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Abstract

Purpose – This study aims to investigate the relationship between knowledge management (KM) and organizational innovation (OI) in higher educational institutions.

Design/methodology/approach – The research method in the study was the descriptive – correlative type and was applied research based on the target. The study population consisted of managers and staff members of 63 Iranian higher educational institutions. In this research, descriptive and inferential statistics were used. To analyse research data, descriptive statistics, and for inferential statistics, the Pearson correlation coefficient test, the simple linear regression test and multiple regression tests were used. For data analysis, SPSS software was used.

Findings – The results of the study demonstrated that there was a significant relationship between KM and OI, and all alternative hypotheses were confirmed. In addition, KM predicted the aspects of organizational innovation in higher educational institutions.

Originality/value – This study supported the members of higher educational institutions to understand how to increase OIbetter and to improve the knowledge and experience of the employees through KM.

Keywords Employee, Organizational innovation, Knowledge management, Higher educational institutions

Paper type Research paper

Introduction

Knowledge is regarded as the most valuable asset in an organization and will remain the same for years to come (Sandhu *et al.*, 2011). Knowledge management (KM) is the "organizing, planning, motivating, and controlling of individuals, systems, and processes in the organization to make sure that its assets related to knowledge are improved and efficiently employed" (King, 2009). KM is associated with the structuring and access to experience, knowledge and skills that create new capabilities, activate high performance, encourage innovation and increase customer value (Beckman, 1999). In today's business environment, organizations integrate KM with innovation to create and maintain competitive advantage because knowledge is a resource to reduce the difficulties of

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innovation processes, and its management is considered as a highly valuable resource. In addition, KM combines external and internal knowledge in an organization and makes it easy to access (Du Plessis, 2007). Knowledge management and innovation configuration determine how the firm can capitalize and create new knowledge, providing context wherein new product development efforts are designed, developed and completed (Shani, Sena, and Olin, 2003). According to the OECD (2005), an organizational innovation (OI) is the implementation of a new organizational method in the firm's business practices (including KM), workplace organization or external relations that has not been previously used by the company. Innovative organizations are continuously looking for better ways to realize business strategies, getting used to cutting-edge technologies and new methodologies (Peng *et al.*, 2011). Consequently, the question on how to improve the organization's innovation capability always draws the attention of both researchers and practitioners.

Although the previous studies have widely investigated and confirmed the relation between KM and OI (Abdi and Senin, 2015; Gloet and Terziovski, 2004; Kör and Maden, 2013; Liao and Wu, 2010; Tavakoli, 2016), the effect of KM dimensions, such as knowledge acquisition, knowledge creation, knowledge storage, knowledge sharing and knowledge application on OI, has been less examined (Tavakoli, 2016). Moreover, although some studies have confirmed the influence of these KM dimensions on OI, they have assessed the technical and administrative innovations (Kör and Maden, 2013), and there is no evidence of investigating the relationships between KM dimensions and other dimensions of OI, such as behavior innovation, product innovation, process innovation, market innovation and strategic innovation (Liao and Wu, 2010). Most of the previous studies have focused on various aspects of technological innovation, leaving OI as the neglected member of the innovation family (Keupp *et al.*, 2012). Furthermore, innovation:

> Can be done not only in product innovation but also in other forms such as process innovations, innovation in the business model, organizational structure, brand, marketing, management systems, customer service, and experience (Aryanto *et al.*, 2015).

According to what has been stated, the present study is an attempt to identify the shortcomings of these thoughts in higher educational institutions and to determine how KM influences OI and helps it set its direction and movement toward dynamism and progress.

Today, higher educational institutions not only give input to innovation but are also embedded in it (Etzkowitz, 2014). Universities and higher educational institutions take advantage of innovations, philosophies, strategies and techniques that are being used in private and commercial sectors to create strategic knowledge for strategic purposes (Kezar, 2000). In the past decade, general innovations and changes have taken place in higher education, such as strengthening and creating international cooperation networks, increasing academic mobility of faculties and students, new management structure, new methods of assessment, accreditation and financing, diversification of courses, programs and studies and the application of technology in teaching and learning. Furthermore, higher education must contribute to equipping graduates with the capabilities required to increase productivity by generating or adapting new knowledge and by making the decision to use it, along with other resources available but not previously used, in the daily development of their tasks and responsibilities (Vila *et al.*, 2012). Therefore, it is necessary to apply a method to create knowledge and to implement it in institutions to achieve educational objectives and maximum benefits (Adhikari, 2010). Moreover, managers should encourage the staff to take an active part in the process of creating, transferring and sharing knowledge to set a knowledge-based culture in academic institutions (Dokhtesmati and Bousari, 2013).

Iranian higher education is considered to be important in all aspects, and currently there are 1,795 higher educational institutions in Iran, among which 1,200 public universities are financed, controlled and supported by the government, and 595 private, often called "free universities," and nonprofit institutions are active in providing training at undergraduate and graduate levels. Additionally, 106 public universities have established Innovation and Entrepreneurship Development Centers, aiming at Iran's competitiveness, innovation and economic growth (Karimi *et al.*, 2010). We believe that study in this field will be useful in identifying patterns of KM and OI in not only higher educational institutions but also other educational institutions. Accordingly, this study aims to investigate the relationship between KM and OI in the Iranian higher educational institutions. As a result, the following main research question was formulated:

RQ. Does knowledge management have a significant influence on organizational innovation in higher educational institutions?

The theoretical framework

Knowledge management and higher educational institutions

KM is an idea that arose almost two decades ago, roughly in 1990 (Koenig, 2012). According to Davenport (1994), KM is the process of capturing, distributing and effectively using knowledge. This definition is simple, stark and to-the-point. A few years later, Duhon (1998) defined KM as an integrated approach to identify, capture, evaluate, retrieve and share all information, and this information could be in the forms of database, document, policy, procedure and formerly uncaptured expertise and experience in individual workers. It is also seen as a process of creating, acquiring and transferring knowledge that is reflected in the behavior of the organization (Bueno *et al.*, 2010). Nowadays, more than ever, researchers of KM are acknowledging employees as the key factor in the KM process, and they propose that organizations must try to leverage the level of human resources' knowledge through coding plans to create a more appropriate context for the creation and implementation of the required KM (Delshab and Sadeghi Boroujerdi, 2018).

Today at an educational institution's level, KM is necessary to create organizations that "learn" more efficiently. Many researchers have stated their interest in introducing KM methods in the field of higher education. Rowley (2000), in a study, asked the question, "Is higher education ready for KM?" Her paper investigated the perceptions of KM within higher education as a management tool and presented the nature of academics and universities and related challenges of KM implementation within this context. Kidwell *et al.* (2000) stated that higher educational institutions have significant opportunities to apply practices of KM to support every part of their mission. In another study, Demchig (2014) found that higher educational institutions tended to neglect knowledge at the organizational level. From the business perspective, a systematic way of managing organizational knowledge among private colleges is crucial for promoting management and technical capabilities to continuously succeed in this challenging economic environment (Keat and Lin, 2018). Ubon and Kimble (2002) recognized some subscriber elements in the KM and online distance education. These subscriber elements are shaping academic communities and construction collaborations, building confidence in sharing knowledge among students. Collaboration and education are the main concepts of knowledge sharing. In fact, collaboration, communication and dissemination of knowledge are meaningful management features (Meese and McMahon, 2012). Furthermore, the applications of individual learning and computer-supported knowledge building are significant in global education (Zhao and Chan, 2014). Studies in educational institutions indicated that KM could be evaluated

according to the following five factors: knowledge creation, knowledge acquisition, knowledge storage, knowledge sharing and knowledge application (Hasani and Sheikhesmaeili, 2016; Sallis, 2002).

- *Knowledge creation*: It is defined as the continuous transmission, composition and transformation of the various kinds of knowledge (Nonaka, 1994). Cook and Brown (1999) distinguish between knowledge and knowing, and they show that the production of the action and reaction between the two is knowledge creation .
- *Knowledge acquisition*: It refers to the knowledge which organizations can make an effort to gain from internal and external sources. Collaborations with external knowledge sources and the use of the knowledge of the members of the organizations are considered as the sources to achieve intangible assets (Gamble and Blackwell, 2001).
- *Knowledge storage*: It comprises structuring, organizing, recovering and maintaining organizational knowledge, which allows companies to memorize knowledge existing in different forms, such as written documentation, electronic information database and expert knowledge (Alavi and Tiwana, 2003).
- *Knowledge sharing*: It has its roots in the technology transfer and innovation background. Knowledge sharing is shown to be happening through the process of learning that organizations continuously engage customers and suppliers with, to innovate or create (Kim and Nelson, 2000). Knowledge sharing can be defined in different methods, depending on the field in which it is intended. Van Den Hooff and De Ridder (2004) define the concept of knowledge sharing as one "process that people are mutually sharing their implicit, tacit and explicit knowledge to make new knowledge."
- *Knowledge application*: It occurs when the available knowledge is used to make decisions and perform tasks through direction and routines.

Regarding competition in higher educational institutions, a number of higher educational institutions have implemented strategies and tools that improve the quality of their students and faculty and provide several community services for the construction of their competitiveness. In this way, KM, the ability to acquire, create, storage, share and application knowledge, is probably to play a significant role in improving and maintaining higher educational institution competitiveness. KM is considered as a significant process in higher educational institutions that are integrated into the KM plan of the general office of higher educational commission and is used as a criterion in the organizational assessment of the office of Iranian higher educational institutions (Barari, 2015).

Iranian higher-education institutions are different in values, location, size, shape, mission, ethics and background. Higher educational institutes in Iran had been undergoing significant changes over the past 18 years. These changes and developments have affected the quantity and method of the general budgets of the system; this has laid emphasis on the research selectivity and injected market ingredients into the budget and management of the system (Hasani and Sheikhesmaeili, 2016). One of the necessary steps to achieve this goal is to increase the level of academic performance by applying the KM system. Having a systematic plan to improve the required conditions for knowledge sharing among Iranian faculty members is identified as an important tool for their empowerment, but in this regard, we should not underestimate the role of organizational memory (Feiz *et al.*, 2017).

Organizational innovation and higher educational institutions

Nowadays, the factors affecting organizational growth have changed from raw ingredients to intangible assets: knowledge and innovation ability (Dickel and de Moura, 2016). A lack

of innovation has been considered in the literature as a barrier to significant growth in companies (Yang, 2012). There is little consensus surrounding the definition of the OI concept (Dubouloz, 2012). Many researchers define innovation in general as a process of developing, adopting and using new ideas to create new products, methods, plans, policies, technologies and services for members of the organization (Albury, 2005).

Vigoda-Gadot *et al.* (2005) view innovation as a multidimensional organizational trait. They define five dimensions for organizational innovativeness: creativity, risk-taking, openness to change, future orientation and proactiveness. Lin (2006) defines OI as a firm's ability to transform and exploit knowledge may determine its level of organizational innovation, such as faster problem-solving capability and enhanced rapid reaction to new information. Evangelista and Vezzani (2010) showed that a compound of product, process and OI has the most potent effect on employment. They have found that a compound of product, process and OI has the most potent effect on employment. In one of the comprehensive classifications, Wang and Ahmed (2004) have evaluated OI according to the following five dimensions: behavior innovation, product innovation, process innovation, market innovation and strategic innovation:

- *Behavior innovation*: It usually comprises the finding of opportunities and generation of new ideas (creativity-related behavior), but it can also comprise behaviors toward the implementation of change, use of new knowledge or a new process and an improvement to increase personal or business performance (implementation-oriented behavior). Behavioral innovation includes the abilities of individuals, groups and managers to create a culture of innovation and company-wide acceptance of the new and innovative ideas.
- *Product innovation*: It includes creating and following the introduction of a product or service, which is either a new or an advanced version of the previous product or services.
- *Process innovation*: It is the implementation of a new or considerably improved good or delivery method (containing considerable changes in techniques, equipment or software). It comprises the introduction of new production methods, new management approaches and new technologies that can be used to improve management and manufacturing processes.
- *Market innovation*: It is the design for incorporating the progress in the science of marketing, engineering or technology to gain marketing efficiency and effectiveness, to increase the competitive advantage and gain value for shareholders.
- *Strategic innovation*: It refers to a design made by a company or organization to encourage technological advances or services, usually by investing in R&D activities.

No longer strictly the scope of R&D departments, innovation is important in higher education institutions for providing the rising value of education to students and the development of efficient all processes of learning-centered and the productivity with which support processes these assist of processes of learning-centered (Meek *et al.*, 2009; Arciénaga Morales *et al.*, 2018). Higher educational institutions should be managed so that innovation is converted into a regular part of the culture and daily actions as innovation are created in the knowledge accumulated by all staff and faculty members.

Driving innovation and implement it is often difficult for higher education institutions. Faculty members in higher educational institutions are the main actors in innovation and its

relevant processes. Moreover, their knowledge and behavior toward innovation are formed by engaging with other members of the faculty (Brennan *et al.*, 2014). Higher education institutions could produce an array of press published describing new plans and activities that are various from the academic norm and break new way and those talented persons have supported for real goals. Higher educational institutions serve as potential sources of both the request for innovation and the talent required to support it.

According to Furst-Bowe and Bauer (2007), changing and innovating new concepts is possible when a systematic process and method is used. Normally, higher education includes all of the components that are necessary for change and innovation.

Higher educational institutions should be managed to convert innovation into a regular part of the culture and daily actions accumulated by all students, staff members and faculty. Both driving and implementing innovation are frequently difficult for higher educational institutions. Faculty members in these institutions are the main actors in innovation and its relevant processes. Additionally, their knowledge and behavior toward innovation are formed by engaging with other members of the faculty. Higher educational institutions serve as potential sources of both the request for innovation and the talent required to support it. According to Rogers (1995), an educational institution is one way to adopt innovations. Eckel (2002), with the support of Rogers (1995), demonstrates that higher educational institutions face requests for an increased impact on the market for doing new things. In the idea of doing new things, "OI" is specified as an obstacle for higher educational institutions. Organizational innovation in the higher educational sector that may take place using innovative education models, curriculum or management serves the purpose of creating business value (Lu *et al.*, 2010).

Knowledge management and organizational innovation

In this section, some studies related to the relationships between KM and OI and innovation are reviewed. The findings from the study of Gloet and Terziovski (2004) showed that there is a significant positive correlation between KM practices and the performance of innovation. They describe KM as the access to expertise, knowledge and experience that creates new capabilities, enables top performance, encourages innovation and increases customer value. Swan *et al.* (2007) found that there is a positive relationship between knowledge sharing and innovation projects. In the same vein, Seidler-de Alwis and Hartmann (2008) demonstrated that organizations promoting processes of knowledge sharing are more successful in innovation. Liao and Wu (2010) concluded that organizational learning is the variable of mediating between KM and OI. They indicated that KM is a significant entrance, organizational learning is the key process and OI is a significant output. In their study, Kör and Maden (2013) demonstrated that KM processes and OI significantly influence innovation types. The results also indicate that KM processes relate positively to innovativeness, which in turn increases innovation in organizations. Abdi and Senin (2015) showed KM had an impact on organizational innovation. The results of the study revealed that organizational learning has an important character as a mediator in the association between KM and OI. The findings of Barari (2015) showed that all components of KM and OI are mutually correlated ($P < 0.01$). Also, the implementation of SEM to test KM and OI showed that the proposed model has good appropriateness and, in fact, OI has been explained by KM. In the same vein, the results of Tavakoli (2016) showed that there is a significant relationship between all the components of KM and OI. KM integrates various kinds of tacit and explicit knowledge. By integration, organizations

can explore what kind of tacit and explicit knowledge subsists in the organization. Also, KM processes, such as knowledge acquisition, knowledge creation, knowledge storage, knowledge sharing and knowledge application, play a major role in bringing innovation. By reviewing the literature, it can be concluded that the present study is one of the first attempts to investigate the relationship between KM and OI in higher educational institutions.

Proposed model of the research

According to the background of the study, the proposed research model is based on the theoretical relationships between a number of factors that are foreseen in the study. In this study, the five dimensions of KM (knowledge creation, knowledge acquisition, knowledge storage, knowledge sharing and knowledge application) and the five dimensions of OI (behavior innovation, product innovation, process innovation, market innovation and strategic innovation) are used in accordance with the research title and supported the hypothetical basics by surveying the research background. This proposed model represents the relationship between the KM model proposed by Sallis (2002), Chen and Huang (2007) and Massa and Testa (2009) and the OI model proposed by Wang and Ahmed (2004). Therefore, the general structure of Figure 1 about the relationship between measurement and review is as follows.

According to Figure 2, the study measurement model illustrates the methods of study hypotheses and provides a basis for analytical tests. Consequently, the main hypothesis of the study and the sub-hypotheses are as follows.

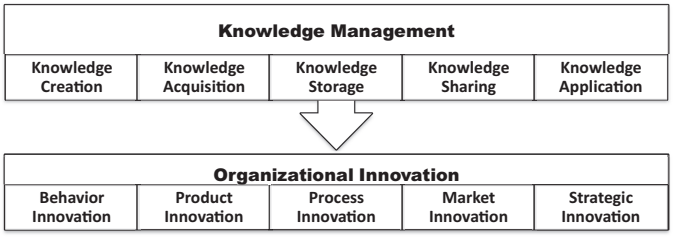

Figure 1.
Proposed research model

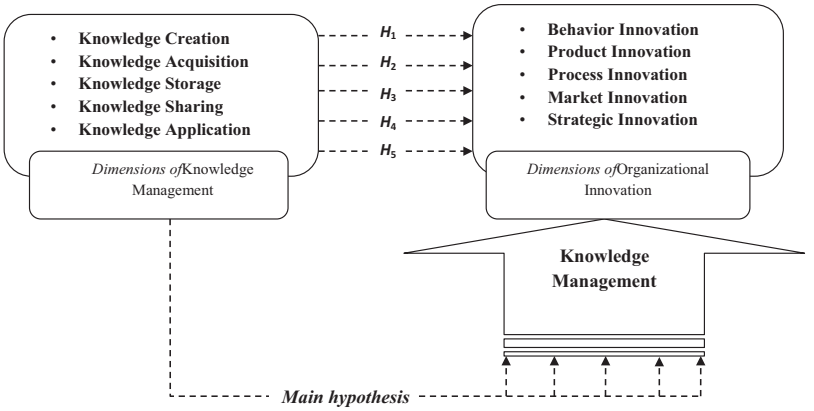

Figure 2.
Research measurement model

Main hypothesis

There is a significant relationship between knowledge management and the dimensions of OI.

Sub-hypotheses

H1. There is a significant relationship between knowledge creation and the dimensions of OI.

H2. There is a significant relationship between knowledge acquisition and the dimensions of OI.

H3. There is a significant relationship between knowledge storage and the dimensions of OI.

H4. There is a significant relationship between knowledge sharing and the dimensions of OI.

H5. There is a significant relationship between knowledge application and the dimensions of OI.

H6. KM predicts the aspects of OI.

Research methodology

The research method

This study aimed to investigate the relationship between KM and OI in Iranian higher educational institutions. This was a descriptive correlational study and was an applied research based on the target. The study was conducted in Spring 2017, and after two months of reminders to encourage survey participation, the data were collected. The study population (n = 3,014) consisted of all of the administrators and staff members in 63 higher educational institutions in the Kurdistan, Kermanshah and Hamadan provinces of Iran. According to Morgan's table, for a statistical sample, 341 people were chosen from institutions, (five or six subjects per institution) (Krejcie and Morgan, 1970). Research-independent variables were the five dimensions of KM, namely, knowledge creation, knowledge acquisition, knowledge storage, knowledge sharing and knowledge application. The dependent variables included the five dimensions of OI: behavior innovation, product innovation, process innovation, market innovation and strategic innovation.

Measurement instruments

To measure the study variables, two questionnaires were used:

- A KM questionnaire, adapted from the standard questionnaire of Sallis (2002), Chen and Huang (2007) and Massa and Testa (2009), which included 25 questions. Some of the items used were: my institution obtains technical knowledge from external sources (other institutions,...), my institution facilitates communication and consultation culture between members and my institution applies members' knowledge in developing new services.
- An OI questionnaire, adapted fromWang and Ahmed's (2004) standard questionnaire, which included 20 questions. Some of the items used were: our new services are often perceived very novel by students, our higher educational

institution has introduced more innovative services during the past five years and we get a lot of support from managers if we want to try new ways of doing things. Both questionnaires had five-choice scales (very low, low, medium, high and very high).

Validity and reliability of questionnaires

The validity and accuracy of the questionnaire are confirmed by 35 experts in the field of educational management. Furthermore, the standardization and normalization of the questionnaires in other studies supported the validation of the test. In the next step, Cronbach's alpha test was used to calculate the reliability of the test questions and the obtained alphas for the KM and OI were 0.84 and 0.77, respectively, which were confirmed.

Methods of statistical analysis

In this study, descriptive and inferential statistics were applied. Descriptive statistics were used for describing the data, and for the inferential statistics, the Pearson correlation coefficient test, the simple linear regression test and multiple regression tests were used. The significant level during research was considered 0.05, and the SPSS software was used for data analysis.

Results

Sample descriptive data

Table I shows the results of the descriptive data of the study with respect to gender, age, education and work experience.

In Table I, according to the gender, most respondents to the questionnaire were male, and for the variable of age, most respondents to the questionnaire were between 30 and 40 years of age. For the education variable, most respondents to the questionnaire had a master's degree at the time of the study, and for the variable of work experience, most respondents to the questionnaire had 10 to 15 years of work experience.

Results obtained from testing hypotheses

Results of inferential analysis

The results of the main hypothesis and sub-hypotheses are shown in Table II.

As shown in Table II, the Pearson R significance test was used to analyze the significant relationship between KM and the dimensions of OI. The result of Sig in all the assumptions is equal to 0.000, which is less than the value of 0.05, so the main hypothesis of the study is confirmed, and there is a significant relationship between KM and the five dimensions of OI. The analysis of the correlation test showed that the intensity of the relationships between KM and behavior innovation, product innovation, process innovation, market innovation, strategic innovation and OI are equal to 0.338, 0.269, 0.331, 0.258, 0.661 and 0.582, and the kind of correlation is direct (positive). Furthermore, other results of Table II show that all sub-hypotheses, including *H1*, *H2*, *H3*, *H4* and *H5*, were approved, and there are significant relationships between knowledge creation, knowledge acquisition, knowledge storage, knowledge sharing and knowledge application and the five dimensions of OI.

H6: KM predicts dimensions of OI.

The outcomes of this hypothesis are presented in Tables III-VI.

In Table III, a significance level of F Fisher is equal to Sig = 0.000, and this value is less than the significance level of 0.05. Consequently, the linearity of the model is confirmed.

Table I.
Descriptive statistics

Gender			Age			Education			Work experience		
Level	*N*	P (%)	Level	*N*	P (%)	Level	*N*	P (%)	Level	*N*	P (%)
Male	229	67	Under 30 years	60	17.5	Diploma	0	0	Under 5 years	20	5.9
			30-40	130	38.3	Up to diploma	41	12.03	5-10	48	14.2
Female	112	33	40-50	100	29.2	BA	98	28.74	10-15	122	35.8
			Above 50 years	51	15	MA	133	39	15-20	72	21.1
						PHD	69	20.23	Above 20 years	79	23
Total	341	100	Total	341	100	Total	341	100	Total	341	100

The total of samples: 341

Table II. The correlation between the dimensions of KM and OI

	Independent variable		Behavior innovation	Product innovation	Process innovation	Market innovation	Strategic innovation	OI
H1	Knowledge creation	Pearson correlation	0.261**	0.202**	0.273**	0.199**	0.460**	0.437**
		Sig. (two-tailed)	0.000	0.000	0.000	0.000	0.000	0.000
		N	341	341	341	341	341	341
H2	Knowledge acquisition	Pearson correlation	0.270**	0.151**	0.303**	0.185**	0.448**	0.426**
		Sig. (2-tailed)	0.000	0.005	0.000	0.001	0.000	0.000
		N	341	341	341	341	341	341
H3	Knowledge storage	Pearson correlation	0.182**	0.215**	0.283**	0.180**	0.468**	0.416**
		Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000	0.000
		N	341	341	341	341	341	341
H4	Knowledge sharing	Pearson correlation	0.229**	0.161**	0.160**	0.255**	0.514**	0.413**
		Sig. (2-tailed)	0.001	0.000	0.000	0.001	0.000	0.000
		N	341	341	341	341	341	341
H5	Knowledge application	Pearson correlation	0.258**	0.229**	0.165**	0.198**	0.460**	0.378**
		Sig. (2-tailed)	0.000	0.000	0.002	0.000	0.000	0.000
		N	341	341	341	341	341	341
Main Hypothesis	KM	Pearson correlation	0.338**	0.269**	0.331**	0.258**	0.661**	0.582**
		Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000	0.000
		N	341	341	341	341	341	341

Notes: **Correlation is significant at the 0.01 level (2-tailed); *correlation is significant at the 0.05 level (2-tailed)

Furthermore, adjusted "r" square is equal to 0.336, which shows that KM variable explains 33.6 per cent changes in OI.

As indicated in Table IV, a significant level of KM is equal to 0.000, which is less than the value of 0.05. Therefore, the variable of KM is effective on OI.

Furthermore, according to the standard coefficient of *Beta*, the amount of influence of KM on OI is equal to 0.582, so we can say that with a one-unit increase in KM, OI as 0.582 units will be increased.

In Table V, because the significance level of F Fisher is equal to Sig = 0.000, and this value is less than the significance level of 0.05, there are linear relationships among the dimensions of KM and OI. Furthermore, the adjusted "r" square is equal to 0.333, which shows the dimensions of KM explaining 33.3 per cent changes in OI.

Standardized coefficients (β) of KM dimensions are shown in Table VI. Knowledge sharing (β = 0.213) has the strongest effect on OI, and dimension of knowledge application (β = 0.180), knowledge acquisition (β = 0.176), knowledge creation (β = 0.133) and knowledge storage (β = 0.128) are in the next rankings.

Discussion and conclusion

Higher education institutions considered as the most important resources contains information, the knowledge required for the advancement and development of society, the center of activities related to creation and production, distribution, transmission and dissemination of knowledge. The purpose of this study was to investigate the relationship between KM and OI in Iranian higher educational institutions. The results of the inferential statistics about the main hypothesis indicated that there was a significant relationship

Table III. Regression model summary

r	R square	Adjusted r square	Std. error of the estimate	F	Sig.
0.582[a]	0.338	0.336	0.38028	173.206	0.000[a]

Note: [a]Predictors: (Constant), KM

Table IV. Regression coefficient

Model	Unstandardized coefficients B	Unstandardized coefficients Std. error	Standardized coefficients Beta	*t*	Sig.
1					
(Constant)	1.376	0.144	–	9.571	0.000
KM	0.581	0.044	0.582	13.161	0.000

Table V. Regression model summary

R	R square	Adjusted r square	Std. error of the estimate	F	Sig.
0.585[a]	0.343	0.333	0.38127	34.908	0.000[a]

Notes: [a]Predictors: (constant), knowledge application, knowledge sharing, knowledge acquisition, knowledge storage and knowledge creation

Model	Unstandardized coefficients B	Unstandardized coefficients Std. error	Standardized coefficients Beta	*t*	Sig.
1					
(Constant)	1.329	0.149		8.941	0.000
Knowledge creation	0.089	0.039	0.133	2.295	0.022
Knowledge acquisition	0.132	0.040	0.176	3.338	0.001
Knowledge storage	0.088	0.038	0.128	2.303	0.022
Knowledge sharing	0.157	0.037	0.213	4.200	0.000
Knowledge application	0.128	0.035	0.180	3.700	0.000

Note: [a]Dependent variable: OI

Table VI.
Multiple regression test

between KM and the five dimensions of OI. The results of the main hypotheses were in line with the results of Kör and Maden (2013), Abdi and Senin (2015) and Barari, (2015). In their study, Kör and Maden (2013) showed that KM processes and OI significantly influence innovation types. In another study, Abdi and Senin (2015) revealed that KM is significantly effective on OI. Barari, (2015) in a survey, showed that all components of KM and OI are mutually correlated ($P < 0.01$).

According to the main hypothesis, the highest correlation was between KM and strategic innovation, with correlation coefficient of 0.661, and the lowest correlation was between KM and market innovation, with the correlation coefficient of 0.258. About the main hypothesis, we can say that KM is an important factor that is the cause of creating a suitable platform for organizational innovation in the institutions of higher education. The managers of the higher education institutions should pay attention and emphasize the cooperation with interdisciplinary teams, entrepreneurship and the spirit of cooperationa and participation. By using the institutionalization of KM in universities, managers have a coherent planning system to encourage innovation in their institutions. Therefore, they need to rely on superior knowledge, the adoption of more sensible strategic decisions on important issues and the improvement of knowledge-based practices.

According to the results of the sub-hypotheses (*H1*, *H2*, *H3*, *H4* and *H5*), there is a significant relationship between dimensions of KM, namely, knowledge creation, knowledge acquisition, knowledge storage, knowledge sharing and knowledge application, and OI. The results of the sub-hypotheses were in line with the conclusion of Swan *et al.* (2007), Seidler-de Alwis and Hartmann (2008) and Tavakoli (2016). Swan *et al.* (2007) concluded that there was a positive relationship between knowledge sharing and innovation projects.

Seidler-de Alwis and Hartmann (2008) demonstrated that organizations promoting processes of knowledge sharing were more successful in innovation. Tavakoli (2016) confirmed the relationship between all the components of KM and OI. According to the sub-hypotheses, the highest correlation is between knowledge creation and OI, with a correlation coefficient of 0.437, and the lowest correlation is between knowledge application and OI, with a correlation coefficient of 0.378. Regarding the results of the sub-hypotheses, we can say that higher educational institutions will use innovative approaches if they have an incentive to exchange members' minds and encourage them to create a network to share, know and discuss their ideas and present their required information transparently. To do so, members of the higher educational institutions should pay attention to cooperation with interdisciplinary teams, entrepreneurship and the spirit of cooperation and participation.

Finally, the outcomes of *H6* show that KM predicts the dimensions of OI. Furthermore, the outcomes of the multiple regression tests show that the five dimensions of KM predict OI in higher educational institutions. Moreover, knowledge sharing has the strongest effect on OI. We recommend the managers of higher educational institutions to make their knowledge available to employees to put up as a model. It becomes a culture and employees, too, share their knowledge with each other to facilitate exchanges (Hasani and Sheikhesmaeili, 2016).

Therefore, educational institutions need to create an atmosphere focusing on the explicit exchange of knowledge and innovation, so that their staff members have more tendency to exchange and apply their modern knowledge with one another. To increase the level of KM, it is suggested that educational institutions appreciate creative and new ideas than ever before. Independent research teams can be formed to transfer knowledge in the educational institutions.

Considering the results of this study, showing KM has a significant impact on OI in higher educational institutions, it is suggested that managers identify important and standard sources of knowledge and store them well. Managers in different sessions need to discuss with staff members to freely present their innovative ideas and organize them. They must create the organizational networks to share information and present a summary of the material being learned in a written and coherent form and keep a formal record of the obtained results in their educational institutions so that they always have an effective role in the advancement of organizational innovation.

Knowledge sharing is mainly one of the unidirectional methods of communication that does not suffice. In fact, one of the KM efforts is to create a central supplier that enables educators and faculty members to transmit the best practices, tips and teaching methods. According to the results of the present study, we can say that the concepts and KM tools have a special potential for the development of higher educational institutions. This study supported some guidelines to help managers and supervisors enhance KM and OI in higher educational institutions. Our practical suggestions are as follows.

This study illustrated the importance of the relationship between KM and OI. Innovation plays a significant role in enabling organizations and staff to create, use and apply knowledge to improve teaching in higher educational institutions. Also, it appears that managers' support for OI is crucial. Therefore, it is recommended that managers of higher educational institutions develop strategies to enhance KM to improve OI. In fact, using KM, managers can have a better understanding to increase OI and improve the knowledge and experience of the members of higher educational institutions.

As an overall conclusion for the present research, it should be stated that innovation should be sought at the heart of KM because stable competitive advantage is concealed in innovation. Consequently, educational institutions need to create an atmosphere focusing on the explicit exchange of knowledge and innovation so that their staff members have more tendency to exchange and apply their modern knowledge with one another. In other words, according to the results of the study, the main purpose of KM in educational institutions is to create and organize an environment in which individuals develop their knowledge, communicate with one another, combine their knowledge with others' and finally apply it. This use of knowledge results in organizational innovation.

References

Abdi, K. and Senin, A.A. (2015), "The impact of knowledge management on organizational innovation: an empirical study", *Asian Social Science*, Vol. 11 No. 23, pp. 153-168.

Adhikari, D.R. (2010), "Knowledge management in academic institutions", *International Journal of Educational Management*, Vol. 24 No. 2, pp. 94-104.

Alavi, M. and Tiwana, A. (2003), "Knowledge management: the information technology dimension", in Easterby-Smith, M. and Lyles, M.A. (Eds), *Organizational Learning and Knowledge Management*, Blackwell Publishing, London, pp. 104-121.

Albury, D. (2005), "Fostering innovation in public services", *Public Money and Management*, Vol. 25 No. 1, pp. 51-56.

Arciénaga Morales, A.A., Nielsen, J., Bacarini, H.A., Martinelli, S.I., Kofuji, S.T. and García Díaz, J.F. (2018), "Technology and innovation management in higher education–cases from latin america and Europe", *Administrative Sciences*, Vol. 8 No. 2, pp. 1-34.

Aryanto, R., Fontana, A. and Afiff, A.Z. (2015), "Strategic human resource management, innovation capability and performance: an empirical study in Indonesia software industry", *Procedia-Social and Behavioral Sciences*, Vol. 211, pp. 874-879.

Barari, R. (2015), "The effect role of knowledge management on organizational innovation in university of Iran", *International Journal of Educational and Psychological Researches*, Vol. 1 No. 2, pp. 87-95.

Beckman, T.J. (1999), "The current state of knowledge management", in Liebowitz, J. (Ed.), *Knowledge Management Handbook*, CRC Press, Boca Raton, FL.

Brennan, J., Broek, S., Durazzi, N., Kamphuis, B., Ranga, M. and Ryan, S. (2014), *Study on Innovation in Higher Education: Final Report*, European Commission Directorate for Education and Training Study on Innovation in Higher Education, Publications Office of the European Union, Luxembourg.

Bueno, E., Aragón, J.A., Salmador, M.P. and García, V.J. (2010), "Tangible slack versus intangible resources: the influence of technology slack and tacit knowledge on the capability of organisational learning to generate innovation and performance", *International Journal of Technology Management*, Vol. 49 No. 4, pp. 314-337.

Chen, C.J. and Huang, J.W. (2007), "How organizational climate and structure affect knowledge management – the social interaction perspective", *International Journal of Information Management*, Vol. 27 No. 2, pp. 104-118.

Cook, S.D.N. and Brown, J.S. (1999), "Bridging epistemologies: the generative dance between organizational knowledge and organizational knowing", *Organization Science*, Vol. 10 No. 4, pp. 381-400.

Davenport, T.H. (1994), "Saving its soul: Human centered information management", *Harvard Business Review*, Vol. 72 No. 2, pp. 119-131.

Dickel, D.G. and de Moura, G.L. (2016), "Organizational performance evaluation in intangible criteria: a model based on knowledge management and innovation management", *RAI Revista de Administração e Inovação*, Vol. 13 No. 3, pp. 211-220.

Delshab, V. and Sadeghi Boroujerdi, S. (2018), "Investigating the influence of unlearning on knowledge management in sport organizations", *Kybernetes*, Vol. 47 No. 10, pp. 2025-2040. No,

Demchig, B. (2014), "Knowledge management capability level assessment of the higher education institutions: Case study from Mongolia", *Procedia - Social and Behavioral Sciences*, Vol. 174, pp. 3633-3640. No. 12.

Dokhtesmati, M. and Bousari, R.G. (2013), "Knowledge sharing in iranian academic institutions: meta-analysis approach", *Procedia-Social and Behavioral Sciences*, Vol. 73, pp. 383-387.

Dubouloz, S. (2012), "Organizational innovation: clarifying the concept as output and as process and suggesting research avenues from these two angles of analysis", International Association of Strategic Management (AIMS) Conference, Lille.

Du Plessis, M. (2007), "The role of knowledge management in innovation", *Journal of Knowledge Management*, Vol. 11 No. 4, pp. 20-29.

Duhon, B. (1998), "It's all in our heads", *Inform*, Vol. 21 No. 8, pp. 8-14.

Eckel, P. (2002), "Decision rules used in academic program closure: where the rubber meets the road", *The Journal of Higher Education*, Vol. 73 No. 2, pp. 237-262.

Etzkowitz, H. (2014), "The entrepreneurial university wave: from ivory tower to global economic engine", *Industry and Higher Education*, Vol. 28 No. 4, pp. 223-232.

Evangelista, R. and Vezzani, A. (2010), "The economic impact of technological and organizational innovations: a firm-level analysis", *Research Policy*, Vol. 39 No. 10, pp. 1253-1263.

Furst-Bowe, J.A. and Bauer, R.A. (2007), "Application of the baldrige model for innovation in higher education", *New Directions for Higher Education*, Vol. 2007 No. 137, pp. 5-14.

Feiz, D., Dehghani Soltani, M. and Farsizadeh, H. (2017), "The effect of knowledge sharing on the psychological empowerment in higher education mediated by organizational memory", *Studiesin Higher Education*, Vol. 44 No. 1, pp. 1-17.

Gamble, P.R. and Blackwell, J. (2001), *Knowledge Management: A State of the Art Guide*, Kogan Page, London.

Gloet, M. and Terziovski, M. (2004), "Exploring the relationship between knowledge management practices and innovation performance", *Journal of Manufacturing Technology Management*, Vol. 15 No. 5, pp. 402-409.

Hasani, K. and Sheikhesmaeili, S. (2016), "Knowledge management and employee empowerment a study of higher education institutions", *Kybernetes*, Vol. 45 No. 2, pp. 337 -355.

Karimi, S., Chizari, M., Biemans, H.J. and Mulder, M. (2010), "Entrepreneurship education in iranian highereducation: the current state and challenges", *European Journal of Scientific Research*, Vol. 48 No No. 1, pp. 35-50.

Keat, K.K. and Lin, A. (2018), "The relationship between knowledge management and organizational performance of malaysian private colleges: a mediating role of managing talent practices", *Advances in Economics and Business*, Vol. 6 No. 2, pp. 81-89.

Kezar, A. (2000), *Higher Education Trends (1999-2000)*, Association for the Study of Higher Education, Washington, DC.

Keupp, M.M., Palmié, M. and Gassmann, O. (2012), "The strategic management of innovation: a systematic review and paths for future research", *International Journal of Management Reviews*, Vol. 14 No. 4, pp. 367-390.

Kim, L. and Nelson, R.R. (2000), *Technology, Learning and Innovation: Experiences of Newly Industrializing Economies*, Cambridge University Press, Cambridge.

King, W.R. (2009), "Knowledge management and organizational learning", in King, W.R. (Ed.), *Knowledge Management and Organizational Learning*, Springer, New York, NY, pp. 3-13.

Kidwell, J.J., Vander Linde, K.M. and Johnson, S.L. (2000), "Applying corporate knowledge management practices in higher education", *Educause Quarterly*, Vol. 4 No. 1, pp. 28-33.

Kör, B. and Maden, C. (2013), "The relationship between knowledge management and innovation in turkish service and high-tech firms", *International Journal of Business and Social Science*, Vol. 4 No. 4, pp. 293-304.

Koenig, M.E. (2012), "What is KM? knowledge management explained", KM World.

Liao, S.H. and Wu, C.C. (2010), "System perspective of knowledge management, organizational learning and organizational innovation", *Expert Systems with Applications*, Vol. 37 No. 2, pp. 1096-1103.

Li-Hua, R., Wilson, J., Aouad, G. and Li, X. (2011), "Strategic aspects of innovation and internationalization in higher education: the salford PMI2 experience", *Journal of Chinese Entrepreneurship*, Vol. 3 No. 1, pp. 8-23.

Lin, Y.Y. (2006), "An examination of the relationships between organizational learning culture, structure, organizational innovativeness and effectiveness: evidence from taiwanese organizations", Unpublished doctoral dissertation, University of Minnesota.

Lu, Y., Zhao, L.Sc. and Wang, B. (2010), "From virtual community members to c2c e-commerce buyers: trust in virtual communities and its effect on consumers' purchase intention", *Electronic Commerce Research & Applications*, Vol. 9 No. 4, pp. 346-360.

Massa, S. and Testa, S. (2009), "A knowledge management approach to organizational competitive advantage: evidence from the food sector", *European Management Journal*, Vol. 27 No. 2, pp. 129-141. No

Meek, L., Teichler, U., Kearney, M. L. (Eds) (2009), "Higher education research and innovation: changing dynamics", *Report on the UNESCO Forum on Higher Education, Research and Knowledge, 2001-2009*, INCHER-Kassel.

Meese, N. and McMahon, C. (2012), "Knowledge sharing for sustainable development in civil engineering: a systematic review", *AI and Society*, Vol. 27 No. 4, pp. 437-449.

Nonaka, I. (1994), "A dynamic theory of organizational knowledge creation", *Organization Science*, Vol. 5 No. 1, pp. 14-37.

OECD (2005), *The Measurement of Scientific and Technological Activities – Proposed Guidelines for Collecting and Interpreting Technological Innovation Data*, Oslo Manual, OECD, Paris.

Peng, J., Zhang, G., Fu, Z. and Tan, Y. (2011), "Exploring innovation in the context of employee relationship and IT-enabled knowledge sharing", *Workshop on E-Business*, Springer, Berlin, Heidelberg, pp. 22-36.

Rowley, J. (2000), "Is higher education ready for knowledge management?", *International Journal of Educational Management*, Vol. 14 No. 7, pp. 325-333.

Rogers, E.M. (1995), *Diffusion of Innovations*, 4th ed., The Free Press, New York, NY.

Sandhu, M.S., Jain, K.K. and Ahmad, I.U.K. (2011), "Knowledge sharing among public sector employees: evidence from Malaysia", *International Journal of Public Sector Management*, Vol. 24 No. 3, pp. 206-226.

Sallis, E. (2002), *Knowledge Management in Education*, 3rd ed., Kogan, London.

Seidler-de Alwis, R. and Hartmann, E. (2008), "The use of tacit knowledge within innovative companies: knowledge management in innovative enterprises", *Journal of Knowledge Management*, Vol. 12 No. 1, pp. 133-147.

Shani, A.B., Sena, J.A. and Olin, T. (2003), "Knowledge management and new product development: a study of two companies", *European Journal of Innovation Management*, Vol. 6 No. 3, pp. 137-149.

Swan, J., Bresnen, M., Newell, S. and Maxine, R. (2007), "The object of knowledge: the role of objects in biomedical innovation", *Human Relations*, Vol. 60 No. 12, pp. 1809-1837.

Tavakoli, M. (2016), "Experimental investigation of the relationship between knowledge management and organizational innovation and creativity in the district 5 of Tehran municipality", *Archives of Business Research*, Vol. 4 No. 6, pp. 112-121.

Ubon, A.N. and Kimble, C. (2002), "Knowledge management in online distance education", *Proceedings of the 3rd International Conference Networked Learning 2002, University of Sheffield*, March, pp. 465-473.

Van den Hooff, B. and de Ridder, J.A. (2004), "Knowledge sharing in context: the influence of organizational commitment, communication climate and CMC use on knowledge sharing", *Journal of Knowledge Management*, Vol. 8 No. 6, pp. 117 -130.

Vila, L.E., Perez, P.J. and Morillas, F.G. (2012), "Higher education and the development of competencies for innovation in the workplace", *Management Decision*, Vol. 50 No. 9, pp. 1634 -1648.

Vigoda-Gadot, E., Shoham, A., Ruvio, A. and Schwabsky, N. (2005), *Innovation in the Public Sector*, The University of Haifa and NIFU STEP, Oslo.

Yang, J. (2012), "Innovation capability and corporate growth: an empirical investigation in China", *Journal of Engineering and Technology Management*, Vol. 29 No. 1, pp. 34-46.

Zhao, K. and Chan, C.K.K. (2014), "Fostering collective and individual learning through knowledge building", *International Journal of Computer-Supported Collaborative Learning*, Vol. 9 No. 1, pp. 63-95.

Zhu, C. and Engels, N. (2014), "Organizational culture and instructional innovations in higher education: Perceptions and reactions of teachers and students", *Educational Management Administration &Leadership*, Vol. 42 No. 1, pp. 136-158. No

Further reading

Lu, H.K., Chang, K.C., Yan, M.J. and Lin, P.C. (2016), "Organizational innovation for continuing education in higher education in Taiwan: the case of the chinese culture university", *International Journal of Continuing Education and Lifelong Learning*, Vol. 8 No. 2, pp. 128-144.

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