managers to take part in the process of change an decision-making, they feel less threatened by the changes. Before implementing any change, the expected opponents must be consulted with and participated in making the decisions.

Another important aspect was integrity of IT and marketing ap-

proaches, which is mentioned in the literature as strategic coordination. Regarding IT and knowledge management, strategic coordination is one of the main challenges. To realize such coordination, the environmental limitation of the business must be taken into account in the IT strategy. Based on the scientific definition, coordination is the ability and capacity to introduce a practical and definite relationship between IT and financial/non-financial measures of performance. Doubtlessly, however, environmental changes are a permanent cause of lack of balance among the strategies. Reich and Benbast (2000) surveyed 10 organizational units and concluded that knowledge sharing among the managers of IT ward and the organization and IT project experience in short-run results in better cooperation between the managers of IT ward and the organization. So that the shared knowledge becomes the main factor in strategic coordination in long-run. Therefore, strong relation between business and IT plans eventuates in high strategic coordination.

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