

# Technology Role In Higher Education And Its Impact On Knowledge Facilitation

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**Abstract:** In order to facilitate and enhance Knowledge Management with the adoption and use of ICT, there is a need for developing new methods, tools and techniques in the development of KM systems frameworks, knowledge processes and knowledge technologies to promote effective management of knowledge for improved service deliveries in higher education. This paper focuses on the conceptual framework of Knowledge Management and Exchange as a key driver of innovation - an essential component in the promotion of growing academic networks at regional, national and international levels. In addition, the paper identifies several research issues to bridge the gap that currently exists between the requirements of education, business communities and policymakers' conceptions and priorities around innovation and entrepreneurial management to address the different emerging projects and challenges in using ICT to enhance KM in higher education.

**Index Terms:** Knowledge exchange, knowledge transfer, knowledge sharing, knowledge management, learning organization, research.

## 1 INTRODUCTION

The Knowledge is a critical organizational resource that provides a sustainable competitive advantage in a competitive and dynamic economy (e.g., Davenport & Prusak, 1998; Foss & Pedersen, 2002; Grant, 1996; Spender & Grant, 1996). To gain a competitive advantage it is necessary but insufficient for organizations to rely on staffing and training systems that focus on selecting employees who have specific knowledge, skills, abilities, or competencies or helping employees acquire them (Brown & Duguid, 1991). Organizations must also consider how to transfer expertise and knowledge from experts who have it to novices who need to know (Hinds, Patterson, & Pfeffer, 2001). That is, organizations need to emphasize and more effectively exploit knowledge-based resources that already exist within the organization (Damodaran & Olphert, 2000; Davenport & Prusak, 1998; Spender & Grant, 1996). As one knowledge-centered activity, knowledge sharing is the fundamental means through which employees can contribute to knowledge application, innovation, and ultimately the competitive advantage of the organization (Jackson, Chuang, Harden, Jiang, & Joseph, 2006). Knowledge sharing between employees and within and across teams allows organizations to exploit and capitalize on knowledge-based resources (Cabrera & Cabrera, 2005; Damodaran & Olphert, 2000; Davenport & Prusak, 1998).

Research has shown that knowledge sharing and combination is positively related to reductions in production costs, faster completion of new product development projects, team performance, firm innovation capabilities, and firm performance including sales growth and revenue from new products and services (e.g., Arthur & Huntley, 2005; Collins & Smith, 2006; Cummings, 2004; Hansen, 2002; Lin, 2007d; Mesmer-Magnus & DeChurch, 2009). Because of the potential benefits that can be realized from knowledge sharing, many organizations have invested considerable time and money into knowledge management (KM) initiatives including the development of knowledge management systems (KMS) which use state-of-the-art technology to facilitate the collection, storage, and distribution of knowledge. Underpinning the role of pioneering technologies in facilitating exchange of knowledge and information exchange processes relationships which exist between university-industry, and challenges faced by rapid changes in technology and how exchange of knowledge will combat technological changes, a challenge ahead. It is built around the current role and application of Information and Technology (IT) infrastructure for practice in the co-operative knowledge-based exchange within the economies and the role of Higher Education Institutions (HEIs) within those economies. KM deals with the analysis and technical support of practices used in an organization to identify, create, represent, distribute and enable the adoption and leveraging of good collaborative knowledge management and exchange processes. Since effective KM and exchange is an increasingly important source of competitive advantage, the application and use of ICT to support KM in higher education is currently requires a new conceptual approach and research agenda to address new challenges. ICT uses in KM provide us with the potential for greatly enhanced access to knowledge combined with the challenge of how to manage the access (Hawkins, 2000). In addition, it promises improvements in the quality, efficiency, and effectiveness of higher education process; and draws solutions from and contributes to multiple disciplines including management, information retrieval, artificial intelligence, and organizational behavior.

## Why Knowledge Exchange?

Knowledge exchange is an important way to share, replicate, and improve to achieve an objective. Stakeholders and other development practitioners usually learn from the practical experience of other who have gone through, or are going

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through similar problems or set of parameters in a give situation. Hence it is an excellent approach to stay connected and access knowledge and identify solutions. What can be expected from knowledge exchange?

- Transformations in scholarly communication: Open Access, e- publishing, research infrastructure, especially for primary data.
- Creating a Common Information Environment: Coordination of Digitization activities, International collaboration, building interoperable information structures.
- Transfer and Innovation: Focus on creating and implementing the technologies that researchers need to stay world class.

## Role of Technology in Knowledge Exchange and Management

The role and adoption of ICT in the current times has been a centre of focus in inspiring the strategic roles of universities towards economic growth and innovation. As the role of information technology in knowledge management processes is catalyzing the rate of knowledge transfer and creation, there is always a need to enhance and facilitate Knowledge Management (KM) to innovate new methods, tools and techniques in the development of KM systems frameworks. It is eventually resulting in promotion knowledge processes and knowledge technologies for an effective management of knowledge for improved service deliveries in higher education. However, it is difficult to choose what type of IT solutions to deploy in support of KM initiatives. There are two basic approaches to KM for which IT can provide support: codification and personalization (Hansen et al. 1999). With the codification approach, more explicit and structured knowledge is codified and stored in knowledge bases. The main role of IT here is to help people share knowledge through common storage so as to achieve economic reuse of knowledge. With the personalization approach, more tacit and unstructured knowledge is shared largely through direct personal communication. The main role of IT here is to help people locate each other and communicate so as to achieve complex knowledge transfer. Wiig (1993) considers KM in organizations from three perspectives: business perspective, management perspective, and hands-on perspectives; with each perspective having different horizon and purposes. The business perspective focus on why, where and to what extent the organization must invest in or exploit knowledge, and looks at strategies, products and services, alliance, acquisitions or divestments from knowledge-related point of view. The management perspective focuses on determining, organizing, directing, facilitating, and monitoring knowledge-related practices and activities required to achieve the desired business strategies and objectives. The hands-on perspective on the other hand focuses on applying the expertise to conduct explicit knowledge-related tasks. Knowledge management is not about managing technology alone, but is about managing how human beings can share their knowledge effectively.

## Proposed Organizational Learning and Knowledge Exchange Model

Our research is a study in bringing a new dimension in knowledge exchange management with reference to higher

education. The proposed model is an innovative deduction of interaction between three major variables of knowledge exchange. An organizational learning is a key dimension to KM, which involves a continuous assessment of organizational experience, converting that experience into knowledge, and making it accessible to the entire organization. Figure1. Illustrates a proposed organizational learning and knowledge exchange model. The proposed model establishes a relationship between the components of organizational learning, knowledge exchange and sharing using ICT. In this model the stakeholder represents Government, university, academicians, students, industry, community, etc.

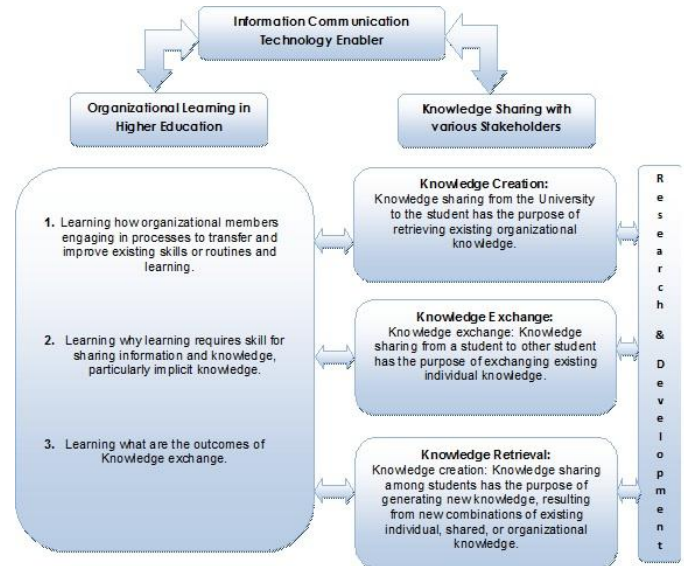


Figure 1: Proposed Organizational Learning and Knowledge Exchange Model

## Technology Role in Higher Education and Research

Knowledge, innovation and Information and Communication Technologies (ICTs) have had strong repercussions on many economic sectors, e.g. the informatics and communication, finance, and transportation sectors (Foray, 2004; Boyer, 2002). The knowledge-based economy sets a new scene for education and scientific research activities and new challenges and promises for higher education. ICTs are a very powerful tool for diffusing knowledge and information, and advanced scientific research. Hence, scientific research in many fields has also been revolutionised by the new possibilities offered by ICTs, from digitisation of information to new recording, simulation and data processing possibilities (Atkins and al., 2003). The advances in modern communication are revolutionizing the exchange of ideas and knowledge. Consequently we are witnessing one of the most visible impacts of ICTs with instant access to data and information in a digital form that allows manipulations that are sometimes not otherwise possible. However, research scientists need to be given adequate training in order to acquire the necessary skills to enable them use computers and other ICT facilities and services. Obioha (2005) stated that some of the achievements that could be ascribed to ICT tools usage include quick search and easy access to information, varieties of information, ease and speed in processing information, and increased knowledge. The blending of

computers and electronic communications has dramatically enhanced the output and productivity of researchers in almost all domains ranging from higher education to space technology. Today it is obviously strategically important for any higher education organization to realize valuable knowledge and information can no doubt be greatly improved if IT is strategically and proactively embraced in support of the institution's mission. Technology has amplified the availability of open content resources globally and they have made their presence online for the convenience and savings of time and effort for students, faculty and staff. Many syllabi, lectures, class exercises, tests and simulations are now available on the Internet globally. In many disciplines higher education institutions are collaborating for the mutual improvement of research and teaching at all participating universities and colleges for knowledge exchange and beyond. Students have a greater choice on the quality teaching and learning materials. Variety of courses or parts of courses called learning objects online; some with scholarly review, in an Open Course Ware Consortium are now available online. This is affecting teaching in terms of improved delivery of great quality and with technology. The university education can more easily provide many methods for teaching a subject and improve teaching and learning by better matching the subject contents. IT has now become an integral part of the educational process in many other ways. Universities play a central role in this process, not only as producers of basic research, but also by creating human capital in the form of higher skilled labor. There are five trends that are changing the higher education globally (Gilly Salmon, 2012). The future of higher education is going to be mobile to greater lengths since mobile devices such as smart phones and tablets are now affordable and accessible than the desktops. The combination of hardware, software, and application programs has created an ideal platform for literally mobile university. Universities are gradually using social networking sites to discuss the ideas of common interest while crowd sourcing and massive online open resources (MOOC) are filling the gaps that cannot be bridged via traditional learning sources. Virtual world is another area of great importance. The universities could increasingly use virtual spaces with avatar students and teachers for innovative teaching, learning and research projects. The virtual world concept is currently enabling us to perform a job that is impossible to think in the real world. Technology has provided specialized platforms that best serve the learning needs. The technology has imparted knowledge and information that are key factors driving productivity, competitiveness and increased wealth and prosperity that universities are now prioritizing more on developing their human capital. Universities who care for creating value for the well being are managed professionally by able leaders who are well versed with the state of the art technology and invest into it. They are visionary in visualizing the future trends, building higher standards, caring about stakeholders especially the community, and work collaboratively with partners. University should be able to create a culture that encourages technological learning centre and take initiatives like seed funding (Ignoring bureaucratic lengthy budgets) and incubating research endeavors. According to Kanter, R.M (2000) "Information technology can facilitate spontaneous, instantaneous, self-organizing exchanges. But a "soft" infrastructure of trust is critical to mobilize people to work across boundaries to seize

opportunities. They must communicate easily and fluently with one another, know their part in the system, grasp the strategy, and know whom to contact with something to offer to a task at hand. Everyone should feel that they can form and join networks. Networks enhance idea generation and knowledge transfer to solve problems or implement best practices."

### **Role of Scientific Research in Higher Education**

Technology has a vital role to play in dissemination of knowledge. For an effective knowledge exchange, various stakeholders are involved directly or indirectly in making the research fruitful. With the help of technology higher education is promoting scientific knowhow. Scientific knowledge is initiated, nurtured to be transformed into viable technology. This paper emphasizes on issues and hindrances in promoting knowledge exchange and encouraging scientific research. Higher education is encouraging students and faculties to be initiators and be enterprising in starting business by establishing incubator's approach and financial incentive by seed funding for start up. Catch 'em young concept where students are exposed to scientific research environment thus creating a research mind set. Higher education needs to frame strategies in promoting scientific research through open innovation and opening research cells in specific fields. University researchers are the principal channels through which new knowledge enters the commercial domain. Henceforth close interaction between university, scientific research and students has to go hand in hand Scientific research enables university to explore possibilities of generating funds through partnerships and collaborations from various industries, government, research bodies' etc Cash flow to the higher education (Universities) is also creating a research ambience and environment which makes the respective university improving their ranking and having a competitive advantage among other universities. Due to thrust on scientific research this has enabled academicians to improve curriculum of courses by making it more applied, more meaningful and compatible with real life examples and cases. Thus the learning outcome is more effective and optimized. Scientific research has largely contributed in innovation, encouraging creativity, harping on new ideas, springing of entrepreneurial, business leaders amongst youth. This has also created an entrepreneurial and enterprising environment which ultimately boosts the industrialization and economic growth. Catch 'em young with scientific research promotes research and development at early stage of students' academic life cycle which increases job opportunities for university students etc which ultimately helps the nation. Today's order is knowledge intensive economy based on innovation, technology, research and development. Emphasis in scientific research has promoted university to be more progressive, becoming an example of a learning organization. Challenges in imparting tacit knowledge has been overcome through research, experimentation, learning by doing etc Interference of government in bridging the gap between higher education and industry can be done in one way by encouraging scientific research. Research focus at higher education level will be a stepping stone for further research studies as well as a knowledge gain for the current students in enhancing their knowledge on research work. As per Shahid Yusuf (2008) Bramwell and Wolfe "students are a major vehicle for the transfer of research finding and valuable, tacit knowledge associated with it. They are also a channel for the

transmission of knowledge from firms back to the universities, a channel informs future research and the design of the university curriculum.” Scientific research improves job opportunities and hone students to improve their employability skills. Research indeed creates value to the students which in turn helps the organization in the form of human capital investment in research and development Shahid Yusuf (2008) “Students in turn, gain a firsthand understanding of practical applications and also of the challenges firms are faced with. This tacit knowledge circulated back to the university department, can both guide the research agenda and create opening for collaborative research and development with industry” Small and medium enterprises have to combat with “500 lb gorillas” (Big corporations) in respect to research and development. Undergoing R&D, purchasing technology is costly and sometimes prices are exuberantly high as a result only large corporations can stretch their muscles. Hence forth SME’s have difficulties in getting advantage over large corporations in terms of adopting to latest technology and R&D. Whereas R&D at university level can be further nursed, ,incubated and experimented at SME’s to make research viable and affordable. SME’s encouragement especially in scientific research can bring mass revolution .SME’s can act as knowledge intermediaries between students and large corporations/government/research institutes etc Students can extend their research from the university to SME’s making it a stepping stone for students to get exposed to their abilities and capabilities which are on test too. Furthermore applying for and getting approval of patents rights, marketing, knowledge technology transfer etc in an organized way will make it commercially viable Not to forget the importance and vital role of financial institutions, banks etc who promote especially academicians and scientists to pour funds and capital investment for their respective research work to make it feasible and commercially viable which ultimately helps the society. Other than that, non financial expertise such as project management, Information Technology, helping in preparing feasibility report, risk assessment report, interacting with publishers of research journal for publication are done by the financial institutions and banks.

### Some of the Outcomes of Knowledge Exchange and Technology Transfer

SABIC has outreached its research and development program by engaging contract research programs in IP ownership, universities research institutes, and engineering companies. It has further elaborated its collaborative programs with Saudi universities in research funding under university grants, establish teaching/Research area of interest to SABIC, undergraduate research awards, participating in curriculum development and advisory committee in order to improve research infrastructures and eventually yield best knowledge and technology transfer to serve the best interest of SABIC.

### Conclusion

Universities which are strong in scientific research will have a competitive advantage. Mechanism of knowledge exchange and scientific research can be best described as a hub spoke mechanism facilitated by the higher education which ultimately benefits the stakeholders. Thus this fabric should be further strengthened. Research is a continuous process. Knowledge exchange in turn promotes further research on the research itself. Research improvement initiatives should be taken in the

culture for further improving the knowledge currency. Creditors and research promoters are vital link between higher education and research. Thus economies of research will exist. Strongest, powerful currency of today is knowledge currency which can only be appreciated by research, knowledge and technology. A new methodology for defining an effective useful knowledge management in conjunction with a conceptual framework for using ICT to enhance KM in higher education is proposed. The proposed framework highlights the relationships and interplay between higher education process, KM enabling ICT, KM processes, and KM outcomes as constituting the key elements of the framework and points out essential issues and requirements for developing the framework. The important role of ICT in creating knowledge, and effectively distribute it, as well as managing it through technologies has been described. The rapid developments in the field of Information and Communication Technology (ICT) and utilization of e-learning tools) have become essentials to educational processes. Theoretically, the proposed framework gives a first understanding of a methodology for developing a framework for using ICT to enhance KM in higher education by defining the key issues that should be considered when developing an effective KM framework, while the research agenda highlight new areas for further research that should be tackled to address emerging challenges. Although the paper is based on synthesis of several pieces of extant research and therefore still requires empirical evaluation and testing, it is hoped that the ideas, conceptual approach, discussion, and research issues set forth in this paper represent a contribution to the literature on KM, higher education, and ICT use for each area and should stimulate interest and future work by KM researchers. Making this world a better place to live today and dream of a safe place for tomorrow can be achieved by injecting research at grass root level. Government focus on R & D, university research environment etc which will not just graduate mere students but will produce scientist, innovators, entrepreneurs, technology leaders etc which ultimately escalates the ranking of not only the nation and the university but also the individual.

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