International Journal of Business and Management; Vol. 11, No. 4; 2016
ISSN 1833-3850 E-ISSN 1833-8119
Published by Canadian Center of Science and Education

The Effect of Knowledge Management Applications on Innovation: A Case Study in the Ministry of Planning and International Cooperation Amman-Jordan

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Received: February 4, 2016 Accepted: March 2, 2016 Online Published: March 15, 2016

doi:10.5539/ijbm.v11n4p282 URL: http://dx.doi.org/10.5539/ijbm.v11n4p282

Abstract

The purpose of this study is to identify the impact of knowledge management applications on innovation in Ministry of Planning and International Cooperation in Jordan. Data obtained through a survey questionnaire distributed randomly to a sample of employees from various administrative levels in the ministry. To arrive at statistically significant conclusions, the authors used regression, correlation and Anova test analysis. The results indicate that a statistically significant effect for the impact of knowledge management applications on innovation in their four types (content applications, software and data management applications, smart applications, software and systems of linkage). It also shows that there are no statistically significant differences in innovation that are attributed to demographic variables (gender and age) and job variables (administrative levels and years of experience) at the level of significance (*P*, 0.05). Since this study was limited to the Ministry of Planning in Jordan, caution must be exercised in generalizing the results from this study to other organizations or sectors. Recommendations: Innovation processes need advanced and appropriate applications of knowledge management in order to improve the quality of administrative performance and to promote motivation ways for employees.

Keywords: innovation, knowledge management applications, and the ministry of planning and international cooperation in Jordan

1. Introduction

The importance of the relationship between innovation and knowledge management applications is due to how these relationships affect the formulation of management strategies. Knowledge management and innovation are important factors in organizational strategic capability to survive through managing their knowledge and finding new solutions to their problems. Realizing the nature of the relationships between the functional components in work will help in generating new value in knowledge and innovation, which improves the decision-making and strategic-planning processes. Organizations need to provide sufficient information for managers to enable analyzing and evaluating the alternatives to achieve desired goals. So, managers should give attention to characteristics that must be developed and are available in human assets as one of the most important resources in organizations, to achieve this, a new philosophy should be adopted for the knowledge management, that depends on the infrastructure readiness to search for information and innovation (Alberto, 2000, pp. 87-98).

The ability of organizations relies on the response immediately and quickly with the right knowledge and information, but information is not knowledge. Knowledge is the correct use of information at work. Each company has basic functions, namely: production and development of products and services. This development allows the organization to grow and develop, as well as create knowledge and develop individuals. Achieving all this is a basic requirement for mastery of long-term for the work (Ján Ko, 2010, pp. 51-63). According to the model presented by Nonaka and Takeuchi (1995), the main objective of the process of knowledge management is to transform the tacit knowledge to explicit knowledge and vice versa. There is another purpose for the knowledge management applications that lies in strengthening the capacity of employees to re-establish the value-added knowledge, and increasing intellectual assets of the organization through collaboration with

knowledge workers and taking advantage of the current intellectual assets (Nonaka & Takeuchi, 1995, pp. 21-23).

2. Literature Review

2.1 Knowledge and Knowledge Management

Many of intellectuals and researchers have called the current era as the knowledge era or the knowledge revolution era after Knowledge has entered the types and areas of knowledge in all aspects of contemporary life. Knowledge is viewed as main supplier in organizations and as an anchor for the organization's activities, such as making smart decisions, prediction and strategic planning (Collis & Hussey, 2003). Knowledge depends on data or information that have been organized and processed to become capable of delivering the understanding, experiment, accumulated learning and experience when applied to the ongoing problem or activity (Truban et al., 1999).

Knowledge management is the methodological process that organizes the creative uses of knowledge (Nonaka, 1991, p. 98). (Turban, Rainer, & Porter, 2003) focuses on the concept of knowledge through its operations "which are the operations of accumulating and innovating knowledge efficiently, applications of knowledge organizes for storing knowledge, and benefit from the sharing of knowledge to be applied effectively". (Dc Sutton, 2001, 80-88) sees that knowledge management as a process that is independent from the rest of the departments, because knowledge management is all linked to the rest of departments in organization in terms of being a set of organizational processes and activities that is in other fields that are producing and forming new knowledge continuously.

This process is conducted through knowledge management processes of storing and innovating knowledge, publishing and distributing, and then recycling and retrieving it among employees and work teams apart from the administrative level and functional area of the organization. That knowledge management is seeking to provide solutions on issues and problems of attracting and producing Knowledge and sharing it among the individuals and groups within organizations and with other organizations. Knowledge management must be based in its building on the renewable and available resources of knowledge, especially on the intellectual and cognitive capital in organizations through the development of an integrated organizational and humanitarian structure (Yassin, 2007).

Knowledge management is an integrated regular and systematic introduction that aims at managing the operations of knowledge and directing and activating the activities of sharing information (Hackett, 2003).

2.2 Knowledge Management Technology

Organizations depend on their technological infrastructure that is based in its kind on nature of the type of knowledge. (Alberto, 2000, pp. 87-98) has explained that knowledge is available within the databases, manuals or procedures is explicit Knowledge that needs to a certain type of technologies for storing and sharing, and these technologies are different from the technologies needed by individuals to share and apply their tacit knowledge.The presence of technology is not enough to provide the means of knowledge sharing and applying. Organizations need to apply another kind of knowledge to continue to develop these technologies to support the operations and activities of knowledge, control over the flow of information from their different sources inside and outside of the organization and distribute them on the management levels in the organization. The strategies needed to develop these technologies face several difficulties; namely, the lack of coordination between knowledge management and the actual needs of the components of the technology, as well as, the difficulty of determining the nature of the resources needed to know. Therefore, structures of these systems have to be taken into account to be applied based on the organization's activities so that information is used to realize the tasks and activities in the various levels of management within the organization.

2.3 Innovation

The concept of innovation is mixed sometimes to other terms such as (Creativity), creation or invention, but innovation (Innovate) comes from the Latin word (Innovate) which means renew (Gould & Kolb, 1964, p. 335). As well as, it has also received the word of Innovation in the Dictionary of Business to show to work that provides an idea, method, product or new service (Collin, 1995). Change is a key part of innovation in organizations; innovation includes harnessing the creative ability in the individuals and workforce, in response to the change. Innovation is an interactive process that is characterized by a technological interdependence between the various subsystems. Innovation is described as an organizational complex because it contains various actors and functions (Grimaldi & Rippa, 2011, pp. 45-55). The goal of innovation is to add value, but the good innovation is to eliminate the trade-offs. Many organizations have an excellent product or perfect service that is

conducted in excellent technology, but the only constraint remains the reason that will pay customers for it. What is required of innovation is "something new" for the life of the customers, such as simplicity, eliminating the risk, convenience, better prices, fun, emotions, symbols, and compatibility with the environment (Ján Ko, 2010, pp. 51-63).

Innovation depends on applying of individuals what they possess of depth, faith, desire and perfecting in the exercise of specific discipline. These individuals often fill leadership positions in the organization, or they have administrative motivational tasks in order to manage and attract innovators to the organization. They are called mostly Knowledge workers or ideas Managers and their organizations are called the innovative organizations that are different from the traditional organizations because the innovative organizations have flexible and decentralized structure, high elasticity, specific values and creative leadership and they emphasize on values and knowledge or innovative culture, work through teams, and work on applying the principles of innovation set by Peter Durker (1988) as cited by Yassin (2007) the following are analyzing the innovative opportunities, recognizing the innovation and its needs to be simple to be effective, it must focuses on specific goals and innovator must achieve the goals set by themselves.

2.4 Innovation and Its Relationship to Knowledge

Innovation can add value through knowledge. Knowledge management is a set of processes, policies and applications that link knowledge of the staff to get to new sources of value in products, services and processes in order to find innovative solutions. Innovation is a systematic and radical process for change. The presence of innovation strongly works to respond to the main changes in the markets in bigger way, which earns the organization a highest competitive advantage, and achieves the strategic flexibility (Ján Ko, 2010, pp. 51-63). The basic level of knowledge is the possibility of every individual to realize several facts and use the data that comes from different sources. The second level of knowledge is represented in owning each individual to a professional understanding for his role in the organization. The level of knowledge and fields of specialization will be considered gradually a criteria for evaluating the value of knowledge assets of the organization. Knowledge workers (strategic, professionals, and researchers) are able to provide insight that is helpful in the evaluation of new situations, and to develop the necessary means to find creative solutions. Knowledge workers represent the essence of intellectual competence in organizations and grasping any systems that are suitable for strategic decisions, especially at this time when organizations find themselves within complex scenarios in carrying out their tasks and achieving their objectives because of the rapid market changes along with globalization, as well as technological advances, especially in the field of technologies of innovation.Innovation technologies will become associated with these factors because of the limited capabilities of organizations, which requirs outsourcing for incorporation into the internal processes of innovation. One of the results of the above is the need for the search process; the research activities let the organization innovate new products and processes and give the Innovators of knowledge workers an important role in the process of change (Alberto, 2000, pp. 87-98).

A study of (Svobodová & Koudelková, 2011) entitled: "Collective intelligence and knowledge management as a tool for innovations" has provided the concept of knowledge management as a deliberate and systematic coordination for personnel, technology, processes and the organizational structure within the organization in order to create value through the reusing and innovation. The results show that there is a positive relationship between innovation and the environment supporting it and the knowledge management so as to improve and strengthen the concept of innovative company when obtaining the external knowledge. According to a study by (Grimaldi & Rippa, 2011) entitled: "An AHP-Based Framework for Selecting Knowledge Management Tools to sustain Innovation Process" has formulated a methodological framework that is based on the analytic hierarchy process to determine the most appropriate set of knowledge management tools necessary to support innovation processes. Research has shown that there is no "one-size-fits-all" in solutions put forward for the use of technology to support knowledge management in organizations. Moreover, it is difficult to provide an accurate description of what the organization could play to support innovation using the tools of knowledge management. Organizations need to find the right solution according to the nature and specificity of their work.

According to a study by (Smith, Busi, Ball, & Van Der Meer, 2008) entitled: "Factors influencing on organization's ability to manage innovation: a structured literature review and conceptual model ", the model of research has been built in nine factors influencing the ability of the organization in the management of innovation, namely: leadership style, resources, organizational structure, technology, knowledge management, corporate strategy, human resources, and the innovation process. Research has addressed technology factors as one of the factors influencing the innovation process and it has been used specifically to facilitate this process and the innovative behavior within organizations and among them. The research shows that the impact of

technology comes indirectly and works through knowledge management.

The study of (Carvalho & Ferreira, 2007) entitled: "Using Information Technology to Support Knowledge Conversion Processes" has concluded that the research of knowledge management software will be classified in more than one of the categories that we proposed, and that the wise choice for knowledge management software required a pre-analysis of the needs of the organization for knowledge. Research has presented ways of how to design a rating system for knowledge management tools, and there is a need for a long-term strategy to provide effective knowledge management and its software, this requires a pre-analysis of knowledge of the needs of the organization until the appropriate information technology is selected. Based upon the above studies and discussions, the following research null hypotheses are posed:

2.5 Hypotheses of the Study

The first major hypothesis: **Ho1**: there is no statistically significant effect at the level of significance ($P \leq 0.05$) for knowledge management applications on innovation in the Ministry of Planning and International Cooperation. The following hypotheses are sub-hypotheses of the first major hypothesis:

1- Ho1a: there is no statistically significant effect at the level of significance ($P \leq 0.05$) for smart applications in business on innovations.

2- Ho1b: there is no statistically significant effect at the level of significance ($P \leq 0.05$) for content applications on innovation.

3- Ho1c: there is no statistically significant effect at the level of significance ($P \leq 0.05$) for software and data management applications on innovation.

4- Ho1d: there is no statistically significant effect at the level of significance ($P \leq 0.05$) for Software and Systems of linkage on innovation.

The second major hypothesis: **Ho2** there are no statistically significant differences at the level of significance ($P \leq 0.05$) on innovation that are attributed to demographic and functional variables at the Ministry of Planning and International Cooperation. The following hypotheses are sub-hypotheses of the first major hypothesis:

1- Ho2a: There are no statistically significant differences at the level of significance ($P \leq 0.05$) on innovation that are attributed to the variable of gender.

2- Ho2b: There are no statistically significant differences at the level of significance ($P \leq 0.05$) on innovation that are attributed to the variable of age.

3- Ho2c: There are no statistically significant differences at the level of significance ($P \leq 0.05$) on innovation that are attributed to the variable of administrative level.

4- Ho2d: There are no statistically significant differences at the level of significance ($P \leq 0.05$) on innovation that are attributed to the variable number of years of experience.

3. Methodology

Population of the study is represented by the workers in the Ministry of Planning and International Cooperation at all departments and directorates of the ministry. The questionnaire was distributed to a random sample of the population. The individuals responded were (98) respondents. After reviewing and sorting the questionnaires, it was discovered that (87) questioners were appropriate to run the data analysis on.

The researchers used a case study method. Whereas the aim of this study was to dig deep into the researched case, which is the Ministry of Planning and International Cooperation to know the effect of knowledge management applications on innovation. This study is considered as a demonstrative study through its purpose considered a cross-sectional study through its time horizon (or planning horizon) because it is done for one time only. The tools and the means in collecting data used were two sources, secondary sources such as book, the previous studies and a primary source of information such as respondents' information in a way that will cover all the various sides of the study from the point of view of the individuals in the sample. To analyze data, descriptive statistics, periodicity of data and percentages were used. In addition, the simple regression analysis and the multiple regression analysis were used to know the effect of knowledge tools on innovations. Finally, research model include the independent variable represented by knowledge management applications that have been identified based on (Grimaldi & Rippa, 2011, pp. 45-55). The dependent variable represented by innovation has been defined on the basis of (Newell, 2006, pp. 862-869).

3.1 Study Results and Data Analyses

Reliability Test:

Cronbach's alpha test was used to test the extent of the reliability of measurement tool. The value reached 97.5% and it is excellent percentage for being higher than the accepted percentage which is 60%.

3.2 Hypotheses Testing and Discussion

The First Main Hypothesis Test: Ho1: there is no statistically significant effect at the level of significance ($P \leq 0.05$) for knowledge management applications on innovation in the Ministry of Planning and International Cooperation.

Table 2 shows the results of the main hypothesis data analysis for knowledge management applications in its four variables on innovation in the Ministry of Planning and International Cooperation. Multiple regression analysis tests were used. The analysis resulted in calculated F=35.961, p=.000 and $Beta$=0.868, Therefore, null hypothesis was rejected and the alternate hypothesis was accepted that there is a statistically significant effect of knowledge management all four applications on innovations at the level of significance of 0.05 also, the relationship is considered strong because r=0.798 and the independent variables explains 63.7% of the change in the dependent variable.

Table 1. Shows the identifiable characteristics for the study sample

Demographical characteristics	Elements	Number-Periodicity of data	percentage %
Type	male	47	%54
	female	40	%46
	Sum	87	%100
age	less than 25	1	%1.1
	25 – less than 30	15	%17.2
	30 – less than 40	34	%39.1
	40 – less than 50	26	%29.9
	50 years or more	11	%12.6
	Sum	87	%100
Years of experience	5 years or less	6	%6.9
	6 – 10 years	20	%23
	11 – 15 years	29	%33.3
	16 years or more	32	%36.8
	sum	87	%100
Administrative level	Department administrator		3.4
	unit administrator	-	-
	section administrator	31	%35.6
	employee	53	%60.9
	sum	87	%100

Table 2. Regression coefficient summary for dimensions of knowledge management's tools

Hypothesis on Tools of Knowledge Management	r	r2	Beta	Calculated F-value	Calculated T-value	Sign	Statistical decision
Main Hypothesis	0.798	0.637	0.868	35.961	-	0.000	Null Rejected
Smart Applications	0.675	0.455	0.675	70.999	8.426	0.000	Null Rejected
Content Applications	0.748	0.560	0.748	108.071	10.396	0.000	Null Rejected
Software and tools	0.751	0.564	0.751	109.873	10.482	0.000	Null Rejected
Software and System Linkage	0.732	0.535	0.732	97.851	9.892	0.000	Null Rejected

The Sub-Hypotheses Testing:

Ho1a: there is no statistically significant effect at the level of significance ($P \leq 0.05$) for smart applications in business on innovations.

Table 2 shows the results of the first sub-hypothesis data analysis for knowledge management smart applications in business on innovation in the Ministry of Planning and International Cooperation. Simple regression analysis test was used. The analysis resulted in, calculated *F*= 70.99, *p*= .000 and *Beta*= 0.675. Therefore, null hypothesis was rejected and the alternate hypothesis was accepted that there is a statistically significant effect of knowledge management smart applications on innovations at the level of significance of 0.05 also, the relationship is considered strong because r=0.675 and the independent variables explains 45.50% of the change in the dependent variable.

Ho1b: there is no statistically significant effect at the level of significance (P ≤ 0.05) for content applications on innovation.

Table 2 shows the results of the second sub-hypothesis data analysis for knowledge management content applications in business on innovation in the Ministry of Planning and International Cooperation. Simple regression analysis test was used. The analysis resulted in calculated *F*= 108.071, *p*= .000 and *Beta*= 0.748. Therefore, null hypothesis was rejected and the alternate hypothesis was accepted that there is a statistically significant effect of knowledge management content applications on innovations at the level of significance of 0.05 also, the relationship is considered strong because r= 0.748 and the independent variables explains 56.00% of the change in the dependent variable.

Ho1c: there is no statistically significant effect at the level of significance (P ≤ 0.05) for software and data management applications on innovation.

Table 2 shows the results of the third sub-hypothesis data analysis for software management tools on innovation in the Ministry of Planning and International Cooperation. Simple regression analysis test was used. The analysis resulted in calculated *F*= 109.873, *p*= .000 and *Beta*= 0.751. Therefore, null hypothesis was rejected and the alternate hypothesis was accepted that there is a statistically significant effect of software and data management applications on innovations at the level of significance of 0.05 also, correlation is considered strong because r=0.751 and the independent variables explains 56.40% of the change in the dependent variable.

Ho1d: there is no statistically significant effect at the level of significance (P ≤ 0.05) for Software and Systems of linkage on innovation.

Table 2 shows the results of the fourth sub-hypothesis data analysis for software and systems of linkage on innovation in the Ministry of Planning and International Cooperation. Simple regression analysis test was used. The analysis resulted in calculated *F*= 97.851, *p*= .000 and *Beta*= 0.732. Therefore, null hypothesis was rejected and the alternate hypothesis was accepted that there is a statistically significant effect of software and systems of linkage on innovations at the level of significance of 0.05 also, correlation is considered strong because r= 0.732 and the independent variables explains 53.50% of the change in the dependent variable.

The Second Major Hypothesis:

Ho2: there are no statistically significant differences at the level of significance (P≤ 0.05) in innovation that are attributed to demographic and functional variables at the Ministry of Planning and International Cooperation.

The Sub-Hypotheses Testing:

Ho2a: There are no statistically significant differences at the level of significance (P ≤ 0.05) in innovation that are attributed to the variable of gender.

Table 3. *T*-test results

Characteristic	Calculated t	SIG t	Statistical Decision
Gender	-1.752	0.083	Null Hypothesis Accepted

Table 3 shows the results of the first sub-hypothesis data analysis for differences due to gender differences. Independent sample *t*-test was used. Analysis shows that results in the previous table as *t*-calculated=-1.752 and *P*=.083>0.05 means accept the null hypothesis that no statistical significant differences at the level of 0.05 and that means there are no differences at the abstract level (P≤0.05) in innovations that are attributed to the gender variable in the ministry of Planning and International Cooperation.

Table 4. Results of One-Way Anova test for the demographic variables

Characteristics	Sum of squares	df	Mean square	F	Sign	Statistical Decision
Age	3.539	3	1.180	2.130	0.103	Null Accepted
Administrative Level	1.116	3	0.372	0.638	0.592	Null Accepted
Years of Experience	1.381	2	0.691	1.206	0.305	Null Accepted

Ho2b: There are no statistically significant differences at the level of significance ($P \leq 0.05$) in innovation that are attributed to the variable of age.

Table 4 shows the results of the second sub-hypothesis data analysis for differences due to age differences. One way Anova test was used. Analysis shows that results as F= 2.130 and P=.103>0.05 means F doesn't have statistical differences means accept the null hypothesis that no statistical significant differences at the level of 0.05 in innovations that are attributed to the age variable in the ministry of Planning and International Cooperation.

Ho2c: There are no statistically significant differences at the level of significance ($P \leq 0.05$) in innovation that are attributed to the variable of administrative level.

Table 4 shows the results of the third sub-hypothesis data analysis for differences due to administrative level differences. One way Anova test was used. Analysis shows that results as F= 0.638 and P=.592>0.05 means F doesn't have statistical differences means accept the null hypothesis that no statistical significant differences at the level of 0.05 in innovations that are attributed to the administrative variable in the ministry of Planning and International Cooperation.

Ho2d: There are no statistically significant differences at the level of significance ($P \leq 0.05$) in innovation that are attributed to the variable number of years of experience.

Table 4 shows the results of the fourth sub-hypothesis data analysis for differences due to number of years of experience differences. One way Anova test was used. Analysis shows that results as F= 1.206 and P=.305>0.05 means F doesn't have statistical differences means accept the null hypothesis that no statistical significant differences at the level of 0.05 in innovations that are attributed to the number of years of experience variable in the ministry of Planning and International Cooperation.

4. Study Results

1. There is an effect that has a statistical significance at the abstract level ($P \leq 0.05$) for the knowledge management applications on innovations in the ministry of Planning and International Cooperation.

2. There is an effect that has a statistical significance at the abstract level ($P \leq 0.05$) for smart applications on innovations in the ministry of Planning and International Cooperation.

3. There is an effect that has a statistical significance at the abstract level ($P \leq 0.05$) for content applications on innovations in the ministry of Planning and International Cooperation.

4. There is an effect that has a statistical significance at the abstract level ($P \leq 0.05$) for software and data management applications on innovations in the ministry of Planning and International Cooperation.

5. There is an effect that has a statistical significance at the abstract level ($P \leq 0.05$) for software and linked systems on innovations in the ministry of Planning and International Cooperation.

6. There are no differences that has a statistical significance at the abstract level ($P \leq 0.05$) in innovations that are attributed to the demographical variables (gender and age), the job (the administrative level and years of experience) in the ministry of Planning and International Cooperation.

5. Recommendations

1. The necessity to analyze the appropriate innovative opportunities to develop the work through making a difference, paying attention to form knowledge and enhancing cooperation and coordination between members of the work.

2. Paying attention to generate the required knowledge to reinforce innovations, and finding various ways and methods to achieve activities and fulfill the work and support them with modern technology

3. Using advanced and suitable knowledge applications in Jordanian ministries just like the Jordanian Ministry of Planning and International Cooperation and that is for the continuation of the innovation process and to raise the level of administrative performance.

4. To promote methods of stimulating the workers in the ministry to use knowledge tools in aim of increasing their efficiency, their creative abilities and developing them.

5. To confirm the necessity of providing the adequate financial and administrative support to develop technological applications and means, especially in a way that sill serve the innovations in the ministry and that's in the aim of keeping up with the global development in this field.

6. Paying attention to involve the stakeholders who are concerned with the issue of innovation to provide various points of views, experiences and knowledge that are required to achieve innovation.

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