Knowledge Management Application in Research Management

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Abstract: In the current era, intellectual capital and organizational knowledge are the only way to grow and develop properly, organizations and communities. Thus, for using which is the main source knowledge in research and development organizations considering knowledge management(KM) can correctly manage attracting externals resources by strengthening researchers and giving organizational and financial resources, setting up a website and publishing technical papers, strengthening members' attitudes to research and presenting papers at conferences and meetings and the outsourcing, which these organizations and their communities, through the effective management of KM can achieve knowledge and opportunity in achieving knowledge.
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1. Introduction

From the 1970s with the fast development of the high technology in the world, especially in the areas of communications and computing, the economic growth pattern fundamentally changed, consequently, since 1990s, knowledge became the most important alternatives for financial and physical capital investment (Rezaeian et al, 2010).Existing organizations, in order to survive even for a decade, must continually change, but change is not enough. Change should be based on data collected from an external and internal environment into knowledge (Rahnavard and Mohammadi, 2009). In this era which is called the intelligent organizations, there are in dynamic environments that are increasingly being controversial challenges. Change and development is an integral part of today's world (Rezaei Fardoyi and et al, 2010). In such circumstances, creating a strategic competitive advantage for organizations requires a new type of organization which has the ability to create qualitative knowledge. Therefore, managers are expected to have a deep understanding of organizational changes and improve organization's performance in investing through knowledge-based projects. Today, the greatest hope for the organization and management is defining a KM system in a successful way. Undoubtedly, universities and educational institutions, and research organizations should appear in the role of leading organizations in designing and implementation of KM systems (Rahnavard and Mohammadi, 2009). KM focuses on creating value which means managing the existing knowledge and converting it into useful knowledge in organizations and has two main parts: KM and increasing the ability to create new knowledge and innovation which the most important change in the new millennium is not using everyday growing knowledge but knowledge is used more and therefore becomes useless (Niazazari and Amooyie, 2007). KM is a field in which knowledge managers and the forces act at ideal time, knowledge is used for the organizational purposes, storage, and retrieval.

2. Theoretical Foundations of KM

KM can be defined as the task of developing and exploiting an organization's tangible and intangible knowledge resources. Tangible assets include the outputs of R&D teams, strategic information about customers, suppliers, products, competitors etc. Intangible assets include the competencies and knowledge resources of human capital within the organization. KM refers to the totality of organizational strategies aimed at creating an intelligent organization, which is able to leverage upon its tangible and intangible assets, to learn from past experiences, whether successful or unsuccessful, and to create new knowledge. At the people level, KM centers on the competencies and learning abilities of individuals. At the organizational level, KM puts emphasis on the creation, utilization and development of an organization's collective intelligence. In terms of technology, effective KM requires an efficiently organized and relevant communication and information infrastructure (Benjamin, Ai-Chee, Thomas, Yue Wah & Hans-Dieter, 2003)

KM is known as a process in which the production, acquisition, capture and use knowledge aims at production, achievement, grasping and using knowledge in order to improve productivity of organizations (Akhavan et al, 2010). KM refers to efforts which systematically find, organize, and access the organization's intangible assets, strengthening a culture of continuous learning and knowledge sharing in organizations (Rahnavard and Mohammadi, 2009).

KM is the process of creating, gathering, organizing, distribution and application of knowledge or art of creating value from an organization's

intangible assets (Rahnavard and Mohammadi, 2009). KM is how to collect, store, transfer, deploy, update and create knowledge and in many organizations it focuses on KM and extensive investment in information technology in order to access the benefits of KM (Abbaszadeh Shahri and Rajablou, 2009). KM rather than thinking about how to run an organization is a strategic asset for the organization. KM is a deliberate, systematic business optimization strategy that selects, distills stores, organizes, packages, and communicates information essential to the business of a company in a manner that improves employee performance and corporate competitiveness (Bergeron, 2003). KM is a system to facilitate learning, innovation and sharing to achieve the strategic objectives of an organization (More, 2010). KM practices aim to see individual knowledge become group and organizational.

Knowledge over time, which in turn improves the stock of knowledge available to the firm (Fen Lin, 2011). From this definition, it should be clear that KM is fundamentally about a systematic approach to managing intellectual assets and other information in a way that provides the company with a competitive advantage. KM is a business optimization strategy, and not limited to a particular technology or source of information.

3. Objectives of KM initiatives

It is agreed that successful companies are those that create new knowledge, disseminate it widely throughout the organization and quickly embody it into new technologies and products (Metaxiotis & et al, 2005). According to Wiig (1997), the objectives of KM initiatives are (Ajmal & et al, 2010):

- to enable an enterprise to act as intelligently as possible in securing its viability and overall success
- to otherwise realize the best value from its knowledge assets.

Benefits of KM by Gary are presented as follows:
1) To prevent loss of knowledge 2) Improving decision making 3) Flexibility and adaptability 4) Competitive management 5) Development Properties 6) Increasing product 7) Customer-oriented Management 8) Application of investments in human capital.

In another study by Ernst & Young Center done for Business Innovation, the knowledge's benefit for the organization was studied and respectively benefits such as improving decision making, increasing accountability, efficiency, innovation, flexibility, quality improvement, reduction of duplication and the ability of an organization's KM, has been given (quoted in Abzari and Kermani, 2005). Akhavan et al (2010) concluded that the benefits of KM include coordination of internal efficiency, and enhancement of customer service quality and efficiency of the organization.

Table 1: KM benefits (Anand &Singh, 2011)

Serial Number	KM Benefits	Reference
1.	Best decision making.	Singh et.al (2006), Dalkir (2005), Chase (1997)
2.	Smoother collaboration	Singh et.al. (2006), Dalkir (2005)
3.	Enhanced learning	Dalkir (2005)
4.	Improved communication	Chase (1997)
5.	Improved employee skill	Dalkir (2005), Chase (1997)
6.	Increased employee satisfaction.	Dalkir (2005)
7.	New or better way of working	Chase (1997)
8.	Sharing best practices	Davenport (1998), Singh et.al. (2006), Dalkir (2005), Chase (1997)
9.	Enhanced the continuity of the organization	Beijerse (1999)
10.	Improved employee loyalty and retention	Anantatmula & Kanungo (2006), Beijerse (1999)
11.	Improved productivity/efficiency	Singh et. al. (2006), Anantatmula & and Kanungo (2006), Chase (1997)
12.	Increased empowerment of employees	Anantatmula & and Kanungo (2006)
13.	Increased sales/profits.	Singh et.al. (2006), Anantatmula & and Kanungo (2006) Chase (1997)
14.	Cycle time reduction	Singh et.al.(2006), Chase (1997)
15.	Develop new business opportunities	Anantatmula & and Kanungo (2006), KPMG (2000),
16.	Developing core competencies	Beijerse (1999)
17.	Enhanced flexibility	Singh et.al. (2006), Chase (1997)
18.	Improved business processes	Anantatmula & and Kanungo (2006)

19.	Faster new product development	Beijerse (1999)
20.	Improved responsiveness	Singh et.al. (2006), Dalkir (2005), Chase (1997)
21.	Reduced risk	Beijerse (1999)
22.	Enhanced customer relation	Dalkir (2005)
23.	Enhanced products or services quality	Chase (1997), Dalkir (2005)
24.	Enhanced customer satisfaction	Dalkir (2005)
25.	Better management of intellectual capital	Demarest (1997)
26.	Increased speed of innovation.	Davenport (1998), Singh et.al. (2006), Dalkir (2005), Chase (1997)
27.	Improved revenues through licensing of patents	Singh et.al. (2006), Anantatmula & and Kanungo (2006)
28.	Reuse of information and Knowledge	Singh et.al. (2006)

'The SECI KM Model' by Nonaka/Takeuchi

The approach taken by Nonaka/Takeuchi aims at generating and distributing knowledge within a company. Their model consists of two main elements, the epistemological and the ontological dimension.

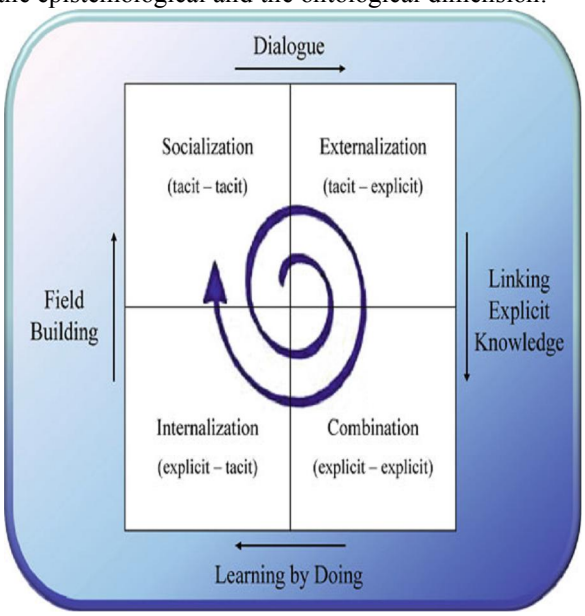

Fig.1: Knowledge Spiral on Epistemological Level (Wilde, 2011)

Epistemology is the study of knowledge. It describes the various types – tacit and explicit – of knowledge and is divided into four main processes of knowledge exchange.

Through the dynamic interaction of the epistemological and the ontological dimension, existing and new knowledge can be extended and results in a knowledge spiral. The four modes of knowledge conversion interacting in the spiral are Socialization (from tacit to tacit), Externalization (from tacit to explicit), Combination (from explicit to explicit) and Internalization (from explicit to tacit).

• Socialization happens when two persons exchange tacit knowledge face-to-face. Examples are a personal dialogue or a conference, but also 'exchange of experience' through observation or imitation.

• Only through Externalization can knowledge be developed and made available for the whole company (e.g. through documentation). This is probably the most important form of knowledge development. Tacit knowledge adopts the form of concepts and hypotheses.

• Combination is the amalgamation of existing explicit knowledge to develop new explicit knowledge. This form of knowledge exchange is supported through documents, PCs, networks and communication tools.

• Internalization is a learning process that is linked to 'learning by doing'. The formation of an own opinion is an example. The explicit knowledge becomes part of the individual's knowledge base and thus an asset for the organization. It is an individual operationalization of knowledge.

The above forms of knowledge development are restricted in their use to the generation of new knowledge. Tacit and explicit knowledge must interact dynamically. The core concepts of knowledge exchange by Nonaka /Takeuchi consist of two different knowledge spirals (Wilde, 2011).

4. Programs of KM and knowledge creation process:

According to Wiig (1997), from a managerial perspective, there are four areas of emphasis for systematic KM (Ajmal & et al, 2010):

1. Top-down monitoring and facilitation of knowledge-related activities;
2. Creation and maintenance of a knowledge infrastructure;
3. Renewal, organization, and transformation of knowledge assets; and
4. Leverage of knowledge assets to realize their value.

David Skyrme (1999) stated that KM programs mostly focus on the following seven strategic steps:

1. Customer knowledge: vital knowledge in most organizations
2. Knowledge of the process: applying the knowledge to do the job

3. Knowledge of products and services: smart solutions to customer needs
4. Individual Knowledge: education and mental power control which is the most valuable asset.
5. Organizational memory: past lessons or any other connection to the organization
6. Knowledge in communication: a deep personal knowledge that supports effective collaboration.
7. Knowledge Assets: Measuring and Managing Your Intellectual Capital

According to Nonaka, knowledge process in organizations follows four actions as follows:

1. From tacit to tacit: occurs when in face to face communication people exchange knowledge.
2. The tacit explicit: generating new knowledge by combining existing knowledge. For instance, an organization's director of finance collects financial information from different parts of the organization, and according to them, provides financial reports.
3. From implicit to explicit: Developing experiences, opinions, comments so that others can use it.
4. From explicit to implicit: explicit knowledge occurs when it is internalized in staff and results in the development of their own knowledge (Skyrme, 1999).

An examination of the characteristics of knowledge process capabilities enable them to be grouped into the four broad dimensions of knowledge creation, conversion, transfer and application.

Knowledge creation is enabled by the processes and activities of interaction, feedback, innovation, brainstorming, and benchmarking. Knowledge conversion is made possible through the processes and activities of synthesis, refinement, integration, combination, coordination, distribution, and restructuring of knowledge. Shared contexts and common representation are required for knowledge conversion, and facilitated by group problem solving and decision-making. Information technologies like e-mail, repositories, intranet portal, teleconferencing, and the activities of mentoring, collaboration and training play a key role in transferring knowledge. Forums such as communities of practice and centers of excellence, and training provide a platform for the transfer of knowledge. Knowledge is effectively applied during the developmental processes of an organization through rules and directives, routines and self-organized teams. Knowledge is applied to formulate and refine the standards, procedures and processes developed to execute tasks within the organization (Sandhawalia & et al, 2011).

5. Research, Basis for Development

Action research is a rational, systematic, process which leads to critical and creative thinking, refining and production. The process usually begins with a question or questions and answers or responses to the outcome which seems fairly convincing. Such a move is in the process of production, exchange and storage of information and parallel the community develops in a way that it may be said research is one of the main factors in the development of any society. Therefore, there is integration between quality and quantity of performance and research progression level in every society, development level and subjective and objective conditions prevailing the society. Today, research is not a personal matter but a collective phenomenon and social reality in which numerous components and elements such as subject, trustee, executor or administrator of research, funding and facilities, institutions and research organizations are interacting with each other and create the country's research system (Hodavand, 2010). Issues such as lack of dependence on the public sector and private sector in independent research had led to weakness in the production of ideas and cultures. One of the best indicators to assess the claim is that we know how much decision making and planning, and dealing with problems and develop solutions is done based on scientific research. This partly is the outcome of their faith and feeling the need to study, the demand for decision-making sections, leading researchers, and funding and suitable research facilities. This requires establishment of an open intellectual environment and organizing the ideas of production process. Study and research, are both considered as basic requirements of scientific and economic development. Chain connections of scientific and commercial applications to research findings can push it towards positive results and enhance the dynamics. From this perspective, it is the researcher's role as the producer and society as the consumer-driven services, which their exchanging base is thought and knowledge. Having many philosophers in each country determines its contribution to the community in production of international knowledge as an appropriate ground for determining sustainable national development level. Experience of industrial countries suggests that the development of skilled and creative manpower is essential for sustainable development and other tools such as energy and capital took the next priorities. In this course, knowledge and knowledge acquirement are considered as a social necessity (not a virtue or self-worth) and requirements such organizations, relationships and communication networks also bring its own behavioral interactions (Hodavand, 2010). Research or study, is an active, consciously process which is organized to discover, interpret and review of phenomena, events, behaviors, and hypothesis. This phenomenon is also available for

using existing events to achieve practical solutions, and technologies.

6. KM Benefits in Research Management:

The university's research process represents a key area which can be enhanced through the application of KM (Kidwell, Linde & Johnson 2000). Research-based way of addressing the problems and priorities, conducting non -duplicated research, reduction of error, optimal allocation of resources, effective choice of researchers, priority investment needs of various organizations in research, determining research priorities on first days of each year, appropriate assessment of previous studies, better and effective decisions, strengthen the research continuum, improving efficiency and productivity in research, optimal allocation of time, developing researcher's competencies, process improvement, quality improvement of research, improving accountability, improving researcher's communication, accelerating innovation, facilitating information sharing between researchers, limiting repetitions, accessing new opportunities in the commercialization of research, customer relationship management, assessment of the research .

6.1. Barriers to KM application in the research organizations:

1. Research culture weakness

Research creates different mental meanings in officials, researchers, scholars and the general public. This different meaning determines the position in facing the subject, the focus of expectations from it and also the amount of focus and support. What is of concern is that the subjective meaning is conflicting among the officials, and this can lead to detachments in research-based culture. Responsible of people in charge for adherence to research and problem solving using scientific terms in full compliance of researchers and scientific ethics this will organize in such a way that the short-term effects on the society and its consequences will be felt in the current processes.

2. Ambiguity in Researcher's Definition

Lack of clear definition of the concept of the research and the researcher followed by a rational process of problem solving will lead to prejudice in individuals and decision-making groups. Criteria in researcher definition must be based on indicators that exist in training and research experiences of an individual. These indicators must conform to certain assumptions and be applied with following scientific principles. The absence or weakness of the correct definition or application defaults of the concept of research and scholarship led to the ambiguity in identification of research concept and researching and unfair distribution of resources, poor governance, failure to prioritize and mismatch between expertise and skills of the researcher with research topics. While there is no clear scientific view on the nature of researcher's action and meaning, most topics were merely studied, based on interest rates, and pledge of individual researchers. Ambiguity in the definition of the key concepts of transparency will also cause officials in charge of science and research, don' defend the status quo without scientific justification

3. Discontinuities in objectives and research programs and activities.

The main background asymmetries and discontinuities between the three elements, objectives, programs and research activities is In the absence of strategic orientation in the field of research and not orientating towards providence.

4. Inappropriate research facilities

Another limitation in research is the lack or limit of the operation of the equipment and facilities needed. Rules and red tape in the operation of the minimum facilities, caused a wide range of leisure researchers solve everyday problems and that is why most of them prefer to assign to further research on the theory and theorizing or make it on much smaller scale. In this case, the results probably would not have high scientific value or less will be accepted by scientific experts and associations.

5. Attractiveness of the Environment:

Administrative system governing research centers do not have the characteristics of a dynamic system. Adopting and implementing flexible rules and solely supervising and not conducting research centers by the ministries and agencies in charge, relationship rather than standard and weakness in terms of legislation and regulations, are among the factors of job non-attraction in research centers (Hodavand, 2004).

6. Dominance of Justify research

Weakness in problem choice, being iterative, lack of visionary insight, lack of appropriate theoretical foundations, lack of priorities, the history and methodology of poverty, lack of tools and tests required for research projects are among facts that involve in low quality of designs and application of results. In fact, research rather than being a means to achieve the goals and to resolve problems is itself a goal (Qazi Tabatabai, 2008).

7. Failure of information systems and documentation

Limitation of information centers and research institutes affiliated with universities, professors and researchers' lack of resources, limited bandwidth access to the Internet, lack of access to research conducted at the national and international levels can be of the major challenges in information systems research.

Weaknesses in gathering, documenting, organizing, storing, and disseminating the information cause results not entirely suited to the market and the

declining quality and quantity of research and uncertainty and doubt in the decisions to be made (Hodavand, 2010).

6.2. Application of KM in Research Management:

Successful organizations, found that knowledge is their most important asset, and some basic principles of KM exists in staff and they see KM as a key factor to success. For this reason, huge investment has been charged for using this type of management. The process of creating, transferring and sharing knowledge are the part of management research that transfers non-use of research-based knowledge into practice. Proper utilization of the research results ensures appropriate management (Ferdowsi and Alavi, 2010).

7. Discussions

Using KM in organizations reduces costs and improves quality, productivity and profitability of the organization. So in this article we have tried to manage existing knowledge in research management as a major component of the pillars of economic and scientific development and through it remove obstacles on the way of researchers, prevent conducting repetitive research, increased errors in the research process to enhance the research process, adaption to the needs of the community or organization, optimal allocation of time and appropriate assessment and qualitative research conducted in various stages of research. According to the model, and application of KM in research management, move life cycle of management research so that researcher's knowledge is updated and motivation and willingness of researchers with organizational and financial advantages in order to acquire new knowledge and transfer of knowledge to set up a website and publish professional journals and presenting at the conference and purchasing of foreign technology and resources to do all kinds of research (applied - basic) promotes and increases, this way it was achieved and developed in all areas. Table 2 was present some of applications of KM in academic research management or research organizations management.

Table 2: Applications of KM in research management

Knowledge Acquisition	owledge registration	Knowledge Transference	Knowledge Creation	Knowledge Application
✓ Planning an appropriate system of academic research management ✓ Setting up and supporting a good research IT architecture ✓ Directing and informing research faculty members ✓ Strengthening organization members' tendency towards research ✓ A real commitment and belief of the authority toward science and research ✓ Financial rewards ✓ Grant	Documentation of knowledge Record ideas Patent provision of various online survey, library Hardware Software Database Technical support IT Assisting faculty to publish their work	✓ Launching professional websites ✓ New access to the net ✓ Publishing papers at national international journals ✓ Creating commitment to self-reliance on technology ✓ Presenting papers at conferences and seminars ✓ A portal for research administration procedures and best practices ✓ Increase the information available ✓ Ensuring the reliability, security and availability of computer hardware and software ✓ Internet / high-speed connectivity	✓ Research interests within an university or at affiliated institutions ✓ Increasing proportion of researcher staff ✓ Increase the proportion of IT expert staff ✓ Support innovation ✓ Research funding ✓ Senior Management support ✓ Participate in decision making ✓ Encourage learning ✓ IT infrastructure ✓ Provides a standard suite of tools and software ✓ Various funding schemes such as research grants ✓ Available resources ✓ Support assisting in preparation	✓ Commercial opportunities for research results ✓ Assisting faculty to publish their work ✓ Regular knowledge sharing activities ✓ Support from both peers and top management

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