CRITICAL REVIEW

Designing and implementing knowledge industry: An integrative framework for universities

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Abstract. This paper intends to identify challenges and limitations regarding the use and implementation of technology at universities in Iran and India, e.g., industrial management, English, etc. After studying the design and implementation of knowledge management in different universities, various aspects of this process have been identified using the content analysis method. This study also provides a framework to design and implement knowledge management systems focusing on eight aspects of objectives, scope, organization, method, technology, achievements, and failures. The analysis argues that universities can change to knowledge-based origination as the service sector moves to electronic services by employing knowledge management innovations. It is required to bridge knowledge from university to industrial sector i.e., knowledge-based production and Intellectual Capital (IC) should transfer to market practice, but a gap exists between these products and supply. The results show that the accomplishment of knowledge management strategies can be effective positively despite existing challenges. Based on the analysis, useful recommendations for improving knowledge management implementation are given to higher education institutes.

INTRODUCTION

Today, knowledge is considered as the capital of the company and organizations found out that they need to take care of their intellectual capitals more than ever. Intellectual capitals due to their key role in gaining competitive advantage have become strategic resources of organizations. (Cech and Bures, 2000) On the other hand, in the past decade, along with the rapid development of information and communication technologies, universities have been also increasingly influenced by these technologies and their applications and

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through utilizing these technologies are looking for opportunities to provide services with higher quality and lower cost (Wu, Huang, Hisa and Tsaiand, 2002) With the advent of information and communication technologies, not only traditional transition and storage methods are completed but also the efficiency and effectiveness of public knowledge transfer mechanism has been significantly improved (Mohammad, 2014; Lin and Umoh, 2002; Muda and Yusof, 2015). In this context, success of universities largely depends on collect, analyze, integrate and share information and knowledge inside and outside of universities (Hsia et al., 2006).

As electronic services expand, transparency and access to information barriers is also trimmed while managing knowledge and information are issues that are highlighted (Gorry, 2007). It is required that organizations develop policies and procedures to expand knowledge management though information technology means. Organizations that could properly combine technology and motivation, have also been able to have performance improvement and expand production and customer relationships (Davenport and Prusak, 2003). While the volume of activities and responsibilities in universities are dramatically increasing, a knowledge management system which is well designed according to IT capabilities can turn into a concentrated force to improve quality of services in a competitive environment (Gorry, 2007). . There is a general agreement that the IT-based technologies can be used to create service knowledge management systems (Gorry, 2007). Technologies such as the Internet and other associated technologies, electronic portals and etc. help universities to integrate service knowledge with their workflow (Dell and Grayson, 1998) Despite various suggested models for this purpose, methods for integrating technologies, knowledge management activities and IT capabilities in order to utilize knowledge management experiences in universities are not well known and there isn't a unique methodology for designing knowledge management systems in this environment (Mohayidin et al., 2007) To solve this problem, a comprehensive framework to help designing and implementing knowledge management system in this sector is needed.

This paper is trying to suggest a framework for the design and implementation of knowledge management systems in universities; In this regard, initially the key aspects of this process has been identified, then the processes of design and implementation of knowledge management system at several universities have been analyzed on the basis of these aspects; and finally, a comprehensive framework for effective design and implementation of this process in universities have been proposed.
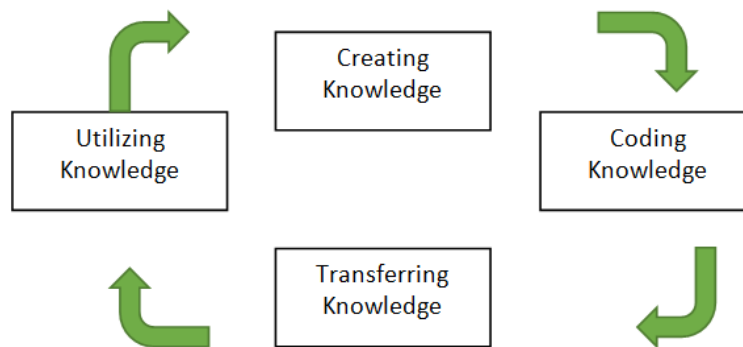
Knowledge Management

Data processed into information through summarization, modification, calculation, classification or documentation. Information is also through comparisons, study relations, interactions of individuals, finding causes, considering the possible consequences, and implementing them are changed into knowledge. Knowledge management is a method of management by processes which through it, an organization identify, use, develop, organize and share knowledge (Hsia et al., 2006).In fact, effective and efficient knowledge management system needs an appropriate combination of managerial, organizational and social initiatives along with proper employment of technology (Selsky,2001).

Knowledge management in in the ear of information in many organizations have been experienced as one of the most promising ways to achieve success and increase competitiveness (Marwick, 2001). Knowledge management is interpreted to increment of innovation and reactivity (Mohayidin et al., 2007). This process can be divided into various sections, for example, creation of internal knowledge, external knowledge acquisition, and knowledge storage in form of documentation instead of storing in daily routines, updating knowledge, and sharing internal and external knowledge (Malone, 2002)

As Figure.1 shows, a knowledge management system generally can be presented as four interrelated activities, including create, Coding, transfer and utilizing knowledge as follows (Alavi and Leidner, 2001)

-Creating Knowledge: Includes all activities for the formation of knowledge. Because, useful knowledge of organization is kept undocumented by experts of organization and tacit knowledge is not documented easily on its explicit form; hence, there are problems in the acquisition of knowledge section (Nonaka, 1991).

- Coding of knowledge: is changing knowledge into an accessible and applicable form.
- Transfer of knowledge: is including sharing knowledge from the point of its creation or coding to applying it
- Utilizing knowledge: is assessment and utilizing of coded knowledge to support activities, decision makings, or problem solving.

Knowledge Management Systems

Knowledge management system is a set of information systems to utilize organizational knowledge ((Malone, 2002). IT-based systems are created to support and promote creation, storage, transmission and applying of knowledge processes (Newman and Conrad, 1999). Many knowledge management initiatives cited IT as a key infrastructure. Recently, the advancement of IT increased knowledge management capabilities while previously was not possible. For example, finding expert through recorded source of knowledge using the online encyclopedia and search databases, sharing knowledge and collaborative work through the Internet and Intranet, access to information or previously conducted projects, and learn about the needs of customers by exploring the available data. In fact, most new IT applications are executed to support organizational knowledge management and its tasks. Various IT technologies which have application in knowledge management can be divided into 6 major categories as follows: (Barnes, 2002)

- Knowledge Based Systems (KBS)
- Data Mining (DM)
- Information and communication Technology (ICT)
- Artificial Intelligence (AI) / Expert System (ES)
- Database Technology (DT)
- Modeling

Knowledge Management in Universities

In recent decades, service organizations such as universities are also faced increased competition just like producer organizations. These organizations must be able to keep existing customers through satisfying an increasingly high level demands and attract new customers. To meet this challenge, there are strong emphasis on knowledge management and even teamwork theory (Liao, 2002). Given that, members of these groups widely shared their knowledge and experience among group members in order to make more, better and newer services, there is a general consensus that knowledge is a major factor in the success of the organization. In recent studies, the importance of knowledge management is firmly authenticated. Many studies have confirmed the importance of knowledge management in support of the initiatives within the organization (Hu et al., 2007) However, despite extensive researches on innovation in products and services, often focus was on manufacturing and knowledge-based industries and very few number of conducted studies dealt with in-depth discussion of knowledge management in the service sector (Finnegan and Willcocks, 2009). Furthermore, current theories have just provided discrete and incomplete ideas about knowledge management principles and have proposed limited guidance to address knowledge management. In addition, although the universities to respond to the rapidly changing environment are relaying on perfection of goods and services, but knowledge management discussion to stimulate Innovative performance of services is still limited (Hogel et al.2007)

Universities and higher education institutions have been accused that in preparing students for deep thinking, quantitative reasoning and research skills have not been successful (Twigg, 1994).Unfortunately, it has been revealed that such these educational environments could not act managed or just in time tailored to the expectations expected from these environments regarding flexible training appropriate for a long time period to students. Some experts believe that the current structure of the university classrooms may damage various learnings which are required in the twenty-first century (Lin and Bransford, 1996) Today, organizations need employees who can quickly contribute in new methods, effectively communicate and cooperate, search information and evaluate them independently, and eagerly share achieved knowledge with their colleagues in such a way that is understandable and ready to use (Grenier and Metes, 1995; Jarvenpaa and Ives,1994) It is the responsibility of educational institutions, especially universities to prepare graduates with these abilities (Piccoli,2000) There are good experiences that support the important role of universities as an organization for thinking, where Knowledge as a source of value creation is produced in it and widely disseminate it (Mohayidin et al., 2007). In addition, many ideas have been suggested to convert universities to learning organizations and prolong survival of them, including sharing individual knowledge in organizational knowledge

(Basu and Sengupta, 2007) One of the methods for achieving mentioned points is promoting culture of creativity and sharing knowledge through teaching and learning methodologies (Brown and Duguid,2000)

METHODOLOGY

Like most managerial systems, design and successful implementation of knowledge management requires a combination of items and methods (Gorry, 2007). In studies which has been conducted to identify effectiveness of important aspects of knowledge management in universities, following points can be mentioned: (Basu and Sengupta, 2007) suggested a comprehensive and detailed framework of success factors in knowledge management which is composed of 12 independent sectors. Although this framework is designed for commercial organizations, but some parts of it has functional capability in educational environments (Basu and Sengupta, 2007) Comprehensive technical infrastructures, networks, knowledge repositories, and technology in general is the most important aspects that have been considered (Barna, 2002) Stimulants such as trainings and incentives as other important aspects have also been regarded (Ardichvili et al., 2003; Lorange, 1996). In other cases, it is mentioned that aspects such as organizational pressure, leadership and cooperation culture can not be ignored in the successful implementation of knowledge management (Sage and Rouse, 1999).

Communication and organizational environment (Moffett et al.2003) the area of knowledge management implementation, utilization reasons and objectives are also other items which has been referred.

In this paper, after studying design and implementation of knowledge management in different universities, various aspects of this process have been identified using content analysis method. Then, these aspects have been classified and in some cases have been fused; and finally, the following eight key aspects are intended for the design and implementation of knowledge management in universities.

- Utilization reasons
- Objectives
- Methodology
- Scope
- Organizing
- Technology
- Achievements
- Problems and Limitations

After that, the design and implementation process of sharing and managing knowledge with an emphasis on key aspects, in a number of university campuses have been surveyed separately. After extraction of mentioned points, these aspects compared to each other; and finally, inference done for each aspect.

Case Studies

In this section, after introducing number of university campuses that have made an effort to knowledge management, general process of sharing and managing knowledge in these campuses has been described.

Considering the huge demand for skilled managers in today's India and the global economy, it is necessary to revise knowledge management initiatives in institutions and universities that have management, commerce and related

disciplines. So that, if they can be considered as knowledge recipient organizations, the management of the institution has been able to successfully implement an integrated technical infrastructure. In this study for achieving top position in the higher education industry, initially the factors influencing the success of knowledge management in businesses are identified; Then, a model has created to highlight possible conditions and results of business institution in achieving its goals which in that important factors such as integrated technical infrastructure, organizational culture, motivation and commitment of users, support of senior managers are noticed. After that, for each factor, operating function and performance of knowledge management has been determined (Basu and Sengupta, 2007).

In this project, two major areas of knowledge management are considered; Knowledge management of subjects in some training programs, and the other is knowledge management as a method of management in University. In the first phase, familiarizing students of master degree and PHD with knowledge management and train them about this process according to their faculties is considered. While, in second phase knowledge management has been used for improving processes and communications for proper utilization of intellectual capitals. (Cech and Bures, 2000)

At first, a concept model is designed to create and deliver knowledge. This conceptual model includes cycle of knowledge and knowledge sharing and university members according to senior management vision cooperate in knowledge creating activities. This model includes three phases and in general fulfill obtaining, creating, coding, saving, sharing, and utilizing of knowledge. (Piccoli, 2000)

Analysis of Sharing and Knowledge Management Process in Studied Universities and Academic Centers

This section followed by design and implement of sharing and knowledge management in studied universities based on eight mentioned aspects in section five of this paper separately and accurately.

Utilization Reasons

Emergence of some problems or presence of some defects encourage organizations to use capacities of knowledge management. In fact, these reasons are the reason to utilize knowledge management in organizations.

Institution of Higher Education of India named "orientation of educational institutions towards learning, beginning of economic reforms in India and the growing demand for highly qualified and informed managers, competition between educational institutions, discovery, publishing and management of all processes, meeting the demands of researchers and students, improving work relationship among them to obtain knowledge from various sources in the fastest possible time" as the reason to utilize knowledge management (Basu and Sengupta, 2007). In United States, reforming universities to learner organizations, reengineering of creation and sharing knowledge are the main reasons. (Piccoli, 2000) Since, universities and higher education institutions, usually have modern information infrastructure; hence, sharing knowledge is more natural for faculty members, the possibility of knowledge management success will be increase. (Cech and Bures, 2000)

By examining the above issues, it can be seen that in universities which operate in competitive environments (Particularly universities that sporadically offer their services), to enhance the cooperative relationship between the members of different faculties, presenting integrated services and maintain the skills and expertise available at the University, Knowledge management can be a very useful way to improve the quality of teaching, research, administrative and easier and more effective management. Experiences has shown, organizations that utilized knowledge management for advertising purposes or unknown reasons, often faced difficulties in implementation and project results are not satisfactory.

Objectives

Regarding the need to explain the purpose of each project prior to implement it, and knowledge management relationship with strategic management, knowledge management objectives should be drafted for the purposes of strategic management. For this purpose, initially the current condition of knowledge in organization and staffs determined with the help of knowledge management and it will be used as one of the considered aspects in strategic management (evaluating internal, external and competitive factors). However, after codifying strategies in strategic management, strategies and goals of knowledge management can be codified in accordance those strategies. At this stage, through answering questions such as "what knowledge do organization have?" "What is the state of organization knowledge?", "What knowledge should organization gain?", and "What should be the state of knowledge? Can help the process of codifying objectives. (Tiwana, 2000)

Knowledge management purposes can be considered at three levels: strategic, tactical and operational. In strategic level, long-term vision and objectives of the organization, and in tactical level developmental policies and short-term goals related to operational needs, and in operational level, processes, internal regulations and routines are regarded.

Indian Institution of Higher Education stated "help to achieve the defined vision, increase competitiveness, productivity and organizational efficiency in customer service, respond to rapidly changing environmental and economic" as its goals for implementing knowledge management processes (Basu and Sengupta, 2007). At Czech universities the purpose of sharing knowledge defined as developing knowledge and extracting intellectual capitals. (Cech and Bures, 2000) While knowledge management projects in educational environments of United States initiated with the aim of creating a systematic and clear process that moreover to develop individual and organizational learning, increase organizational memory (a knowledge which is saved to be used in future). (Piccoli, 2000)

Some of the goals which are followed in implementing knowledge management at the above organizations are in the strategic level such as helping organization to achieve its vision. Some others are in tactical level, such as increasing competitiveness in service, and improving educational process can be classified as third level.

Decision-makers should clearly indicate the project objectives before proceeding to the design and implementation of knowledge management. In fact, these goals set the general direction of knowledge management movement.

Scope

After setting goals, a section, staffs, or specific responsibilities of organization elected as pilot for implementing knowledge management process and after getting feedbacks and the confirm success of it, it can be applied to other people or more areas. This scope can range from physical, department, process, responsibilities, procedures or specific activities of the organization that however it is advised to include areas with robust knowledge, valuable activities, and talented staffs. It should be noted that in selecting the pilot area, short duration of time spent on it will be very important. It should be as short as possible so extending it won't be a problem. Define and limit the scope of application of knowledge management has various outcomes such as increased level of success, quicker and more accurate assessment and review, creating culture, and facilitating the development of knowledge management in entire organization. (Goory, 2007; Bergeron, 2003)

The scope of utilization in case studies are: research and educational activities of faculty members of Indian higher education Institute (Basu and Sengupta, 2007) , activities of graduate students and professors and managerial activities of the Czech University (Cech and Bures, 2000) educational and research activities of students, alumni and professors of universities of United States (Piccoli,2000).

Organizing

Organization is very important in knowledge management and can be effective in successfully implement it. In general, structure and organization of knowledge management projects should be determined to initiate them. project manager, and the relevant sub-group of internal and external consultants, senior managers of organization or departments, project sponsors, team of users, work groups (placed in strategic, operational, technological, financial, human resources, marketing, construction, cultural, motivational and etc.) the network of experts, considered centers including real or virtual are some of the issues that must be specified at the beginning of the project with the tasks of each category. In addition, because people are like pillars of knowledge management, user teams should be identified and classified and then, the most suitable and most motivated people should be considered as heroes or leaders of the project (Tiwana, 2000).

Out of examined cases, in the second case, holding virtual assembly for professors to discuss and select interested professors as heroes and the core of knowledge management has been mentioned (Basu and Sengupta, 2007). In Czech university, the central repository of knowledge is considered for knowledge sharing. Four categories of university graduate students, doctoral students, professors offering courses, and members of the management team are considered. Regarding the structure of universities and relative independence of complexes and colleges, while supporting senior managers, knowledge management implementation approach was bottom to top; whereas, applying the principles of knowledge management has started and run paralleled in all colleges (Cech and Bures, 2000). While in United States, three groups of professors and researchers, graduates, and students nearing graduation and studying are chosen for for the three sectors of search, production and learning in virtual web-based learning environment have been taken into the account (Piccoli, 2000).

RESEARCH METHOD

Knowledge strategies or general implementation of it should be initially specified at the beginning of knowledge management project. Knowledge strategies are codified with complete recognition of internal and external environment of organization and concerning factors such as ambiguousness and level of uncertainty in the future of organization, flexibility in various levels of strategic, structural, and functional levels and routine activities, business process and empowering IT filed, and selecting one or a mixture of creating or sharing knowledge approaches, creating innovation in high levels of organization and delivering it to lower levels or concentrating on goals of lower levels and functional ideas, enhancing structure and flow of knowledge or create a new structure, transferring knowledge or integrate it, privatizing knowledge or documenting information and digitalizing them. For example, if more changes and ambiguousness is considered in future of the organization, then the strategies should tend toward transferring knowledge rather than coding them. (Bergeron, 2003) After determining strategies and general methods, it will be time to determine minor methods or functional programs. In fact, these programs determine the methods of implementing knowledge management descriptively and in details.

Some methods that Taiwanese hospitals are considered for their nursing section are includes: identifying and classifying nursing activities, identifying important activities of knowledge management for each group, determining knowledge management techniques for each group, investigating empowering IT section, informing and training nurses, finding registered knowledge repository through utilizing online directories and searching in databases, connecting nurses to all informational systems (electronic hygienic registration, clinical decision support systems, relating recommendations, medicine knowledge databases) (Hsia et al., 2006).

Indian Institute of Higher Education provided some programs such as preparing infrastructures and facilitating high end infrastructural facilities according to international standards, determining research interests of professors, creating consultancy and discussion consolations, research and development and organizing managerial systems in accordance to time and utilizing present capacities in industries and other organizations, increasing internet bandwidth, sharing experiments with professors of other universities and industry managers through holding national and international conferences, presenting some methodologies for automatic knowledge gaining and utilizing through work procedures, evaluating efficiency of professors, mining projects and students' interning reports, encouraging members to persuade their education, attending national and international conferences and research opportunities, presenting weekly progressive reports to professors each summer and determine conventions they have to attend, financial rewards for research activities, forcing members to learn new technologies and revising educational programs, polling students and professors about work procedures, holding courses of profit developing, create and share knowledge for managers and consultants, announcing work results of active professors in this filed and restructuring to create motivation and increase academic activities for faculty members.(Basu and Sengupta, 2007)

Czech universities considered three general aspects of knowledge management. These aspects include: selected knowledge activities, training staffs and considering traditional identity of university. In the first aspect, two processes of creating knowledge and sharing knowledge is regarded. This project focused on sharing knowledge assuming that creating knowledge in universities has good overall condition and in accordance central repository of knowledge has been created.

Methods of knowledge management is different in organization, but in spite of this fact, in all organizations in determining workflow two aspects of managerial and cultural issues should be considered. Many organizations failed in implementing effective knowledge management because they ran the project without noticing human dimensions (dominant culture of organization, lack of familiarity with knowledge management and its benefits, office relations, believe and actual support of managers) (Goory, 2007). Moreover, below points should be noticed:

- Create work groups from various fields, these peoples should be familiar with IT technologies and interested in it
- Providing technical infrastructures (cultural, work, office, and communicational, etc.)
- Implementing main plans and technical tasks of management (identifying and evaluating present knowledge, creating knowledge roadmap, gaining knowledge and saving it, creating knowledge repositories, knowledge committee, expert network, etc.)
- Identifying important activities on that section and correcting procedures and structures
- Innovation and commitment of users
- Training users and managers and establishing learning circles
- Designing reward structure
- Time management thought the design and implementation of project

CONCLUSION

It seems knowledge management process has been conducted completely in mentioned case studies and I spite of limitation and barriers had acceptable results. Achieved results shoed that proper and successful implementation of knowledge management helps organization to reach its goal and and vision and will have acceptable results. A framework for design and implement of knowledge management in universities is suggested in this article. IT is clear that there is enough motivation for implementation of knowledge management in most of the people and can reach suitable results through effective knowledge management. Most of the organization because of lack of noticing key factors and human aspects (such as long time of implementation, not enough interactions between people and universities, lack of infrastructures and commitment of high ranked managers) have failed in implementing knowledge management. General suggestions for improving this process with emphasizing of eight mentioned aspects are:

- Convergence of knowledge management project with future vision of organization
- Noticing connection of knowledge management with strategic management
- Full support of first level managers and commitment to important of design and implementation of knowledge management

-Begin project with a small section of university having knowledge capabilities and more motivations

-Fast design and implementation of project

-Facilitating technological infrastructures through IT capabilities

-Noticing cultural characteristics of organization and conducting various programs to prepare cultural atmosphere for accepting and utilizing knowledge management

-Necessary training for utilizing technology and knowledge management methods

-Create knowledge core (Knowledge hero) and specifically noticing it

-knowledge management method should be suitable for organization condition and localized

-Implementing structural reforms for efficient implementation of project

-Evaluating successfulness of knowledge management implementation and in case of success expand it to other part of organization

-Announcing achievements and results of implementing knowledge management

-Revising limitation and barriers and solve the issues

LIMITATIONS AND RECOMMEDNATIONS

Clearly implementing and running knowledge management in any organization will face some difficulties. Indian Institute of Higher Education in implementing and running knowledge management faced various difficulties such as lack of marketing for attending discussion conversion and lack of clearness in stating its purposes, unofficial knowledge sharing culture, low connection with other universities' professors, minimum try for forming teams and groups for longer duties and projects, knowledge interaction limited to rooms or groups and direct connections, relating knowledge innovation to personal goals instead or organization goals, lack of feedback, etc.

Identifying and predicting limitation and problems can help in reducing them. These limitations can be divided into general categories of cultural and motivational, technological, infrastructural, financial, managerial, and implementation of knowledge management.

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— This article does not have any appendix. —