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EXPLAINING THE RELATIONSHIP BETWEEN KNOWLEDGE MANAGEMENT ASPECTS AND EMPLOYEE INNOVATION OF ISFAHAN MOBARAKEH STEEL COMPANY

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ABSTRACT

This study was conducted as case study in Isfahan Mobarakeh Steel Company in order to determine the relationship between knowledge management aspects and innovation in organization. The study statistical population consisted of 280 employees of Isfahan Mobarakeh Steel Company that 162 subjects were selected as statistic sample based on Morgan and Krejcie tables. Required information has been collected by the questionnaire that is based on the conceptual model adapted from Pang Lu Liu and *et al.*, model (2009). The validity of the questionnaire was conducted by the approval of relevant professors and reliability of the questionnaire was assessed by Cronbach's alpha that was 0.85. Kolmogorov-Smirnov test, Pearson correlation and regression test were used for data analysis. Study result confirmed that there is positive and significant relationship between knowledge creation, knowledge storage, knowledge distribution and knowledge application components and innovation and the main hypothesis of the present study was confirmed based on the relationship between knowledge management and employee innovation. Components of knowledge application and knowledge distribution explained effectively employees' innovation.

Keywords: Knowledge Management, Innovation, Knowledge Application, Knowledge Distribution

INTRODUCTION

Creativity and generating new ideas and thoughts by managers and organizational employees is very important and has reserved high position for itself in organization. Today, organizations are successful and can survive in competitive worlds that make constantly new ideas functional in their organization. This is possible by creative directors and employees, but does company create needed conditions and environment? Are they familiar with appropriate levers for optimizing innovation success? Today country's organizations are compelled to compete with other organizations within and outside the country, like other international organizations so that they can stay in business environment. Hence they must be superior compared to competitors at least in one area and have an advantage so that convince their clients. In other words, they have no choice but to be innovative (Beyhat, 2001).

Knowledge management is the practice of identifying, seizing, organizing and processing information to create knowledge, that will be distributed and then will be available to others so that to be used for more knowledge creation (Rading, 2004). Today organizations consider knowledge as the most valuable and strategic resource and they are sure that in order to remain competitive and improved organizational performance they must manage their intellectual resources and capabilities (Ghelich, 2009). So all organizations have associated most of their organizational processes with simple and basic knowledge management activities, regardless of their size. So, if we want to find major and important factor for the success of any enterprise in applying knowledge management in order to make a competitive advantage, we will pay attention undoubtedly to people who work at organization (Asadzadeh and Jalaliyan, 2007). Management role has been emphasized as a key lever in innovation creation and the relevant aspects of tacit knowledge and innovation management will be examined and explained with the aim of creative success, while citing on researches done in this area. On this basis, this study reviews the literature on

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knowledge management and innovation in organizations, and then the relationship between knowledge management and innovation in organizations will be examined.

Literature

Knowledge Management

Different definitions of knowledge management have been presented. Knowledge management observes the set of processes during which knowledge is directed continuously and increasingly (Santos and Dirgan, 2001).

Knowledge management is identification process of intelligent asset and establishing a culture and information infrastructures that encourage participation and learning, this process seeks to make smart investments by acquiring, growing and using all of the things that people know. This capital in today knowledge- oriented organizations is a common language that uses ideas, concepts and new information and creates "collective knowledge" and creates added value by transferring it into new products and services. The key point in knowledge management is to define and extract knowledge essence from information deep sea. Note that the values can be both material and non-material; knowledge management is recognized as the art of creating value from intelligent assets (Belinger, 2004). This issue searches an opportunity to increase the quality of decisions, services and products through increasing knowledge and value and providing flexibility by adding intelligent search and by certification of intelligent capital identify critical operations and potential difficulties that divert knowledge flow from path.

Thus manpower enables organizations to cope with situations and effective prediction of future (Seveidy, 2001). In organizations that are administered in traditional form, knowledge flows up down over the organizational lines. In this case, knowledge is rarely available at the right time and place. But in knowledge-based organizations that implement knowledge management, knowledge is current all over the organization. Everyone can use it according to his needs in a more appropriate time in order to perform tasks. For further clarification of this issue, we can consider knowledge management cycle (Karimi, 2006).

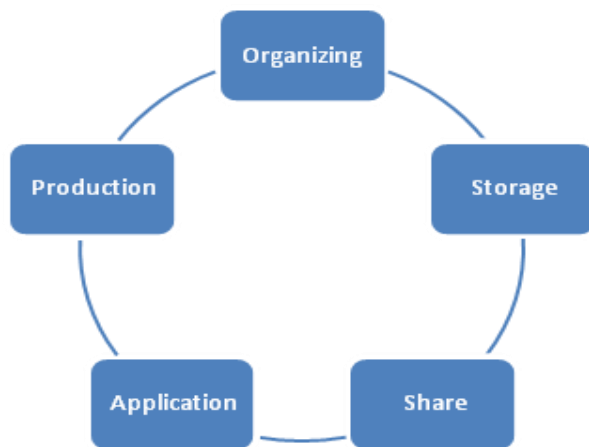


Figure 1: Knowledge management cycle diagram (Karimi, 2006)

Daqfos (2003): Knowledge management is the combination of governance, control, creativity, coding, dissemination processes and applying knowledge power in organization and its main purpose is to ensure that needy person acquires his necessary knowledge at the right time to, so the ability to make decisions timely and appropriately is provided for him.

Gutcho (1999): knowledge management is an interdisciplinary business model with all aspects of knowledge such as creation, encryption, sharing knowledge, and investigating how these activities enhance learning and innovation.

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Afrazeh (2004): Knowledge Management is a business discovery process, development and creation, sharing, maintaining, evaluating and applying the right knowledge at the right time by the right person in the organization. That is accomplished through linking between human resources, information technology and communication and creating an appropriate structure to achieve organizational goals.

Knowledge Management Process

When organizations need to be creative, innovative and successful development, necessary knowledge must be available to them (knowledge detection). After identifying the knowledge, the next step is to create or acquire knowledge. Knowledge creation refers to the ability of organizations to create new and useful ideas and solutions. Knowledge creation is an important process in which motivation, empathy, experience and luck play an important role. The third step is to share the generated knowledge. It is necessary that knowledge to be shared within the organization prior operation in organizational levels. If the generated knowledge is not provided for other organization individuals and groups, declining generated knowledge will be out of organization's innovation path.

Knowledge Management Models

Many models have been suggested on knowledge management that has different processes. "Kakabads *et al.*," mention four models as follows (Kaviani and Niazi, 2007).

Network Models

In this type of models, the focus is on communications, business, decision and transfer through the exchange of horizontal information. Important knowledge lies in a network including individuals who come together with different tools and awareness of these insights and information out of formal groups and teams is a key factor. In this view, creating social relations, social capital and respect to reciprocity, as the main activity of knowledge is taken into consideration.

Cognitive Models

Knowledge is as an organizational asset that requires careful acquisition, expression, storage, measurement, maintaining and controlled distribution. Creating value is done through successive application of best methods and avoiding obscure, traced errors and benefiting from learned lessons. This view focuses on re-use, reproduce, standardization and removal of the old methods that have lost their effectiveness.

Communication and Associative Models

These models discuss on working groups features that must have capabilities like self-organization, continuous learning and informal exchanges. Knowledge will develop in an idea that flows in a community, where there is a common language, trust allows operation of revelations, latent arrays may planned creatively and major signs and working solutions are released by explaining working stories.

Philosophical Models

In these models, markets and internal processes are considered based on two-way conversation in a strategic context, questions about the exploration assumptions on competitors' behavior. This view prefers personalization over coding and uses quantity technology. Also, major cultural stimuli of this work are to maintain open communication (interlocution), encouragement, reflection of comments, creative exploration and proving belief and opinion.

Innovation

Drucker says that business has only two main tasks and emphasizes these two, including: marketing and innovation. Completion of these tasks leads to the conclusion and conclusion leads to added value and other activities are costly (Ahanchi, 2007).

Innovation is a process that provides new products and services, added value, and a degree of novelty to the organization, suppliers and customers through developing new business methods, creating strategies, solutions (Mcfadzean *et al.*, 2005). Innovation is the process of taking a creative idea and turning it into a product, services and new methods of operation. Innovation creates talent and ability to change or adaptation (Abdul, 2006).

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Principles of Innovation

Managers must note that creating an innovative environment requires true understanding of principles including:

1. Cost: organizations are often forced to innovate and one way is to pay attention to costs. It is necessary that all people of organization remember that, it is a routine trying and this leads itself to innovation.
2. Quality: If everyone in the organization from top management to lower level employees talk and act in world-class, individuals will become innovative and will improve products and services continuously.
3. Efficiency: Innovation does not only mean good ideas which occasionally occur, it means that what is needed for efficiency is considered constantly.
4. Relevance: companies must know what is relevant to their business and markets in which they operate and what is irrelevant. Innovation is worthwhile when it is utilized.
5. Awareness of market: Innovation depends on identifying market gaps and this means that companies need to be aware of market opportunities.
6. Competition: Many companies involved in the production forget that they compete and their income depends on being better and innovative compared to competitors. People mentality must be so that this that if there is no morality, they might lose their jobs (Barden, 2008).

Types of innovation from Organizational Perspective

Fundamental Innovation: This fundamental innovation leads to creation of new markets.

Performance Development Innovation: When innovation occurs in a product, companies try to increase use of new product.

Technology recreation innovation: Technology recreation needs importing materials and equipment from other areas of industry in order to produce new product.

Naming and labels promoting innovation: innovation in product labels tends to buy a particular product.

Innovation Process: Innovation in the production process makes the company an advantage over competitors including: speed up of production process and increased flexibility of production from one product to another.

Innovation in Design: One of the important problems in designing is flexibility, this means that goods have adjustment capabilities according to market conditions and consumer preferences change.

Innovation in revised formulation: revised formulations include changes in the structure of current product with no changes in its components.

Innovation in services: Studies show that the cost of attracting a customer is seven times the cost of maintaining it, so innovation in services is one of the most important issues in competition.

Innovation in packaging: changes in packaging typically changes purchasing or the way of using it in a time period and opening up new markets for the goods (Hadizade and Rahimi, 2005).

Factors Affecting Innovation

Organizational structure, culture variables and human resources ability in innovation are the most important influencing factors, including (Eshaqi, 2008):

Organizational Structure

We can express three statements based on extensive researches and according to the structural variables. Firstly, organizational structures have a positive effect on innovation, because their expertise is low, they have fewer rules and their decentralization is more than mechanical structures. They increase flexibility, adaptability and fertilization that make easier the adoption of innovations.

Secondly, easy access to abundant resources is the key factor of innovation. Abundance of resources enables administrators to spend for innovation and accept failures. Finally, the relationship between units and acceleration in interaction of organizational lines helps to break down barriers to innovation.

Organizational Culture

Innovative organizations have similar cultures. They encourage to experience, they reward to successes and failures and gain experience from mistakes. An innovation culture has seven features including

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acceptance of ambiguity, tolerance in impractical issues, low external control, patience in problems, Patience in collisions, emphasis on results rather than on equipment and emphasis on open systems.

3. Human resources variables

In the context of human resources, we understand that innovative organizations are actively and up to date involved in education and development of members' knowledge. They provide job security for their employees at higher levels in order to reduce fear of deportation for mistakes and dare people to be open to changes.

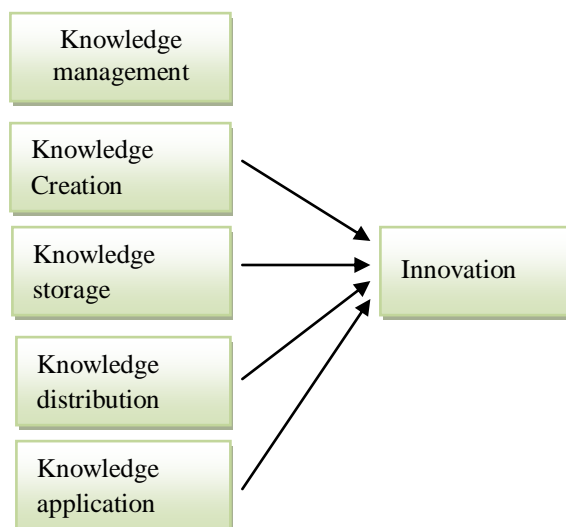


Figure 2: Conceptual model

Research Hypotheses

The Main Hypothesis:

There is relationship between knowledge management and employee innovation components of Isfahan Mobarakeh Steel Company.

Sub-Hypotheses:

1. There is relationship between knowledge creation and employee innovation of Isfahan Mobarakeh Steel Company.
2. There is relationship between knowledge storage and employee innovation of Isfahan Mobarakeh Steel Company.
3. There is relationship between knowledge distribution and employee innovation of Isfahan Mobarakeh Steel Company.
4. There is relationship between knowledge application and employee innovation of Isfahan Mobarakeh Steel Company.

MATERIALS AND METHODS

Methods

The study method is descriptive as well as correlation in terms of the relationship between variables. Since the results of this study can be used practically, this research is applied in terms of aim. Data is collected at a specific time, so it is cross-sectional study in terms of data collection time.

The statistical population included 280 employees of Isfahan Mobarakeh Steel Company that 162 subjects were selected as sample by Morgan and Krejcie tables. A questionnaire with 39 questions was used to collect data that items 1 to 8 measured Knowledge Creation component, items 9 to 18 measured knowledge storage component, items 18 to 26 measured knowledge transfer component, items 27 to 31 measured knowledge application component and items 32 to 39 measured innovation component. The

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reliability of questionnaire was obtained 0.85 using Cronbach's alpha that represented internal stability and homology of questionnaire.

Data Analysis

Studying the Data Distribution Normality

One of the basic pre- assumptions for selecting appropriate method for data analysis and selecting appropriate statistical test is to study data normality that was evaluated using Kolmogorov-Smirnov test in this study and results are given in the below table.

Table1: Kolmogorov-Smirnov test.

Variable name	significance number(sig)	Statistics(z)
Knowledge Creation	0.38	0.91
Knowledge storage	0.55	0.80
Knowledge distribution	1.88	1.08
Knowledge application	0.22	1.04
Innovation	0.38	0.91

Table 1 shows that due to the obtained significance level in each test, normal distribution of data normality is not rejected. So given that significance level of independent and dependent variables components is higher than 0.05, data are normal and Pearson correlation method can be used for hypotheses significance.

The first sub-hypothesis: There is relationship between knowledge creation and employee innovation of Isfahan Mobarakeh Steel Company.

Table 2: Correlation test between knowledge creation and innovation variables

Variable	Knowledge application
	Pearson correlation
Innovation	0.496
	Significance
	0.000
	Number
	162

Test results show that there is significant and positive relationship between knowledge creation and innovation variables. Pearson correlation coefficient equals to 0.496 and is significant at level of 0.01. Thus, we can conclude that knowledge creation effects significantly on innovation of Company. So, the first sub-hypothesis is confirmed.

The second sub-hypothesis: There is relationship between knowledge storage and employee innovation of Isfahan Mobarakeh Steel Company.

Table 3: Correlation test between knowledge storage and innovation variables

Variable	Knowledge storage
	Pearson correlation
Innovation	0.780
	Significance
	0.000
	Number
	162

Test results show that there is significant and positive relationship between knowledge storage and innovation variables. Pearson correlation coefficient equals to 0.780 and is significant at level of 0.01. Thus, we can conclude that knowledge storage effects significantly on innovation of Company. So, the second sub-hypothesis is confirmed.

The third sub-hypothesis: There is relationship between knowledge distribution and employee innovation of Isfahan Mobarakeh Steel Company.

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Table 4: Correlation test between knowledge distribution and innovation variables

Variable		Knowledge distribution
Innovation	Pearson correlation	0.730
	Significance	0.000
	Number	162

Test results show that there is high correlation between knowledge distribution and innovation variables. Pearson correlation coefficient equals to 0.730 and is significant at level of 0.01. Thus, we can conclude that knowledge distribution effects significantly on innovation of Company. So, the third sub-hypothesis is confirmed.

The forth sub-hypothesis: There is relationship between knowledge application and employee innovation of Isfahan Mobarakeh Steel Company.

Table 5: Correlation test between knowledge distribution and innovation variables

Variable		Knowledge application
Innovation	Pearson correlation	0.809
	Significance	0.000
	Number	162

Test results show that there is high and positive correlation between knowledge application and innovation variables. Pearson correlation coefficient equals to 0.809 and is significant at level of 0.01. Thus, we can conclude that knowledge application effects significantly on innovation of Company. So, the forth sub-hypothesis is confirmed.

There is relationship between knowledge management and employee innovation components of Isfahan Mobarakeh Steel Company.

Results of table 6 show that the relationship between knowledge management and employee innovation variables at significance level of (Sig=0.000) is 0.572. We can analyze that the correlation between two variables is 0.57. So, the main hypothesis is confirmed.

Table 6: Correlation coefficient between knowledge management and employee innovation

Variable		Innovation
knowledge management	Pearson correlation	0.572
	Significance	0.000
	Number	162

Table 7: Correlation matrix between knowledge management and employee innovation

	Innovation	Knowledge Creation	Knowledge storage	Knowledge distribution	Knowledge application
Innovation	1				
Knowledge Creation	**0.35	1			
Knowledge storage	**0.24	**0.55	1		
Knowledge distribution	**0.38	0.63	**0.56	1	
Knowledge application	*0.23	0.51	**0.43	**0.65	1

* $p < 0.05$ ** $p < 0.01$

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As it can be observed from the above table, the correlation is statistically significant between knowledge management and employee innovation ($p < 0.05$). (Table 8)

Table 8: variance analysis test for model significance

	Sum of squares(ss)	Degrees of freedom(df)	Mean square(MS)	F
Regression	7627.89	1	7627.89	** 34.92
Remainder	40415.21	185	218.46	
Regression	8889.77	2	4444.89	** 20.89
Remainder	39153.33	184	212.79	

** $p < 0.01$

As it can be seen in the above table, obtained F values in each three steps are significant ($P < 0.05$ and $\text{sig} = 0.000$ is less than 0.05); Thus, we can conclude with 0.99 confidence that the relationship between knowledge management and employee innovation is statistically significant and predictive variables (Knowledge management components) can predict criterion variable (innovation); therefore, we are entitled to Regression Analysis. Stepwise regression model has been used to determine the best predictor of innovation among predictor variables.

Table 9: Results of stepwise regression

		Beta	SEB	B	R ²
Step 1	Constant amount	0.16	3.9	31.95	-
	Knowledge application	0.398	0.3	1.79	-
Step 2	Constant amount	0.19	4.15	27.32	0.03
	Knowledge application	0.26	0.39	1.17	-
	Knowledge distribution	0.213	0.19	0.47	-

Stepwise regression results of Table 9 show that knowledge distribution, firstly has entered into model as the strongest predictive variable and has explained 16% of criterion variable variance (employee innovation); in the second step, knowledge application was added to the model and these two variables (knowledge application, knowledge distribution) have explained 19% of criterion variable variance (innovation); knowledge creation, knowledge storage and knowledge application components has not have significant role in explaining criterion variable variance. As it was shown in Table (9), in the first step, knowledge application variable has entered into the model and has had significant role in predicting criterion variable with (Beta=0.398) ($p < 0.001$); therefore innovation equation is obtained from knowledge application variable as follows.

$$\text{Innovation} = 31.95 + 1.79 (\text{knowledge application})$$

In the second step, knowledge application variable with (B=1.17, $p < 0.001$) and knowledge distribution variable with (B=0.47, $p < 0.001$) have significant role in predicting criterion variable.

$$\text{Innovation} = 27.32 + 1.17 (\text{knowledge application}) + 0.47 (\text{knowledge distribution})$$

RESULTS AD DISCUSSION

The first Sub-Hypothesis

According to Table (2), since the correlation coefficient between knowledge creation and innovation variables is 0.496 and obtained significance level is less than 0.01 ($\text{sig} = .000$), so the significance of relationship between knowledge creation and innovation is confirmed. Therefore, it can be concluded that increasing employee knowledge creation, their innovation will increase, too. For results explanation it can be said that organization employee who transfer personal knowledge among themselves through conversation, lecture, sharing and storytelling, obtain and create knowledge and thereby provide its performance improvement.

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The Second Sub-Hypothesis

According to Table (3), since the correlation coefficient between knowledge storage and innovation variables is 0.780 and obtained significance level is less than 0.01 (sig =.000), so the significance of relationship between knowledge storage and innovation is confirmed. Therefore, it can be concluded that increasing employee knowledge creation, their innovation will increase, too. For explaining this result, it can be acknowledged that organization knowledge must be fully identified and stored so that organization's all experiences and knowledge to be used optimally and if the created and obtained knowledge in databases are stored, maintaining and employing them we will create an appropriate context for innovation in the organization.

The Third Sub-Hypothesis

According to Table (4), since the correlation coefficient between knowledge distribution and innovation variables is 0.730 and obtained significance level is less than 0.01 (sig =.000), so the significance of relationship between knowledge distribution and innovation is confirmed. In explaining third hypothesis it can be said that Knowledge management disseminating knowledge in organization tries to provide exploitation field of knowledge and generate new knowledge and organizational knowledge can be distributed efficiently and effectively through knowledge sharing process in organization and when this knowledge is used in other parts of the organization it will result in improving and promoting innovation.

The Forth Sub-Hypothesis

According to Table (5), since the correlation coefficient between knowledge application and innovation variables is 0.809 and obtained significance level is less than 0.01 (sig =.000), so the significance of relationship between knowledge application and innovation is confirmed. On this basis, organization can be efficient in the formation and development of knowledge, by organizing conferences and meetings with many members, and giving the opportunity and time for people in order to study and exchange knowledge. Another method that can be used to develop and use knowledge is wise usage of IT and creation of exhibitions in which many suppliers show their skills and knowledge and thereby take steps to achieve objectives through knowledge dissemination and finally assist innovation development of organization providing appropriate and updated information to employee.

The Main Hypothesis

According to Table (6), Since the correlation coefficient between predictor variable (Knowledge management) and innovation is 0.572 and obtained significance level is less than 0.01 (sig =.000), so the significance of relationship between knowledge management and innovation is confirmed. According to Table 9 Stepwise regression test results show that knowledge application and knowledge distribution variable are more effective than other variables on organizational innovation.

Suggestions

1. According to the first sub-hypothesis confirmation, it is proposed that organizations must consider people tacit knowledge the basis of organizational knowledge creation as a rich and potential source of new knowledge in order to create knowledge. However, tacit knowledge cannot be easily transferred to others or it cannot be benefited commonly. As it is obtained mainly by experience and is not easily expressed in words. Therefore, sharing tacit knowledge is considered an important step in the realization of knowledge creation among individuals with different attitudes and motivations. Also, it is recommended that, optimal support and encouragement system to be created for employee who have new ideas.
2. According to the results of second sub-hypothesis, it is proposed that since more information results in information accumulation in organization, one of the ways of arranging and processing information is to determine the probable location of information accumulation and knowledge storage within the organization. It is recommended that organization's members access information in all sectors through seminars and conferences.
3. According to the third sub-hypothesis confirmation, we must set up a comprehensive system for knowledge management and a think room for exchanging experiences among employees by assigning knowledge code to protect their intellectual rights, in order to share knowledge.

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4. According to the results of fourth sub-hypothesis, since efficient effective manpower cannot be supplied quickly from somewhere, thus enhancing teamwork seems essential in organizations.

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