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Promoting Organizational Innovation among Agricultural Extension Experts: The Role for Knowledge Management

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Abstract

Recently, innovation has become a very important issue, as it provides a strategic advantage for organizations to outperform competition and remain agile in the environment. Additionally, knowledge management is considered to be a strong support for innovation. However, few studies examine the role of human resource management in fostering knowledge capability which leads more innovation in the organizations. The purpose of this study was to examine the role of knowledge management components in organizational innovation among agricultural extension experts in Khuzestan Province. The statistical population of this study consisted of all agricultural extension experts in Khuzestan Province (N=328). Using Bartlett's et al. (2001) sampling table, 130 of them were selected as a sample using the proportionate stratified random sampling method (n=130). The instrument of gathering data was a questionnaire that validity was confirmed by the panel of experts and its reliability was established by Cronbach's Alpha coefficient (α>0.70). The results of multiple regression analysis revealed that knowledge management components (knowledge creation, knowledge acquisition, knowledge storage and knowledge sharing and application) had positive significant effect on organizational innovation among agricultural extension experts in Khuzestan Province. The results emphasize the importance of knowledge management components to the success of innovation process in agricultural extension system.

Keywords:
knowledge management, organizational innovation, agricultural extension, Khuzestan Province

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INTRODUCTION

In the fast changing business world of today, innovation has become the mainstay of every organization. Organizations have to ensure that their business strategies are innovative to build and sustain competitive advantage. Innovation has, however, become increasingly complex due to changing customer needs, extensive competitive pressure and rapid technological change (Cavusgil et al., 2003). The complexity of innovation has also been increased by growth in the amount of knowledge available to organizations as basis for innovation. Innovation is extremely dependent on the availability of knowledge and therefore the complexity created by the explosion of richness and reach of knowledge has to be identified and managed to ensure successful innovation (Darroch & McNaughton, 2002; Adams & Lamont, 2003; Shani et al., 2003). Knowledge management has become the key factor that determines organizations' capability to face the changing needs of customers, the pressure from competitors and the constant technological change (Scarbrough, 2003).

To enhance competitiveness, enterprises strive to create innovative knowledge approaches in order to enhance performance. Therefore, knowledge management capabilities and knowledge innovation have become important topics for improving business performances (Tsai- Mei et al., 2010). Knowledge management is not an objective itself; it is indeed, a means towards innovation generation (Nonaka & Takeuchi, 1995).

The current literature seems to agree that knowledge management can markedly improve innovation in organizations (e.g. Carneiro, 2000; Darroch, 2005; Basadur & Gelade, 2006; Kianto, 2011). However, the implications of this idea still remain very general (Chapman &Magnusson, 2006). What particular knowledge management issues should be prioritized by managers in order to improve innovation performance in their organizations? Existing literature does not provide a comprehensive answer to this question, and there are several reasons for that. First, most of the earlier studies have either addressed the impact of only one (e.g. Brachos et al., 2007; Deng et al., 2008; Taminiau et al., 2009) or two (e.g. Smith et al., 2005; Chou, 2005) particular knowledge management issues on innovation, or considered all of them in a bulk (e.g. Marque´s & Simo´n, 2006). There have been few previous studies empirically examining the impact of a full range of knowledge processes on innovation (Darroch, 2005; Darroch & McNaughton, 2003). Due to the fact that very little clarity exists in current literature (Plessis, 2007). Therefore, this article aims to clarify the role of knowledge management components in organizational innovation among agricultural extension experts in Khuzestan province.

Knowledge management

This is not a new concept or new thought. Human binges always have produced knowledge during his historical and social evolution and have used that to change the society (Khansari, 2005). Knowledge has been recognized as a valuable organizational resource from a strategic perspective and a foundation for competitive advantage in today's business environment (Erden et al., 2008). Knowledge management can be studied from different perspectives: conceptual, process, technological, organizational, management and implementation. In this sense knowledge management includes new elements which determine how a firm is managed. We do not understand knowledge management as a new management paradigm since it does not have a perfectly structured methodology or a prescriptive framework through which any type of organization can be managed (Palacios-Marqués & Garrigós-Simón, 2005). They define the content of the knowledge management construct through two dimensions: principles or practices. Principles refer to the aims that the organization tries to achieve. They refer to a higher level of research which is more abstract or related to ideas. A set of basic principles guides the organization. Principles are implemented through a set of practices which represent the activities and methods used to institute knowledge management. Practices refer to a more practical or perceptible level of research. From this dimension, knowledge management is understood as an organizational innovation which involves important changes in the introduction of strategy and in traditional management practices. Ac-

cording to the Adam and Mccreedy (1999) points of view the knowledge management, basically is a kind of activities which noticed to some strategies in order to manage the humanities mental capitals. Akram et al. (2011) believe knowledge management is an organizational process that aims to create centralize knowledge source within the organization that acquire, assimilate, distribute, integrate, share, retrieve and reuse the internal and external, explicit and tacit to bring innovation in the organization in the form of the product, people and organizational process.

Andreeva and Kianto (2011) know knowledge management process that encompasses knowledge creation, intra-organizational knowledge sharing and application, external knowledge acquisition, and knowledge storage and documentation. The following will be a brief presentation of these processes.

Knowledge creation

Knowledge creation refers to the organization's ability to develop new and useful ideas and solutions regarding various aspects of organizational activities, from products to technological processes to managerial practices (Nonaka, 1991). This notion appears to be very close to the one of innovation, and, indeed, these two terms are often used interchangeably. However, there is a subtle difference between them - while knowledge creation refers primarily to the process of development of new ideas, innovation is used in the literature to mean the successfully implemented (and commercialized) outcome of this process, to describe this process, or both (Andreeva and Kianto, 2011).

Intra-organizational knowledge sharing and application

Intra-organizational knowledge sharing refers to moving existing knowledge between different organizational actors, both within and between departments and hierarchical levels (Chou et al., 2014). Knowledge sharing helps the company use available resources in the most efficient way by transferring the best practices from one department to another, from one project or client to another, etc. (Yu et al., 2010).

External knowledge acquisition

The term 'acquisition' refers to a firm's capability to identify, acquire and accumulate knowledge (whether internal or external) that is essential to its operations (Gold et al., 2001; Zahra & George, 2002). Knowledge acquisition refers to the knowledge that is available outside the firm. Various external sources represent a very rich knowledge source, however, to be able to exploit it, organization needs to know how to identify what is interesting and useful in external environment, acquire this knowledge, disseminate it and apply it to commercial end (Zahra & George, 2002). Acquiring knowledge can involve several aspects including creation, sharing and dissemination.

Knowledge storage and documentation

All the knowledge that has been acquired created and shared needs to be supported by knowledge storage and documentation; otherwise an organization is constantly in danger of accidentally losing the gained knowledge (e.g. Stein & Swass, 1995). Hence, knowledge needs to be stored in an organization's database for subsequent use by employees in different departments (Storey & Kelly, 2002). Knowledge storage is similar to organizational memory, in which it enables an individual to store, integrate, and reuse the information again in future (Lai et al., 2011). Therefore, refined and stored knowledge enables an employee to retrieve and disseminate knowledge conveniently, proving it to be a valuable element for the organization (Gold et al., 2001).

Organizational innovation

Innovation is defined in many different ways in the literature. According to Chen et al. (2004) innovation refers to the introduction of a new combination of the essential factors of production into the production system. Harkama (2003) stated that foremost and basic purpose of innovation is to produce new knowledge which can develop and find out the doable solutions for society. Innovation is a practice and process which capture, acquire, manage and diffuse knowledge with aim to create new knowledge which will support to produce and deliver distinctive and idiosyncratic kind of products and

services (Gloet & Terziovski, 2004).

Steiber (2012) defines organizational innovation as an organizational method in working practices, organizing work environment and external relations which are new for organization, and tends to improve organizational performance. Nevertheless, there is no universally agreed definition of organizational innovation. However, organizational innovation has been defined as the application of ideas that are new to the company, to create added value either directly for the company or indirectly for its customers, whether the newness and added value are embodied in products, processes, services, or in work organization, management or marketing systems (Hernández- Mogollon et al., 2010; Weerawardena, 2003). Camisón and Villar-López (2012) defined organizational innovation as the implementation of a new organizational method in a firm's business practices, workplace organization, or external relationships. Therefore, organizational innovation can take the form of a new service or product, a new structure, a new production process, or a new administrative system (Bilgihan et al., 2011; Gebauer et al., 2011). This implies that organizational innovation is a social process leads to major changes in the organization and may be operationalized as a three multidimensional concept into Product Innovation (PI), Administrative Innovation (AI), and Process Innovation (PCI) (Kising'u et al., 2016).

In their research Koch and Hauknes (2005) described product innovation as focusing on the features and design of products and services and argued that process innovation refers to the development of policies, procedures, and organizational forms. Administrative innovation includes the development and implementation of the organization's activities, such as organizational structure, administrative processes, and changes in the social system that consists of organizational members and relationships among them (Walker, 2007). Hamel (2006) perceived innovation as encompassing process innovation such as customer services, and logistics, and management innovation such as strategic planning, project management and employee assessment. It has been suggested that process innovation could determine an organization's success or failure (Liao et al., 2008).

Empirical study and hypotheses

Akram et al. (2011) found that different components of knowledge management as knowledge activities, knowledge types, transformation of knowledge and technology have a significant and positive effect in bringing innovation through transformation of knowledge into knowledge assets in organizations. Parlby and Taylor (2000) asserted that the foremost purpose of knowledge management is to bring innovation. Hall and Andriani (2003) studied managing knowledge associated with inter-organizational innovation, and identified knowledge gaps in innovative firms. In another way, Jang et al. (2002), in their study of process innovation at the Samsung Company, described the relationship between the knowledge produced during process innovation activities and the organizational knowledge management. All these studies have provided abundant information on the relationship between knowledge management concepts and innovative concepts. Inkinen (2016) followed a systematic review procedure and found that utilization of knowledge management practices is significant driver for innovation. Abou-zeid and Cheng (2004) theoretically propose that some types of innovations would be supported more by knowledge creation processes, while other types of innovations would be supported by knowledge utilization processes. Smith et al. (2005) found that knowledge creation capability of a firm fully mediates the relationship between the potential for intra-firm knowledge sharing and number of innovations in a firm. The results of Andreeva and Kianto (2011)'s study showed that while all knowledge processes have a beneficial impact on innovation, knowledge creation impacts innovation the most and fully mediates the impact of knowledge documentation, intra-organizational knowledge sharing and external knowledge acquisition on innovation performance. Kamasak and Bulutlar (2010) indicated that knowledge sharing positively influences innovations in organizations. Saenz et al. (2012) indicate that employee's willingness to both donate and collect knowledge enables the firm to improve innovation capability. According to Cavusgil et al. (2003), the strength of inter-firm relationships influences the extent of tacit knowl-

Table 1
Number of Items and Cronbach's Alpha Coefficient

Constructs	Number of items	Cronbach's Alpha
1- Organizational innovation	21	0.92
- Product innovation	7	0.72
- Administrative innovation	7	0.84
- Process innovation	7	0.89
2- Knowledge management	15	0.90
- Knowledge creation	4	0.88
- Knowledge sharing and application	4	0.78
- Knowledge acquisition	3	0.79
- Knowledge storage	4	0.72

edge transfer and the tacit knowledge obtained from partner firms affects a firm's innovation capability. According to Gunsel et al. (2015), the organizational knowledge (i.e. the amounts of knowledge that an organization possesses and continually acquires) influences the innovation process. Chang and Lee (2007) examined the effect of knowledge accumulation capability on organization innovation. Knowledge storage was found to assist these organizations in the transmission of knowledge, where employees in the organizations were able to obtain the knowledge when and as they need it, resulting in time and cost saving. Through the integration of knowledge, the firms were able to perform better in terms of administrative and technical innovations. Organizational knowledge is translated into a core organizational capability for the organizations that are able to use effectively what they know in order to act before their competitors by constructing and managing an innovation portfolio which is hardly possible for competitors to imitate (Gunsel et al., 2015). Therefore, based on above empirical study the following hypotheses are shaped:

H1: There is a significant and positive relationship between knowledge creation and organizational innovation.

H2: There is a significant and positive relationship between knowledge sharing and application and organizational innovation.

H3: There is a significant and positive relationship between knowledge acquisition and organizational innovation.

H4: There is a significant and positive relationship between knowledge storage and organizational innovation.

METHODOLOGY

Research type and design

This study was quantitative in nature and applied in purpose, which was carried out using descriptive- correlational research design.

Sample

The statistical population of this study consisted of all agricultural extension experts in Jihad-e-agriculture management and centers of agricultural services in Khuzestan Province (N=328). Using Bartlett's et al. (2001) sampling table, 130 of them were selected as the sample using the proportionate stratified random sampling method (n=130).

Instrument

The instrument of this research was a standard questionnaire, which consisted of three parts: (a) personal and professional characteristics of the agricultural extension experts; (b) knowledge management; and (c) organizational innovation. In the second part, the knowledge management (KM) measures were adapted from Andreeva and Kianto (2011). Their measurement scales for KM are operationalized with four components: knowledge creation (4 items), knowledge sharing and application (4 items), knowledge acquisition (3 items) and knowledge storage (4 items), uses 15 items. In the third part, the organizational innovation (OI) measures were adapted from Kising'u et al. (2016). Their measurement scales for OI are operationalized with three components: product innovation (7 items), administrative innovation (7), and process innovation (7 items), uses 21 items. The statements of questionnaire

were each rated by respondents using a five-point Likert scale (from 1=entirely agree, to 5=entirely disagree). The validity of questionnaire was confirmed by the panel of experts (faculty members in Department of Agricultural Extension and Education at Ramin Agriculture and Natural Resources University, Khuzestan Province, Iran) and its reliability was established by Cronbach's Alpha coefficient (Table 1).

Data analysis

Data was analyzed by SPSSwin$_{23}$ software in two parts of descriptive (frequency, percentage, mean, minimum, maximum and standard deviation) and inferential (correlation analysis and multiple regression analysis) statistics.

RESULTS

The mean age of respondents was 38.59 years (SD=9.24) and their work experience mean was 14.48 years (SD= 9.53). The majority of the agricultural extension experts were male (73.8%) and 34 of them (26.2%) were female. The majority of respondents are married (64.6%) and 46 of them (35.4%) were single. The educational level of the majority of the agricultural extension experts were B.Sc. (87.7%), and 15 of them were M.Sc. (11.6%). The majority of respondents had graduated with an agricultural major (74.6%) and 33 of them (25.4%) had graduated from other majors.

Pearson correlation coefficient was used to investigating the relationship between KM components and OI among agricultural extension experts in Khuzestan Province (Table 2).

The results in Table 2 reveal that KM components, namely knowledge creation, knowledge sharing and application, knowledge acquisition and knowledge storage have positive and significant correlation with OI among agricultural

Table 2
Mean, SD and Correlation Matrix of Constructs

Constructs	Mean [a]	SD	1	2	3	4	5
1- Organizational innovation	3.05	0.72	1				
2- Knowledge creation	2.81	0.99	0.85**	1			
3- Knowledge sharing and application	3.08	0.86	0.69**	0.64**	1		
4- Knowledge acquisition	3.03	1.03	0.75**	0.58**	0.28**	1	
5- Knowledge storage	2.86	0.89	0.81**	0.74**	0.56**	0.53**	1

** p<0.01
The mean of 5 (1=entirely agree, to 5=entirely disagree)

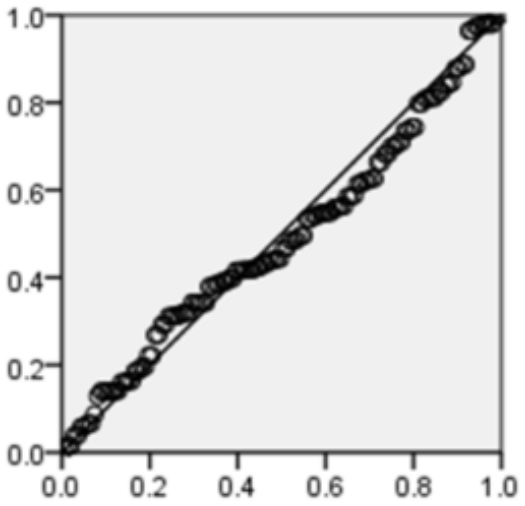

Figure 1. Normal plot of the standardized residual

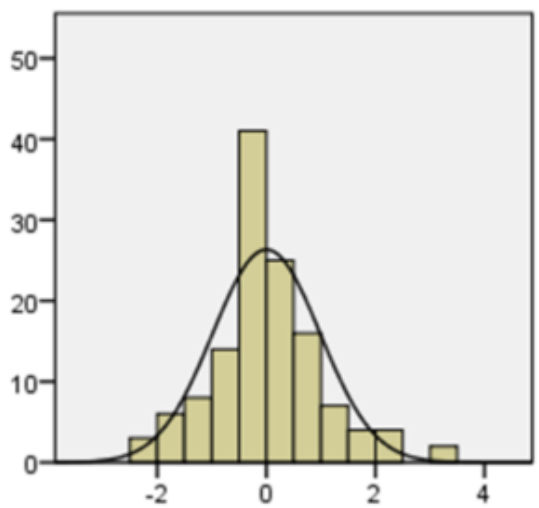

Figure 2. Normal distribution histogram of the standardized residual

Table 3
Regression Model Summary

Model	R	R^2	Adjusted R^2	Std. Error	F	p-value
1	0.95	0.90	0.90	0.22	299.92**	0.000

** p<0.01

Table 4
Coefficients of Regression Model

Model	Unstandardized Coefficients		Standardized Coefficients	t	p-value	Co-linearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
Constant	0.42	0.09	-	4.94**	0.000	-	-
Knowledge Creation (X_1)	0.20	0.03	0.27	5.72**	0.000	0.34	2.98
Knowledge sharing and application (X_2)	0.22	0.03	0.26	7.07**	0.000	0.56 0.63	2.78 1.60
Knowledge acquisition (X_3)	0.26	0.02	0.38	10.84**	0.000	0.42	2.37
Knowledge Storage (X_4)	0.22	0.03	0.27	6.28**	0.000		

** p<0.01

extension experts in Khuzestan Province. In other words, it can be stated that the increase or decrease in the amount of KM components among agricultural extension experts in Khuzestan Province the amount of OI among them also increase or decrease.

Enter multiple linear regression method used to model the linear relationship between a dependent variable and independent variables (Dong et al., 2008). In an ideal model, independent variables should not be related among themselves, commonly known as the problem of multi co-linearity, as indicated by their respective values of variance inflation factor (VIF), being above 10 (Hasheminasab et al., 2014). VIF and tolerance index showed that there was not multi co-linearity among variables and the coefficients determined by this model probably are the best values (Table 4).

The residual from the regression model were plotted to demonstrate assumption violations (Hasheminasab et al., 2014). Normal plot and normal distribution histogram of the standardized residuals are shown in Figure 1 and 2. The normal plot of the residuals in Figure 1 had a straight-line appearance. Also histogram with normal overlay of the distribution of the residuals showed that the measurement errors in the dependent variable (OI) were normally distributed (Figure 2). These results indicated goodness of the model for predicting OI using selected variables.

As a second step, determination coefficient (R^2) was used to determining the effects of KM components as independent variables on OI as dependent variable by fitting a linear equation to the observed data (Table 3).

The statistical model developed by enter multiple regressing explained 90% ($R^2 = 0.90$) of the total variation within the OI while the remaining 10% probably be due to residual effects. Analysis of variance (ANOVA) for this model was shown in Table 3. When all measured variables were present in the prediction model by enter multiple regression, ANOVA showed that the model was high significant ($F= 299.92$, $P<0.01$).

T-test and standardized coefficients (β) calculated for all variables separately (Table 4). The results in Table 3 revealed that all KM components significantly contributed to the model at the 1% of probability; so, it can be said that all KM components were important to be presented in modeling of OI. Therefore, all hypotheses ($H1$-H_4) were confirmed. Accordingly, the predicting model equation for OI was formulated by using KM components as follow:

$$OI = 0.42 + 0.20_{X1} + 0.22_{X2} + 0.26_{X3} + 0.22_{X4}$$

Furthermore, to determine the relative importance of independent variables, standardized coefficients (βeta) were considered. This statistics shows the effect of each independent variable separately from the effects of other independent variables on the dependent variable (Shiri et al., 2013). Accordingly, the most influential independent variable on the dependent variable (OI), was the knowledge acquisition variable with β= 0.38. This means that a unit change of standard deviation of the knowledge acquisition variable, explains 0.38 of unit change in standard deviation of the OI. Other important variables influenced the dependent variable were: the Knowledge storage with β=0.27, the knowledge creation with β=0.27 and the Knowledge sharing and application with β= 0.26.

CONCLUSION AND RECOMMENDATIONS

In the present knowledge era organizations emphasize on human capital as a tool to achieve sustainability and competitive privileges by making use of KM. The directors of organizations should steadily encourage their personnel to innovation. They should try to motivate them in increasing the effective implication of KM in the organization. In this regard, the aim of this study was to clarify the role of knowledge management components in organizational innovation among agricultural extension experts in Khuzestan Province.

The results of study explored the effect of knowledge management components on the organizational innovation among agricultural extension experts in Khuzestan Province. Because a significant and positive relationship was found, the knowledge management framework can be used to address factors that stimulate or inhibit organizational innovation among agricultural extension experts in Khuzestan Province. The findings of this study are consistent with the previous studies that established a significant and positive effect of knowledge management components on the organizational innovation (Jang et al., 2002; Akram et al., 2011; Andreeva & Kianto, 2011; Inkine, 2016). In summary, knowledge management creates a culture within which the value of knowledge and application thereof is identified and communicated. Such a culture encourages knowledge based processes and programs, such as innovation. A knowledge management culture also creates behavioral change towards creation, sharing, Knowledge acquisition and storage of knowledge, e.g. through performance measurement. Knowledge management creates a culture conducive to innovation and creativity in organizations.

In general, based on this article, it is clear that knowledge management components play a significant role in organizational innovation among agricultural extension experts in Khuzestan Province. Knowledge management is enhanced by a culture where the role of knowledge, knowledge management, innovation and creative thinking is encouraged. Most knowledge management programs have a strong knowledge culture element through which an organizational culture of knowledge generation and sharing is emphasized. This benefits innovation programs as it provides knowledge as resource, but it also provides a culture within which innovation, creativity and learning through mistakes are encouraged and valued.

This study also leads to some practical and theoretical implications. Its results demonstrate the important role of knowledge management processes for innovation. For the practicing managers intending to increase the rate of innovation in their organizations, this means that knowledge management is an important activity to master. The managerial lesson from the findings presented above is that, if priorities are to be set, enabling and maintaining knowledge creation process should be the first issue to invest in. In its turn, knowledge creation can be promoted by supporting intra- organizational knowledge sharing and application, external knowledge acquisition, and knowledge storage and documentation.

This study has addressed gaps in previous research on knowledge management processes and innovations, yet the interpretations proposed are still subject to certain limitations. Further research is required, however, on the potential role of knowledge management in innovation and how the value of knowledge man-

agement can be maximized to ensure a more efficient and effective innovation process. This study was based on a dataset from Khuzestan Province. This means that there were big contextual differences between the observations in the data collected. While it was found that there were no major systematic differences between the different provinces in the analyzed dataset, the cross- province differences in knowledge-based innovation processes still present a topical research problem. The more specific examination of the province differences in knowledge management should be conducted in further studies, with large datasets from different province in Iran. Larger datasets would also allow testing the proposed comprehensive model with structural equation modeling technique that could allow examining simultaneous interaction among all of the variables in the model. Indeed, findings of this study suggest that mediation and moderation analysis are fruitful avenues for further research that may lead to a better understanding of such complex phenomena as knowledge processes and innovation.

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