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Knowledge Management and Innovation: An Integrative View

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Abstract

Innovation has taken the centre stage in the knowledge era where the innovation is the key for success. Three broad categories of innovation have been identified in the literature: strategic innovation management to assist in managing the organization in turbulent environment, management of innovative change initiatives and innovation through knowledge creation and application i.e. Knowledge Management (KM). Large body of knowledge already exists in the first two categories while the third area is relatively less explored. Therefore, in this paper a multidisciplinary review of literature deriving insights from various areas of knowledge and the existing models have been conducted to understand the interlinkage between KM and innovation leading to sustainable competitive advantage.

Keywords*: Knowledge Management, Innovation, KM practices, Explicit and Tacit knowledge, SECI model, Ba Model*

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1. INTRODUCTION

In the globalized knowledge economy, companies apply innovation as their inherent competence to deal with competition, diversification of product and services, quality, market share and profit. Three broad categories of innovation have been identified in the literature: strategic innovation management to assist the organization in the challenges faced by its environment, management of innovative change initiatives and innovation through knowledge creation and application i.e. KM **(Nonaka and Takeuchi, 2004)**. The concept of knowledge, as major determinant for global competitiveness, has received significant attention in recent years. According to **Drucker (1994)** the society that is emerging is dependent on the development and application of new knowledges: 'knowledge is being applied to knowledge itself'.

Organizations have realized that the key to innovation lies in knowledge and its application. Closely linked with innovation is the body of knowledge referred to collectively as Knowledge Management (KM). Many successful companies have found that KM strategies and practices are central to ongoing innovation **(Boutellier et al., 1999; David and Foray, 2001; AD Little, 2001; Tidd et al., 1997)**. Within each of these categories, innovation can be ranked from incremental to breakthrough **(Tushman et al., 1997)**. The paper is organized as follows: initial section starts with the introduction followed with the literature review on KM and Innovation. Research methodology used is the next section. The fourth section discusses linkage between the two concepts followed by KM as a predictor of innovation (KM models approach). Then the paper concludes with discussion and conclusion.

2. LITERATURE REVIEW

2.1 Knowledge and Knowledge Management

Knowledge is a reality since the origins of humanity **(Bell, 1974)**. The spiritual literature of the Indian culture was given the name of Veda. The Sanskrit word *veda* means knowledge or revelation. In ancient Greece, knowledge is defined as a justified belief that increases an entity's capacity for effective action **(Huber 1991; Nonaka 1994)**. 'Knowledge is information in the mind, in a context which allows it to be transformed into action' **(Hunter, 1999). Zack (1999)** purported knowledge as the fundamental factor of competition. According to him organizations with superior knowledge are better equipped to coordinate and combine their resources and capabilities in such creative and unique ways that they provide higher values to their customers.

The study of KM is not very recent rather the discipline has emerged in the last two decades. The discipline is very vast and has roots in many other areas of study. Knowledge is seen at the centre of global economic transformation **(Bell, 1978)**, competitive advantage of an organization **(Mayo and Lank, 1994)** and a shift from 'info-war' to 'k-warfare' (knowledge warfare) **(Baumard, 1996). Holsapple and Joshi (2004)** defined KM as an entity's systematic and deliberate efforts to expend, cultivate, and apply available knowledge in ways that add value to the entity in the sense of positive results in accomplishing its objectives or fulfilling its purpose. Bishop et al. (2008) termed it as a method of exploiting, or transforming knowledge as an asset for organizational use to help continuous improvement. In the recent past KM has received a lot of attention by the corporate world as it has contributed towards the growth of knowledge-intensive businesses in the economy.

KM literature has various views, paradigms, models, propositions and linkages with other fields. The gist of all this is to define KM, its value, benefits, different strategies, etc. As the field matures, KM compels one to examine all approaches to sharing information and knowledge, informal and formal, social and technological. The various facets related to KM are coming into picture. The picture is blurred but there are few facts which have gained acceptance. Although definitions and schools of KM vary in their description of KM, there seems to be a consensus that it is a process of capturing and sharing knowledge among people to create additional value **(Dunning, 1993)**. As **Evanschitzky et al. (2007)** state: 'To be of value to the organization, the transfer of knowledge should lead to changes in behaviour and to changes in practices and policies, and to the development of new ideas, processes, practices, and policies'. Thus, it can be said that it fosters creativity and innovation. The challenge is to harness knowledge workers' creative ideas and convert them into reality **(Sinha et al., 2012)**.

As we have discussed that KM has many dimensions, the field seems to be very complicated. To add more dimensions, some researches relate it to the competitive advantages, and some relate it to e-business (Lin and Lee, 2004); some associate this to organizational learning, and some link up it to organizational innovation (Darroch, 2005; Davenport and Prusak, 1998).The shift to a knowledge based economy has added the dimension of knowledge to the existing set of factors of production. Now business location decisions are not based on the availability of cheap land, low-cost labour, availability of capital and raw materials alone. The ability of a locality to supply a company's need for information and knowledge assets has become paramount in economic development (Jorbae and Alliance, 2001). There have been very few studies linking KM and innovation using a multi-disciplinary approach. This paper a multidisciplinary review of literature deriving insights from various areas of knowledge and the existing models have been conducted to understand the interlinkage between KM and innovation leading to sustainable competitive advantage.

2.2 Innovation

Innovation has been defined in different ways from incremental to radical, process to product, technological to organizational. The definition by economist **Schumpeter (1934)** is, 'Innovation is the commercial or industrial application of something new—a new product, process or method of production; a new market or sources of supply; a new form of commercial business or financial organization.' Researchers from the field of economics have articulated innovation both as a discrete product or outcome and as a process of introducing something new **(Mansfield, 1968; Kamien and Schwartz, 1975)**. Economists also consider innovation as one of the factors that stimulate increased productivity and economic growth at the industry level **(Leonard, 1971; Nelson and Winter, 1982; Kline and Rosenberg, 1986)**. Economist recognizes that technological advancement has been a powerful instrument of human progress and economic development.

Innovation is also termed as the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations (OECD, Oslo Manual, 3rd Edition, 2005). Innovation activities are all scientific, technological, organizational, financial and economic endeavours which actually, or are intended to, lead to the implementation of innovations. It is also true that innovation cannot be directly created. The successful innovation in

an organization is based on strategy, is dependent on both effective internal and external linkages, usually requires enabling mechanisms to make change happen, and only happens within a supporting organizational context (Tidd et al., 1997).Advent of information technology has been instrumental in increasing productivity, fostering collaboration and knowledge sharing within organizations as well as across organizations. Many companies have learned that information technology can help increase their innovators' productivity even before those innovations become formal projects. Information systems in organizations can help with collaboration, knowledge sharing, competitive intelligence, and in many other ways to help employees generate ideas that are both creative and potentially valuable for organizations (Gordon et al., 2008).

3. RESEARCH METHODOLOGY

To examine the relationship between KM and innovation, required data has been gathered from secondary source. This paper has performed detailed analysis of literature and articles to develop a deeper understanding of the concepts. Research papers concerning KM, KM models and innovation were accessed utilizing social sciences databases. The databases used for research are: ProQuest Central, Emerald, SAGE, Business source complete (EBSCO), and IEEE explore.

The research papers selected for the paper used the term: knowledge management, knowledge management models and/or innovation in their title. Moreover, references of all research papers selected were scanned to identify relevant research on topic. All research papers were analysed from the perspective of the theme of the paper.

4. LINKAGE BETWEEN KM AND INNOVATION

Herkema (2003) defines innovation as a knowledge process aimed at creating new knowledge geared towards the development of commercial and viable solutions. **Penrose (1959)** identified the knowledge base of a firm as its main characteristic. According to **Cavusgil et al. (2003)**, it is difficult to build and sustain an innovation program in the increasingly complex scenario due to changing customer needs, extensive competitive pressure and rapid technological change. The different technological trajectories and their technological opportunities are connected by several influencing devices and feedback mechanisms. Improvements in one technology can create totally different applications in other technologies or even totally new technological opportunities. Knowledge sharing aids in cross-fertilization effects of different technologies **(Riege, 2005)**. **(Newell et. al. 2009)** in their book 'Managing Knowledge Work and Innovation' however caution that knowledge work depends primarily on the behaviours, attitudes and motivations of those who undertake and manage it and not simply on the implementation of information systems technology.

According to **Fischer (2001)**, innovation and knowledge creation are viewed as interactive and cumulative processes contingent on the institutional set-up. Arthur Anderson Business **Consulting (1999)** notes the KM also improves the quality and quantity of innovative knowledge in an organization. **Coombs and Hull (1998)** in their work "Knowledge Management Practices for Innovation", provide an operational view that tries to find relations between the two activities. The main objective of their work is to contribute to organizations for simple, practical guidelines to improve their response to adopt changes quickly to changing market conditions, as a

fundamental ingredient for success. **Cavusgil et al. (2003)** agree that KM is a mechanism through which innovation complexity can be addressed.

The entwining relationship between innovation and knowledge is a stimulus to increase knowledge creation and its transfer in organizations. The experts have realized that to increase this knowledge base and to convert this knowledge into innovation, knowledge outside the boundaries of organization is crucial. **Ju et al., (2006)** argued that in order to get competitive advantage organizations should continuously learn from outside sources. **Messa and Testa (2004)** stated that organizations must develop the receptors that gain or absorb the external knowledge and this activity is strongly correlated to the innovation capability. According to KM experts, the management of knowledge should be business driven and strategic in outlook so as to maximize return on (intellectual) capital and to sustain business success in an era of turbulent markets and global market expansion **(Liebowitz, 2000)**. However, knowledge becomes obsolete as soon as it is created. New knowledge has to be created continuously in order for a company to survive in this competitive business world. Organizations that rapidly capture and implement new knowledge across the organization will be able to foster innovation faster as compared to those organizations that do not focus on this aspect **(Cavusgil et. al., 2003)**.

Innovation has become a necessity rather than a luxury for organizations today. Innovation is required because we cannot expect that the accumulated competence, skills, knowledge, product services and structure of the present will continue to be adequate **(Drucker, 1992)**. The new age economies have been investigating innovation in attempts to understand and hence enhance the likelihood of increasing innovation (Backing Australia's Ability, 2001; OECD 2000, 2001, 2004).The paper seeks to have a balanced view of innovation process by exploring the various KM models. The author has tried to look at the various dimensions of KM and innovation in the contemporary context while considering the models.

5. KNOWLEDGE MANAGEMENT: PREDICTOR OF INNOVATION (KM MODELS APPROACH)

Few organizations truly understand how to manage knowledge to achieve their goals after understanding the importance of knowledge as an asset **(Yu, 2005)**. To actualize KM, firms frequently turn to technology-based information systems such as knowledge repositories and expert databases **(Durcikova and Gray, 2009)**. **Duffy (2000) and Lang (2001)** argued that IT is strategically essential for global reach when organizations are geographically distributed. These rapid developments in computing capabilities and information technology were very clearly seen to be drivers for the increasingly important role of knowledge and information in society and corporate life. The surge in the flow of information and connectivity provided organizations to share a great volume of information and knowledge in a manner that had never been possible. IT has provided a weapon to the organizations to leverage the information they possess and it has become a central theme in implementing KM. A compilation of KM models has been made in Figure 1.

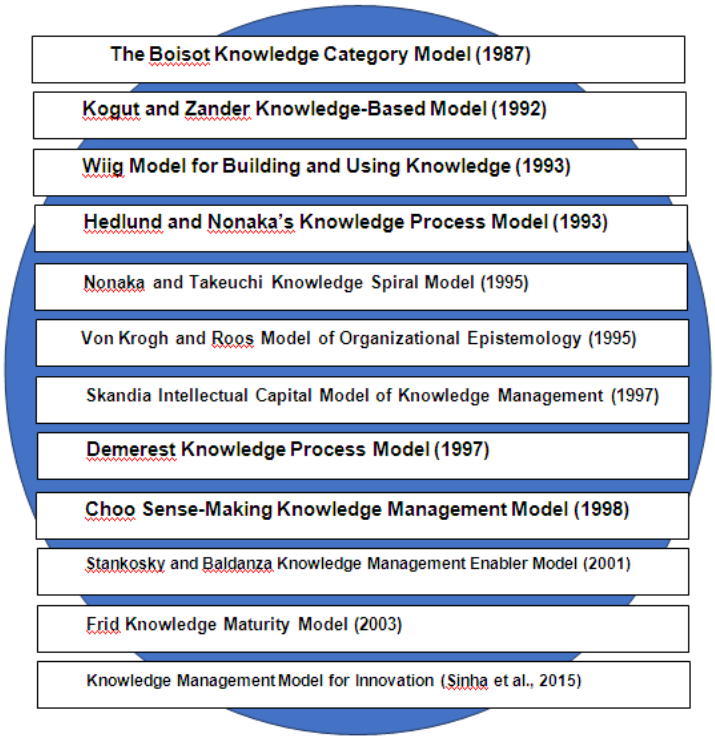

Figure 1: KM Models

Source: Compiled by the author

There are other models also like Complex Adaptive System Models of KM and the European Foundation for Quality Management (EFQM) KM Model. For the paper, the author has considered the models impacting innovation in an organization. To leverage KM effectively, organizations address KM from a social and technological point of view as well. **Abecker et al. (1999)** found that 'effective KM requires a hybrid solution; one that involves both people and technology…our long-term vision is a corporate or organizational memory, at the core of a learning organization, supporting sharing and reuse of individual and corporate knowledge'. In another study of innovation at the firm level **(Tidd et al., 1997)** have identified common components in innovative organisations. These components include strategic approaches, linkages and high involvement of staff. **Hedlund and Nonaka (1993)** claimed KM characteristics have effect on various types of activities especially innovation. It also impacts the strategies which can directly be associated with the organization's success. The main challenge, therefore, is creating an enabling knowledge society where workers would not be mere labour but building blocks of a knowledge creation framework and users of knowledge, working towards an innovation eco-system.

Knowledge as the base for competitive advantage was initially proposed by **Kogut and Zander (1992)**. "What firms do better than markets, is the creation and transfer of knowledge within the organization" is the theme of their research. The organizing principles refer to as "the organizing

knowledge that establishes the context of discourse and coordination among individuals with disparate expertise and that replicates the organization over time in correspondence to the changing expectations and identity of its members" **(Kogutand Zander, 1996)**.

Boisot's (1987) model considers knowledge as: codified or uncodified; diffused or undiffused. It deliberates that there is a spread or diffusion of knowledge across organization as reflected in the horizontal dimension of the model **(Sensuse et al., 2014)**. According to **Frid's (2003),** the KM maturity assessment levels and KM implementation can be divided into five levels. The five maturity levels are knowledge chaotic, knowledge aware, knowledge focused, knowledge managed, and knowledge centric. It also purports that the distinctive and differentiating activities that organizations should focus on are institutionalizing successful initiatives and valuing intellectual assets **(Haslinda and Sarinah, 2009). Choo (1998)** adopts a sense making approach where KM focuses on how information elements are fed into organizational actions through knowledge creation, sense and decision making **(Dalkir, 2011)**.

Experts define organization, leadership, learning and IT as the backbone of KM model. The framework developed by **Stankosky and Baldanza (2000)** has considered technology equally important as any of the other three pillars of KM i.e. organization, learning and leadership. These four pillars form the "foundation" of any KM system. Without all of them in some kind of harmony, a KM system (KMS) does not exist (**Mohamed et al., 2006**). "ITs role is emerging as an integrator of communications technology, rather than solely a keeper of information. The critical role of IT lies in its ability to support, communicate, collaborate, and help those searching for knowledge and information" **(McCampbell et al., 1999)**. Information technology and the advent of the personal computer have greatly enhanced organizational effectiveness, inter-organizational deployment, and cognitive advance **(Grover and Davenport, 2001)**.

Demerest Knowledge Process model (1997) assumes that constructed knowledge is embodied within the organization, not just through explicit programs but through a process of social interchange. In reality, the flows of knowledge transfer may be extremely rapid and circulatory as the case for some forms of action learning. The model is intrinsically linked with the social and learning process within organizations **(Sensuse et al., 2014)**. According to **Zack (1999)** the information technology plays four different roles in KM. The first one is obtaining knowledge; defining, storing, categorizing, indexing, and linking knowledge-related digital items; followed by seeking and identifying related content; and flexibly expressing the content based on the various utilization backgrounds. IT can enable rapid search, access and retrieval of information, and can support collaboration and communication between organizational members making way for innovation. In essence, it can certainly play a variety of roles to support an organization's KM processes **(Alavi and Leidner, 2001; Lee and Hong, 2002)**. The implementation of a KM system (KMS) enables the effective application of management best practices and information technology tools to deliver the best available knowledge to the right person, at just the right time, to solve a problem, make a decision, capture expertise, and so forth, while performing their work and creating scope for innovation in the organization.

In the contemporary context of KM, there is a broad collection of information technologies that supports KM which can be applied and integrated into an organization's technological platform. According to **Serban and Luan (2002)** they can be grouped into one or more of the following

categories: business intelligence, knowledge base, collaboration, content and document management, portals, customer relationship management, data mining, workflow, search, and e-learning. **Wiig (1993)** discusses the five levels of internalization of knowledge: novice, beginner, competent, expert and master. In another classification of forms of knowledge; he explains: public knowledge (explicit that can be learned and shared), sharing expertise (intellectual assets) and permanent knowledge (tacit and used without knowing), **Sensuse et al. (2014)**. It also extends that an organisation has to create and sustain a balanced intellectual capital portfolio for competitiveness.

According to Von Krogh and Roos Model of Organizational Epistemology (1995), the following aspects should by analysed: why and how the knowledge gets to the employees of a company; why and how the knowledge reaches the organization; what does it mean knowledge for the employee/organization and what are the barriers for organizational KM (Cristea and Căpaţînă, 2009). The cognitive perspective states that a cognitive system, no matter if it's human or artificial, creates representations (models) of the reality, and the process of learning appears when this representation is somehow manipulated (used in different inferences).

Skandia Intellectual Capital Model of KM (1997), explains the relevance of equity, human, customer and innovation. It also dwells the knowledge flow within and externally across the networks of partners. In the core of the framework, innovation is facilitated. Lank (1997) suggests that this model assumes a scientific approach to knowledge and assumes that intellectual capital can be transformed into commodity or assets of organizations but unfortunately, this intellectual view of KM ignores the political and social aspects of KM.

Another model proposed by **Nonaka et al. (2000)** is Ba model. The model dwells into the knowledge creation to improve innovation and learning. The SECI model is superimposed to understand the various stages of knowledge creation. The process is spiral in nature and it starts from Socialization (first quadrant) where tacit knowledge is converted into tacit knowledge. The conversion process is very difficult as tacit knowledge is involved. It requires the presence of both the parties at the same time. However, technology has removed many barriers and facilitated virtual places to have seamless interaction irrespective of the location of the people involved in the process.

The next step Externalization (second quadrant)) is to convert the tacit knowledge into explicit knowledge through dialogue and interaction. The role of technology is highly commendable in this stage. The new age companies are leveraging technology to convert the tacit knowledge of its employees, competitors, experts, customers and various stakeholders into explicit knowledge which could lead to new products and services. The third quadrant (Combination) is the stage where explicit knowledge is converted into explicit knowledge. Here the databases are continuously upgraded and help people to 'learn, unlearn and relearn' the new mantras of competitive world. The fourth quadrant (Internalization) is the stage where explicit is transformed into tacit knowledge. Companies are creating simulations, and other exercises to help people to reach to next level of understanding and creating new avenues for growth.

The spiral process starts at individual level, covers the various teams and groups and finally spans over at the organizational level. The concept of Ba is "shared space". It talks about the knowledge and its context. The moment knowledge is separated from Ba (taken out from

context), it becomes information. An organization is a collection of Ba known as "Basho" (greater Ba). Four types of Ba represent the four stages of the SECI Model. **Nonaka et al. (2000)** further explained the concept of Ba and the respective four stages considering on the basis of individual or collective interaction and the medium used (face to face or virtual). The model suggested **Skandia (2001)**, also propose the same. **Nonaka (2000)** model has been transformed into a new model in the light of technological advances.

In a more comprehensive fashion, there is a need for looking at various KM practices in Indian context. An extensive range of KM practices for a KM implementation have been identified in the literature. However, there is a dearth of such studies in Indian context. In another study to find out the relationship between KM practices and Innovation, **Sinha et al. (2015)** found that 9 KM practices impact the innovation. The model was developed in the context of Indian IT/ITES companies. The emphasis of this study shifted from "perceived importance" to what organizations do in practice in order to make their KM initiative successful. The framework developed discusses the role of the following nine KM practices in innovation: KM culture and leaders' support; KM processes; Resources for KM; Networking and alliances; KM strategy; Training and development of employees for KM; Information Technology; Assessment of KM initiatives; and Organizational Infrastructure for KM.

Organizations are more successful when they practice the philosophy of acceptance of knowledge sharing (not hoarding) as strength. Organizational culture defines the value of knowledge, and also explains the existence of the advantage of knowledge innovation in an organization. The role of top management could not be ruled out when it comes to KM initiatives. The initiatives should be supported by the KM processes and activities. According to **Skyrme and Amidon (1997)**, a framework of KM processes for identifying, capturing and diffusing important knowledge in a structured way is very necessary for the KM initiatives. Consideration of resources' availability as well as their proper allocation and management are, therefore, of prime importance for organizations in adopting KM.

Having coalition with external and internal entities encourages the KM initiatives. The formation of knowledge networks becomes an important research subject in today's turbulent environment where announcements of partnerships between knowledge-intensive companies abound **(Peña, 2002)**. In addition to alliances with various bodies, one of the means for driving the success of KM is to have a clear and well-planned strategy **(Liebowitz, 1999)**. The strategy to implement KM initiatives should be well supported by comprehensive training programs allowing employees to increase their knowledge base and skill sets. The organization should also assess the effectiveness of its endeavours by metrics that are needed to further convince management and stakeholders as to the value of KM initiatives. Another key facet for implementing KM is the development of an earmark organizational infrastructure. This implies establishing a set of roles and teams to perform knowledge related tasks **(Davenport et al., 1998)**.

6. DISCUSSION

There have been various models and views by experts in the light of the various upcoming tools and technology. There is a need to understand the various models and their applicability in the context of changing times. In the paper, authors have tried to highlight the various KM models and their respective features. KM focuses on learning, sharing and innovation. KM is not a

business strategy per se although it has a lot of influence on the corporate strategy of any organization. KM should not be considered as an IT solution for all the problems as technology is just an enabler. This is kept in mind while designing the models. This KM framework for innovation is an attempt to provide a model based on knowledge-cantered principles, knowledge-sharing infrastructure and knowledge-based initiatives.

The model suggested by **Sinha et al. (2015)** considers the relationship between KM and innovation from a broader perspective. It highlights the importance of various KM constructs impacting innovation especially in the Indian context. The model is a conceptual model and should be tested empirically for the various sectors in the Indian economy. The model can also be tested in other developing economies and can pave a way for increasing the innovation quotient of the organizations.

7. CONCLUSION

In this knowledge-driven economy, firms are becoming aware of the fact that knowledge is a resource requiring explicit and specific management policies and practices to be acquired, processed and exploited efficiently. Among other objectives, the role of KM policies and practices is to foster a firm's innovation. The challenges of the new age competition making organizations realize that there is a need to define a vision to harness the vast amount of internal, organization-based knowledge as well as externally derived knowledge sources to support the KM mission i.e. to conduct and communicate the research and development that leads to conceptual breakthroughs and new applications that support national and global well-being.

There have been many common factors in various models that feature in this paper which are applicable to all the 21st century organizations. The factors include the receptivity of the people involved in the initiatives through a culture of support and top management's commitment. Also, the training of employees and a well-defined KM strategy facilitate innovation in the organization. The technology has to be the continuous support for the initiatives where the tools assist the various stakeholders to have a constant dialogue amongst each other. The organizations should have forums and platforms to exchange knowledge with the external sources also in order to share and develop explicit as well as tacit knowledge. The model for managing diverse and distributed collections of organizational knowledge that is being looked for would include enabling greater sharing and openness in the use of that knowledge and in supporting an overall learning organization environment.

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