An evolutionary and interpretive perspective to knowledge management

Chalee Vorakulpipat and Yacine Rezgui

Abstract

Purpose – The purpose of the paper is to provide a review of knowledge management (KM) literature by adapting and extending McElroy’s KM generations model.

Design/methodology/approach – The paper draws from a range of KM research published in the academic and trade literature. An interpretive stance is adopted to provide a holistic understanding and interpretation of organizational KM research and related knowledge management systems (KMS) and models.

Findings – To be effective organizations need not only to negotiate their migration from a knowledge sharing (first generation) to a knowledge creation (second generation) culture, but also to create sustained organizational and societal values. The latter form the third generation KM and represent key challenges faced by modern organizations. A true value creation culture is nurtured through a blended approach that factors a number of perspectives to KM, including human networks, social capital, intellectual capital, technology assets, and change processes.

Research limitations/implications – The interpretive approach adopted throughout the review is limited to, and focused on, understanding the implementation and organizational implications of KM initiatives and technology.

Originality/value – While value creation focuses on the organizational and societal impact of knowledge management, the paper describes how human networks, social capital, intellectual capital, technology assets, and change processes emerge as essential conditions to enable knowledge value creation.

Keywords Knowledge management, Knowledge sharing, Knowledge creation, Information systems

Paper type Literature review

1. Introduction

In recent years, knowledge management (KM) has attracted considerable interest from the academic community. A growing number of organizations have included knowledge management into their strategies and have as a result reported:

- business process efficiency improvements;
- better-organized communities; and
- higher staff motivation (Nonaka and Takeuchi, 1995).

Knowledge, including knowing and reasons for knowing, has attracted considerable interest from Western and Eastern philosophers (Wiig, 2000). However, knowledge related research has suffered from a lack of integration with other theories. This was a determinant factor in the gradual emergence of a KM perspective as an established discipline (Wiig, 2000).

KM is a broad and expanding topic (Scarborough et al., 1999). In reviewing the theory and literature of this field (Venters, 2001), it is necessary to commit to an identifiable epistemic flavor of approach. Many such approaches to knowledge management are identified, and have been categorized in various ways (Alavi and Leidner, 2001; Earl, 2001; McAdam and...
McCreedy, 1999; Schultze, 1998). Schultze (1998) engages Burrell and Morgan’s (1979) framework in order to identify a two-fold typology of knowledge within the debate about knowledge management; objectivist and subjectivist. An objectivist approach views knowledge as objects to be discovered (Hedlund, 1994). In identifying the existence of knowledge in various forms and locations, technology is employed in the codification of such knowledge objects (Hansen et al., 1999). In contrast, a subjectivist approach suggests knowledge is inherently identified and linked to human experience and the social practice of knowing, as seen for example in the work of Tenkasi and Boland (1996) and Brown and Duguid (1998). In adopting such a stance, it is contended that knowledge is continuously shaped by the social practice of communities and institutions.

Alavi and Leidner (2001) note that knowledge may be viewed from five different perspectives:

1. State of mind perspective emphasizing knowing and understanding through experience and study (Schubert et al., 1998).
2. Object perspective defining knowledge as a thing to be stored and manipulated and a process of simultaneously knowing and action (Carlsson et al., 1996; McQueen, 1998; Zack, 1998).
4. Condition perspective emphasizing a condition of information access (McQueen, 1998).
5. Capability perspective viewing knowledge as a capability with the potential for influencing future action (Carlsson et al., 1996).

Similarly, these different views of knowledge lead to different perspectives of KM:

- information technology (IT) perspective focusing on the use of various technologies to acquire or store knowledge resources (Borghoff and Pareschi, 1998);
- socialization perspective focusing on understanding organizational nature (Becerra-Fernandez and Sabherwal, 2001; Gold et al., 2001); and
- information system (IS) perspective focusing on both IT and organizational capability perspectives and emphasizing the use of knowledge management systems (KMS) (Schultze and Leidner, 2002; Tiwana, 2000).

This latter perspective forms the focus of the present paper.

The paper first presents a taxonomy of KM drawn from an Information Systems (IS) research perspective. This is followed by a review of knowledge management systems (KMS). Then, the paper provides a summary of the three main generations of KM (Koenig, 2002; McElroy, 1999; Snowden, 2002). A gap is then identified in current KM evolution theories. The paper adopts and extends McElroy’s (1999) generations of KM by identifying a third generation: Value Creation. Therefore, the following sections adopt McElroy’s (1999) KM generations model and present a review of knowledge sharing and knowledge creation with a focus on IT and socialization. A review of the proposed “third generation KM” (value creation) is then presented. The final section concludes the paper and presents a summary of key findings from the review.

2. Taxonomy of KM in information systems research

Schultze and Leidner (2002) provide a taxonomy of published KM research based on a theoretical framework developed by Deetz (1996). This framework is an adaptation of Burrell and Morgan’s (1979) paradigms of social and organizational inquiry. Deetz’s framework relates to the notions of subjectivity and objectivity in organizational science discourses (Figure 1).

The framework is structured into four discourses: the normative, the interpretive, the critical and the dialogic. The normative discourse is concerned with codification, normalization and the search for law-like relationships. As a result, the research findings could be both generalizable and cumulative. The interpretive discourse emphasizes the social and
organizational issues. Researchers are assumed to create a coherent, consensual, and unified representation of the organizational reality. The critical discourse aims to expose and challenge the theories. The dialogic discourse bears a number of similarities with the critical discourse, but considers power and domination as situational factors, not owned by individuals.

Most KM articles are classified in the normative discourse. These provide systems to facilitate the storing and transferring of knowledge. Some articles are classified in the interpretive discourse and aim at coordinating collective action in systems of distributed knowledge. Very few articles fall within the critical and dialogic discourses, as it is difficult to identify related themes in Deetz’s dissensus discourse (Figure 1). As suggested by Schultze and Leidner (2002):

- the normative discourse is suitable for studying technology solutions for KM;
- the interpretive discourse is more adept at understanding the implementation and organizational implication of KM initiatives and technology;
- the critical discourse is well suited to highlighting the social inequities underlying organizational distinction; and
- the dialogic discourse is best suited for the examination of contradictions in KM.

The paper adopts an interpretive stance as it aims to provide a holistic understanding and interpretation of organizational KM underpinned by the use of technology.

3. Knowledge management systems

Knowledge management systems (KMS) refer to a class of information systems applied to managing organizational knowledge (Alavi and Leidner, 2001). That is, they are IT-based systems developed to support and enhance the organizational processes of knowledge sharing, transfer, retrieval, and creation. Many KM initiatives rely on IT as an important enabler, and tend for some of them to overlook the socio-cultural aspects that underpin knowledge management (Davenport and Prusak, 1998; Malhotra, 1999; O’Dell and Grayson, 1998).

The literature discussing applications of IT to organizational knowledge management initiatives reveals three common applications (Alavi and Leidner, 2001):
1. The coding and sharing of best practices.
2. The creation of corporate knowledge directories.
3. The creation of knowledge networks.

One of the most common applications that falls under category (1) is internal benchmarking with the aim of transferring and sharing internal best practices (KPMG, 1998; O’Dell and Grayson, 1998).

While KMS tend to follow the normative trend, the interpretive approach is best reflected in environments supporting the development of communities of practice (CoP) (Saint-Onge and Wallace, 2002; Wenger et al., 2002). The success of these individually led initiatives has gradually attracted interest from both the research community and corporate senior management staff within and outside these organizations. They relate more generally to groups of individuals within or across organizational boundaries that share a common concern, a set of problems, or a passion about a topic, and who deepen their understanding and knowledge of this area by interacting using face-to-face or virtual means (synchronous and asynchronous) on a continuous basis (Wenger et al., 2002). The gaining popularity of Communities of Practice has been reinforced by the quest for innovation and value creation as it is widely recognized that these only happen when empowered individuals are well connected using a variety of means and communication mediums both inside and outside the organization.

4. Generations of knowledge management

The scope and definition of KM has evolved over the years. At present, there are at least three accounts of generations of KM (Firestone and McElroy, 2003):

1. The first account is proposed by Koenig (2002). He argues that the first stage of KM evolution focuses on IT-driven KM or knowledge sharing. The use of IT, in particular internet/intranet, and tools for knowledge sharing and transfer can create value-added to the enterprise. Moreover, this stage emphasizes “best practices” and “lessons learned”. On the other hand, the second stage focuses on socialization issues, including human and cultural factors. This stage stresses the importance of organization learning applied from the work of Senge (1990), knowledge creation adapted from the SECI model (Nonaka and Takeuchi, 1995), and Communities of Practice (Wenger et al., 2002). This first account suggests that the next generation of KM will focus on taxonomy development and content management.

2. The second account is proposed by Snowden (2002). The first stage of his theory emphasizes the sharing and transfer of information for decision support. The second stage focuses on processes facilitating tacit/explicit knowledge conversion inspired by the SECI model (Nonaka and Takeuchi, 1995). Snowden (2002) envisions the next age of KM as:
   - knowledge viewed as a thing and a view;
   - centralization of context, narrative and content management;
   - an understanding of organizations as engaged in sensemaking; and
   - and scientific management and mechanistic models.

3. The third account is proposed by McElroy (1999). He identifies two generations of KM. The first generation focuses on “supply-side KM” or knowledge sharing: “It’s all about capturing, codifying, and sharing valuable knowledge, and getting the right information to the right people at the right time” (McElroy, 1999); while his second generation emphasizes “demand-side KM” or knowledge creation. While this definition of the evolution of KM has received a wider acceptance, Firestone and McElroy (2003) argue that this perception of change relates more to the evolution of knowledge processing than to knowledge management.
Firestone and McElroy (2003) argue that the first and second accounts have many weaknesses and are not clear enough to theorize the proposed generations of KM. The difficulties in Koenig’s account begin in that the first stage makes no reference to IT support to develop "best practices” and “lessons learned”. Furthermore, in stage two, the theory does not provide the connection between:

- CoP and the work of Senge, Nonaka/Takeuchi.
- The connection between CoP and knowledge creation and innovation.

Lastly, Firestone and McElroy (2003) argue that taxonomy development and content management already exist.

Moreover, this is part of coordinating and sharing already existing knowledge. This therefore represents an extension of the first stage, and should not form the basis of the envisioned future stage. The difficulties of the second account (Snowden, 2002) are contended by Firestone and McElroy (2003). The first stage, emphasizing information distribution to decision makers, is too narrow. It is similar to Business Process Re-engineering (BPR), and ignores human factors facilitating knowledge sharing. The second stage reveals the misunderstanding of knowledge conversion and knowledge creation. Knowledge conversion in the SECI model is not defined as the whole knowledge creation. In addition, this stage does not provide an impact on KM caused by knowledge conversion. The provided argumentation (Firestone and McElroy, 2003) raises some serious concerns about Snowden’s second account of KM.

These three generations of KM are summarized in Table I. Despite the difficulties in the first and second accounts, all three accounts provide a level; of similarity: the first generation tends to focus on knowledge sharing, the second generation on knowledge creation. However, the third generation remains unclear (Firestone and McElroy, 2003). This is a gap that the present paper addresses and discusses in section 7. The paper adopts and extends McElroy’s (1999) generations of KM by identifying a third generation: Value Creation. The following sections provide a review of each the three generations of KM.

5. Knowledge sharing

Knowledge sharing can be considered as the first generation knowledge management and is described as “supply-side KM” as people can acquire supplied knowledge through knowledge sharing systems (Firestone and McElroy, 2003). Moreover, knowledge sharing is not only defined as transmitting knowledge to target receivers, but also absorbing and being used by people. It can be represented as an equation proposed by Davenport and Prusak (1998):

\[
\text{Knowledge sharing (transfer)} = \text{Transmission} + \text{Absorption (in use)}
\]

<table>
<thead>
<tr>
<th>Table I Generations of KM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Koenig’s account</td>
</tr>
<tr>
<td>----------------</td>
</tr>
<tr>
<td>First generation</td>
</tr>
<tr>
<td>Second generation</td>
</tr>
<tr>
<td>Third generation (future generation)</td>
</tr>
</tbody>
</table>
In terms of IT, knowledge sharing is defined as “IT-based KM” through the use of a number of tools and technologies, including the ones described in section 3, which enhance productivity and effectiveness (Koenig, 2002).

A shared knowledge space should be provided to exchange explicit knowledge in an organization (Alavi and Leidner, 2001). The space provided can be considered as either “physical” or “virtual”. Although IT is supposed to enable sharing of only explicit knowledge (Roberts, 2000), Bolisani and Scarso (1999) suggest that IT can also enable sharing of tacit knowledge in the form of pictures, drafts, and other means by using adapted computer applications. However, when the tacit knowledge shared is delivered, it still needs to be decoded by the human operators (Bolisani and Scarso, 1999).

In terms of business competition, trading and sharing of knowledge have become increasingly important and have forced organizations to create market spaces and places to promote knowledge sharing related activities (Choo, 2003). Interaction or conversation between people, for example, is often perceived as the simplest approach to transferring knowledge within an organization. Nevertheless, it may be inconvenient where cultural barriers exist (Davenport and Prusak, 1998). It is argued that to align knowledge sharing with organization culture, designing and implementing KM to fit the culture can be more effective than altering and changing the culture itself (McDermott and O’Dell, 2001). Moreover, organizational culture is divided into two dimensions: the visible dimension – “thing”, and the invisible dimension – “seen but unspoken” (McDermott and O’Dell, 2001). Organizations should make sharing knowledge visibly important by, for example, making it directly part of the business strategy, initiating it obliquely on to another key business, routinizing, matching the organization’s style and aligning reward (McDermott and O’Dell, 2001).

Tacit knowledge is defined as implicit and non-codifiable knowledge that is difficult to share or that is learnt by experience, “learning by doing”, and apprenticeship. To succeed in sharing tacit knowledge, it is necessary to share through know-how, the process of demonstration, and through show-how, face-to-face contact between transmitter and receiver. In other words, the transfer of know-how requires a process of show-how (Roberts, 2000).

Despite the tendency to emphasize the role of IT in KM, there is an increase of powerful arguments for a more holistic view, which recognizes the interplay between social and technical factors (Pan and Scarbrough, 1998). Therefore, a socio-technical approach to knowledge sharing is applied in many organizations. There is an example of a case study of success in knowledge sharing using this approach at Buckman Laboratories (Pan and Scarbrough, 1998). The knowledge architecture was first designed, and then a department was set up with the major responsibility of knowledge transfer. Rules have then been created for the information search system to reduce response time to customers, for example by capturing knowledge into a re-usable form. This approach emphasizes the interplay between KMS and the organizational context. It is suggested that management and leadership play a critical role in establishing the multi-level context for the effective assimilation of KM practice (Pan and Scarbrough, 1998).

In human terms, motivation can encourage people to share knowledge. In this case, Osterloh and Frey (2000) define two types of motivation in the firm: extrinsic and intrinsic motivation. First, employees are extrinsically motivated if they satisfy their needs indirectly, especially monetarily. For example, employees who mostly share knowledge win rewards. Second, motivation is intrinsic if an activity is undertaken for one’s immediate need satisfaction. In other words, employees have a self-defined goal. Employees, for instance, share knowledge in order to practice themselves or to satisfy the need for recognition in the firm. This is in line with a case study of Lotus Development Corporation showing that people who ask previously answered questions are likely to be told where the answer can be found and advised in the future to check the database before asking such questions (McDermott and O’Dell, 2001).
Trust among people can promote knowledge sharing and is important to the exchange of knowledge. “Without trust there is no knowledge sharing” (Lee, 2001; Roberts, 2000; Sveiby, 1999). Davenport and Prusak (1998) also highlight trust in knowledge sharing, noting that the transfer of informal knowledge is endangered by a particular American sense of what is and is not “real” work.

Knowledge sharing is a dynamic process or continuous learning, not a static process (Gilbert and Cordey-Hayes, 1996). Therefore, Gilbert and Cordey-Hayes (1996) provide a process framework of knowledge sharing. The aim of this conceptual framework is to track the ability of the organization to achieve knowledge transfer by investigating the organizational processes that might encourage or prohibit learning. The model leads to the development of a set of routines of knowledge sharing that are reflected in the behavior of members in organizations. Further research on knowledge transfer in strategic alliances reveals that knowledge variables such as tacitness, asset specificity, prior experience, complexity, partner protectiveness, cultural distance, and organizational distance impact the process of knowledge sharing, but establishing knowledge ambiguity can fully mediate the effects of these variables (Simonin, 1999).

The term “ontology” is now used in the context of knowledge sharing. Gruber (1995) defines ontology as “a formal, explicit specification of a shared conceptualization,” and states the use of formal ontology for specifying content-specific agreements for a variety of knowledge-sharing activities.

An understanding of the concept of knowledge sharing is important because an organization’s achievement depends on its knowledge sharing strategy. Five major points emerging from the review of knowledge sharing can be summarized as follows:

1. IT can enable both explicit knowledge and, to a lesser extent, tacit knowledge sharing.
2. Human interaction is the simplest approach to sharing knowledge within an organization.
3. KM strategies may be adapted to fit with organizational culture.
4. Motivation –, e.g. monetary rewards, recognition, and praise – can persuade people to share knowledge.
5. Trust is an important factor in enabling knowledge sharing.

6. Knowledge creation

Knowledge creation is an organizational, social, and collaborative dynamic process through interaction between tacit and explicit knowledge (Nonaka et al., 2000; Pentland, 1995). Four modes of knowledge creation through the SECI model are proposed (Nonaka et al., 2000). This contrasts with the traditional Western epistemology emphasizing the static and non-human nature of knowledge processes. This section presents different knowledge creation models. The SECI model is first presented, and followed by four models adapted from or related to the SECI model. A comparative analysis of these models is provided at the end of this section.

6.1 SECI model

The SECI model (Nonaka et al., 2000) is the spiral, interaction process of knowledge conversion between tacit and explicit knowledge. The knowledge conversion includes four
modes: socialization, externalization, combination, and internalization. The socialization highlights the conversion of tacit to new tacit knowledge through shared experience (e.g. apprenticeship). The externalization mode focuses on the conversion of tacit knowledge to explicit knowledge by creating concepts articulating tacit knowledge (e.g. metaphor, analogy and model). The combination mode refers to the conversion of explicit knowledge to new explicit knowledge that is more systematic. The internalization mode refers to embodying explicit knowledge into tacit knowledge through learning by doing.

It is required for organizations to establish place or space, “‘ba’”, to create knowledge (Nonaka and Konno, 1998). This is a requisite as knowledge cannot be created without context. “‘ba’” is a shared place, including physical or virtual, for creating knowledge through human interaction. Four types of ba within the SECI process are identified: originating ba, dialoguing ba, systemizing ba, and exercising ba. Originating ba is a common place for sharing experience through face-to-face interactions. Dialoguing ba is a place where mental models and skills are articulated by common terms or concepts. Systemizing ba is a place of collective and virtual interaction, where people can have activities through on-line networks or any computer technologies. Exercising ba is the place for embodying explicit knowledge through virtual interaction.

Knowledge assets are the inputs, outputs and moderating factors of the knowledge creating process. They are divided into four types:

1. experiential knowledge assets, consisting of the shared tacit knowledge built through organizational experiences;
2. conceptual knowledge assets, consisting of explicit knowledge articulated through images, symbols and language;
3. systemic knowledge assets, consisting of systemized and packaged; and
4. routine knowledge assets, consisting of the tacit knowledge that is routinized and embedded in the actions and practices.

To lead the knowledge creating process, top and middle managers are identified as the key persons to work on the four elements of the process (Figure 2). They have to provide the knowledge vision, develop and promote sharing of knowledge assets, create and energize ba, and continue the spiral of knowledge creation.

### 6.2 Extended SECI model

Uotila et al. (2005) designed an extended version of the SECI model to avoid the problem of ‘the black hole of regional strategy making’ that can occur due to the foresight process not rooted deeply enough into already existing structures and competences of a region. Two new knowledge conversion modes focusing on self-transcending knowledge (not yet embodied tacit knowledge) and two new ‘bas’ are added to the extension model, as shown in Figure 2.
in Figure 3. Two additional modes are identified: visualization and potentialization. The visualization mode is the conversion from self-transcending to tacit knowledge through visions, feelings, mental model, etc. This mode takes place in “imagination ba”. Forecasts, scenarios and expert-based statements can be made. However, in highly complex systems, forecasts are difficult to handle in the long term. A combination of scenarios and expert-based statements may be suitable. The potentialization mode is the conversion from tacit to self-transcending knowledge by sensing the future potentials and seeing what does not yet exist. The potentialization process takes place in “futurizing ba”. Scenarios and expert-based statements may be used in futurizing ba.

6.3 7C model

The “7C model” for understanding organizational knowledge creation is proposed by Oinas-Kukkonen (2004). The 7Cs (which consist of Connection, Concurrency, Comprehension, Communication, Conceptualization, Collaboration, and Collective intelligence) play a critical role in the knowledge creation process. The 7C model is described as the dimension of different contexts: technology, language, and organizational contexts (Lyytinen, 1987). In the technology context, Internet “connection” can provide knowledge for several “concurrent” users. In the language context, “comprehending” and “communicating” are introduced as the important factors when information is provided to users. In the organizational context, knowledge “conceptualization” can articulate knowledge through interaction among people (“collaboration”). These six “C’s lead to a greater sense of togetherness and “collective intelligence”.

The 7C model is not linear, but a multiple-cycle spiral process (Figure 4). Four key phases or sub-processes driven within the knowledge creation exercise are proposed: comprehension, communication, conceptualization, and collaboration. Comprehension refers to a process of surveying and interacting with the external environment and embodying explicit knowledge into tacit knowledge by “learning by doing” (similar to internalization in the SECI model). Communication refers to a process of sharing experiences (similar to socialization in the SECI model). Conceptualization refers to a collective reflection process articulating tacit knowledge to form explicit concepts and systemizing the concepts into a knowledge system (similar to externalization and combination in the SECI model). Collaboration refers to a true team interaction process of using the produced conceptualizations within teamwork and other organizational processes.

6.4 Combined research model

To compete in a dynamic global market, the need for tools and decision-making technology increases. Heinrichs and Lim (2005) propose the “combined research model”, combining
organizational decision models and competitive intelligence tools. Four factors of knowledge creation and strategic use of information competence are identified:

1. **Pattern discovery**: pattern discovery drives organizations to create new knowledge from existing knowledge such as past decisions, past solutions, and diagnostic evaluation of past rules and models.

2. **Strategy appraisal**: appraising the impact of a strategy is necessary before deciding to continue or develop new niches, and allows organizations to develop an historical knowledge base regarding the success and failure of past strategic decisions.

3. **Solution formulation**: formulated solutions are key components affecting insight generation competence and can gain higher confidence of knowledge workers.

4. **Insight generation**: Insight generation involves observing and interpreting charts, graphs, tables, and other information to derive meaningful ideas, directions, and solutions for the organization. Insights can provide guidance to innovative problem solving and strategic decision-making.

6.5 **Community-based model**

From the models mentioned above, Lee and Cole (2003) proposed an alternative model of knowledge creation, the "community-based model". The latter exhibits substantial differences with the SECI model: it does not concentrate on the individual or a firm while the SECI model does. The community-based model focuses on knowledge creators who are talented volunteers and interactions across organizational and geographical boundaries. In other words, the created knowledge is owned by anyone who contributes it. Table II highlights the major differences between the firm-based and the community-based models of knowledge creation.

7. **Value creation: the third generation knowledge management**

The relationship between value creation and KM has been argued by several scholars (Chase, 1997; Despres and Chauvel, 1999; Gebert et al., 2003; Liebowitz and Suen, 2000; Rezgui, 2007). Moreover, Despres and Chauvel (1999) suggest that knowledge can be
described as a source of value creation. Liebowitz and Suen (2000) include value creation into KM metrics for measuring intellectual capital. In terms of organization processes, Gebert et al. (2003) suggest that knowledge management processes have inherent value creation capabilities. In addition, Løwendahl et al. (2001) propose a framework for the analysis of value creation and knowledge creation in professional service firms (PSFs).

Value creation is gradually being established as the next generation of KM (Vorakulpipat and Rezgui, 2006; Vorakulpipat and Rezgui, 2007). Five major factors toward value creation emerge from the literature:

2. Social capital.
3. Intellectual capital.
4. Technology assets.
5. Change processes.

7.1 Human networks

Allen (2003) suggests that organizational learning should be dynamic and that intangible assets and social prosperity are anticipated to create major impacts on KM. For example, the concept of Community of Practice (CoP) (Wenger et al., 2002) is introduced as an effective social activity to share tacit knowledge in Xerox. This had the effect of promoting human networks and motivating people to share and create knowledge.

Intangible assets have the potential to create more value than tangible or physical assets. Three factors of intangibles, consisting of human capital, external capital, and structure capital, are expected to generate future benefits and create sustained organizational and societal values (Allen, 2003; Blair and Wallman, 2001). These also include business relationships, internal structure, human competence, social citizenship, environment health, and corporate identity (Allen, 1999). Once created, intangible and tangible values are included as a part of value networks for creating relationships between people, groups, or organizations.

Table II: The comparison between the firm-based model and the community-based model of knowledge creation

<table>
<thead>
<tr>
<th>Organization principles</th>
<th>The firm-based model</th>
<th>The community-based model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intellectual property ownership</td>
<td>Knowledge is private and owned by the firm</td>
<td>Knowledge is public but can be owned by members who contribute it as long as they share it</td>
</tr>
<tr>
<td>Membership restriction</td>
<td>Membership is based on selection, so the size of firm is constrained by the number of employees hired</td>
<td>Membership is open, so the scale of the community is not constrained</td>
</tr>
<tr>
<td>Authority and incentives</td>
<td>Members of the firm are employees who receive salaries in exchange for their work</td>
<td>Members of the community are volunteers who do not receive salaries in exchange for their work</td>
</tr>
<tr>
<td>Knowledge distribution across organizational and geographical boundaries</td>
<td>Distribution is limited by the boundary of the firm</td>
<td>Distribution extends beyond the boundary of the firm</td>
</tr>
<tr>
<td>Dominant mode of communications</td>
<td>Face-to-face interaction is the dominant mode of communication</td>
<td>Technology-mediated interaction is the dominant mode of communication</td>
</tr>
</tbody>
</table>

Human capital can improve value creation in several ways. For example, formal and informal communication using face-to-face (including scheduled meetings) and virtual (synchronous/asyncronous) means (e.g. telephone and e-mail) are perceived as effective to promote knowledge sharing and creation. Whittaker et al. (1994) show a preference for informal communications (e.g. unscheduled meetings or any face-to-face interactions). Early face-to-face meetings in team work tend to improve the team’s project definition (Ramesh and Dennis, 2002), and to enhance the effectiveness of subsequent
electronic communications (Powell and Dent-Micallef, 1999). Therefore, lack of human networks or communication is identified as a problem that may lead to the ineffectiveness of teamwork (Pynadath and Tambe, 2002) and will hinder any knowledge sharing and creation perspective.

7.2 Social capital

The concept of social capital has recently been researched in the context of KM (Cohen and Prusak, 2001; Lesser and Prusak, 1999; Lesser, 2000; Nahapiet and Ghoshal, 1998). The idea of social capital – physical capital, financial capital, and human capital – can be applied to create value-added for firms. Because of its emphasis on collectivism and co-operation rather than individualism, distributed community members will be more inclined to connect and use electronic networks when they are motivated to share knowledge (Huysman and Wulf, 2006). In terms of socio-technical design, KM tools to support social capital are aimed to bridge various social communities. The tools may foster social capital by offering virtual spaces for interaction, providing the context and history of interaction, and offering a motivational element (e.g. score) to encourage people to share knowledge with each other (Huysman and Wulf, 2006). Tsai and Ghoshal’s research reveals an association between social capital and firms’ value creation (Tsai and Ghoshal, 1998). This relationship is supported by related research (Nahapiet and Ghoshal, 1998). Moreover, in terms of organizational structure, social capital helps people develop trust, respect, and understanding of others, especially in the context of a strong organizational bureaucratic culture. This contributes indirectly to value creation.

7.3 Intellectual capital

Intellectual capital (IC) has enjoyed a very rapid diffusion over recent years and is also a growing area of interest in KM. It encompasses organizational learning, innovation, skills, competencies, expertise and capabilities (Rastogi, 2000). Liebowitz and Suen (2000) exhibit that value creation is used as a KM metric for measuring intellectual capital. The value creation metric includes training, R&D investment, employee satisfaction, relationships development, etc. Nonaka et al. (2000) suggest that learning by doing can embody explicit knowledge into tacit knowledge through Internalization in the SECI process. Also, training programs can help trainees understand themselves, and reading documents or manuals can internalize the explicit knowledge written in such documents to enrich their tacit knowledge base. Adapted training can foster cohesiveness, trust, teamwork, individual satisfaction, and higher perceived decision quality, as highlighted in the literature (Tan et al., 2000; Van Rysen and Hayes Godar, 2000; Warkentin and Beranek, 1999). In addition, IPR and confidentiality issues should not be overlooked as Denning (1999) suggests that external knowledge sharing poses greater risks than internal sharing as they raise complex issues of confidentiality, copyright, and in the case of the private sector, the protection of proprietary assets. It is suggested that value creation can be driven by intellectual capital, and an intellectual capital management system should be created to measure performance (Bontis et al., 1999).

7.4 Technology assets

Managing and enhancing the organizational processes of knowledge creation, storage/retrieval, transfer, and application have relied on the wide use of Knowledge Management Systems (KMS). This suggests that technology, including KMS, is an essential ingredient to sustain value creation. Applications of IT to organizational knowledge
management initiatives has focused on three common applications (Alavi and Leidner, 2001):

1. The coding and sharing of best practices.
2. The creation of corporate knowledge directories.
3. The creation of knowledge networks.

While KMS initiatives rely on IT as an important enabler, they tend to overlook the socio-cultural aspects that underpin knowledge management (Davenport and Prusak, 1998; Huysman and Wulf, 2006; Malhotra, 1999; O’Dell and Grayson, 1998).

Moreover, the future KM can be envisioned as:

- the emphasis on the design of KM technology to fit organization culture;
- the ability to embed KM technology in natural surroundings, and be able to retrieve knowledge whenever and wherever it is needed; and
- the simple and effortless use of technology to create interaction (VISION, 2003).

Semantic web, natural language processing, mobility, virtual collaborative workspaces are the important facets for future KM (VISION, 2003). Next generation KM will also be impacted and shaped by changes in IT and artificial intelligence development, and by the changes expected in people-centric practices to support innovative works (Wiig, 1999).

7.5 Change processes

In this context, change management plays an increasingly important role in sustaining “leading edge” competitiveness for organizations in times of rapid change and increased competition (McAdam and Galloway, 2005). The future has only two predictable features – “change and resistance to change” and the very survival of organizations will depend upon their ability not only to adapt to, but also to master these challenges.

Organizational change can be divided into two issues: IT and human issues. In terms of human issues, adapting organizational policies to motivate employees to share and create knowledge by providing monetary reward or recognition is suggested, as confirmed by Rus et al. (2002). On the other hand, technology adoption in organizations should not be overlooked. The technology adoption model (TAM) (Davis, 1989) proposes that perceived usefulness and perceived ease of use influence the use of information systems innovations and that this effect is mediated through behavioral intentions to use. Christiansson (2003) also agrees that study of the change process is necessary to create the requisite organizational and societal values. A KM maturity roadmap is an important milestone to enable organizations to assess the effectiveness of their KM implementations in the future.

A true value creation culture can be found through the appropriate combination of human networks, social capital, intellectual capital, technology assets, and change processes (Figure 5) where issues such as learning and trust must be blended successfully towards the vision of knowledge-enabled value creation (Rezgui, 2007; Vorakulpipat and Rezgui, 2006; Vorakulpipat and Rezgui, 2007).

8. Conclusions

The paper has presented a discussion of KM, generations of KM (knowledge sharing and knowledge creation, and value creation) based on a review and synthesis of a broad range of relevant literature. The definition of KM has evolved over the years. The paper defined knowledge sharing as the past generation KM, knowledge creation as the current generation KM, and value creation as the future generation KM. Value creation focuses on the organizational and societal impact of knowledge management. Human network, social capital, intellectual capital, technology assets, and change processes emerge as essential conditions to enable value creation. Focusing on social capital, the paper refers to collective capabilities derived from social networks. The higher the level of social capital, the more distributed communities are stimulated to connect and share knowledge (Huysman and
In terms of technology, members of communities will be more inclined to use adapted KMS when they are motivated to share knowledge with others. KMS that embed social awareness can play an important role in addressing these requirements, promote social capital in fragmented and distributed networks, and enable KM initiatives in an organization. However, the organization’s ability to effectively use, acquire, share, apply and create knowledge is more important and should not be overlooked.

KM has major implications in the learning capability of an organization and its ability to adapt to an ever changing and competitive environment. Therefore, migration from knowledge sharing to knowledge creation and from knowledge creation to value creation is necessary although it may be difficult to negotiate and achieve. The authors are currently working on a KM capability and maturity framework that will facilitate these transitions, and an empirical research on value creation capabilities in a KM perspective.

Clearly, it is important for researchers conducting KM-related research to understand the various factors that affect value-added KM. The authors hope that the present review will contribute to the ongoing debate on KM and its future evolution.

References


VISION (2003), VISION Next Generation Knowledge Management, available at: http://km.aifb.uni-karlsruhe.de/fzi/vision/


About the authors

Chalee Vorakulpipat is a PhD student in the Informatics Research Institute at the University of Salford. He has worked for over a decade as a research assistant in the National Electronics and Computer Technology Center of Thailand. He has been involved in several projects in information systems development. His research interests include information systems, knowledge management, social and organizational studies, and software development. Chalee Vorakulpipat is the corresponding author and can be contacted at: c.vorakulpipat@pgr.salford.ac.uk

Yacine Rezgui is the (founding) Director of the Informatics Research Institute at the University of Salford, and a Professor of Applied Informatics. He has worked several years in industry as an architect, and project manager on information technology research and development projects. In the last 15 years, he has led and been involved in over 15 national (EPSRC) and European (FP4, FP5, FP6) multi-disciplinary research projects. He conducts research in areas related to software engineering (including service-oriented architectures), information and knowledge management, and virtual enterprises. He has over 100 refereed publications in the above areas, which appeared in international journals such as *Interacting with Computers*, *Information Sciences*, and *Knowledge Engineering Review*. He is a member of the British Computer Society.