

# **Towards an Understanding and Conceptualization of Knowledge Managing within the Context of Inter-Organizational Networks**

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## **Abstract**

It is argued that the basic economic resource in the next economy is knowledge. An important source for competitive advantage in this economy lies in an organization's network of external relationships. This paper presents a conceptualization of strategic knowledge managing within the context of inter-organizational networks. The conceptualization is based on extensions of the resource- and knowledge-based view of the firm as well as ideas from inter-firm relationships and the "gift economy." Three types of inter-organizational networks for strategic knowledge managing are defined: 1) extra-networks, 2) inter-networks, and 3) open networks. Based on the conceptualization, the paper discusses strategic knowledge managing in the three network types and points out new knowledge managing research issues. The paper also presents some implications of the conceptualization for the use of information and communication technologies for knowledge managing.

## **1. Introduction**

It is argued that knowledge is displacing natural resources, capital, and labor as the basic economic resource in the next economy (Drucker, 1995). Commentators on contemporary themes of strategic management stress that a firm's competitive advantage flows from its unique knowledge and how it manages knowledge (Barney, 1991; Boisot, 1998; Spender, 1996; Nonaka and Teece, 2001). Some researchers even state that the only sustainable competitive advantage in the future will be effective and efficient organizational knowledge managing (Wikström and Normann, 1994; Nonaka and Takeuchi, 1995; von Krogh *et al.*, 2000a). Said Nonaka: "When markets shift, technologies proliferate, competitors multiply, and/or products become obsolete almost overnight, successful companies are those that constantly create new knowledge, disseminate it widely throughout the organization, and quickly embody it in new technologies and products." (Nonaka, 1991). This has led to an interest in idiosyncratic knowledge that is valuable, rare, immobile, and exploited by a firm to give the firm a competitive advantage (Barney, 1991).

Organizations have always "managed" knowledge more or less intentionally. The concept of coding, storing, transmitting, exchanging, and using knowledge in organizations is not new, but management practice is becoming increasingly more knowledge-focused (Truch *et al.*, 2000; Collison and Parcell, 2001; Hatten and Rosenthal, 2001). Furthermore, organizations are increasingly depending on specialist competencies and employees using their cognitive capabilities and expertise (Blackler, 1995, Reich, 1991).

The recent interest in organizational knowledge has prompted the issue of how to manage knowledge to an organization's benefit and to the use of information and communication technologies (ICTs) for managing knowledge—these ICTs-based systems are

called knowledge management systems (KMS). Generally, knowledge managing (KM) refers to identifying and leveraging the individual and collective knowledge in an organization to support the organization in becoming more competitive (Davenport and Prusak, 1998; O'Dell and Grayson, 1998; Cross and Baird, 2000; Baird and Henderson, 2001). Research suggests that an important source for competitive advantage lies in an organization's network of external relationships (Gulati *et al.*, 2000). The use of inter-organizational relationships and networks is an alternative to the use of hierarchy or market. It is well known that firms, based on transaction cost criteria, use outsourcing to lower costs despite the firms having the necessary resources and capabilities internally. In the knowledge economy inter-organizational relationships and networks are also created because firms do not possess the required knowledge-related resources and capabilities internally. Furthermore, inter-organizational relationships and networks can also be used to create new knowledge faster and embody it in new services and products which can reach the market faster or create a new market—related to “time to market” and “competing for the market.”

Though we have some answers to the question: “Why do firms invest and engage in inter-organizational knowledge managing?” we have fewer answers to the question: “How can firms strategically manage knowledge within the context of inter-organizational networks to improve firm performance?” While we have some theories, frameworks, and models related to the latter question, there are large gaps in the body of knowledge.

The purpose of this paper is twofold. First, to present a conceptualization of strategic knowledge managing within the context of inter-organizational networks. It is based on extensions of the resource-based and the knowledge-based view of the firm. The resource-based view of the firm in part breaks down when we address inter-organizational networks. Ideas from inter-firm relationships, the “gift economy,” and the open source movement are used to discuss how a firm can gain a competitive advantage from knowledge managing in inter-organizational networks. Second, to discuss implications of the conceptualization for the use of ICTs for knowledge managing.

Our approach is conceptual-analytic (Järvinen, 2000), which means that we draw on the significant amount of research and experience reported in the literature. The conceptualization points out new research areas and issues in inter-organizational knowledge managing. The paper is a step in the development of our understanding of “economies of knowing.”

The remainder of the paper is organized as follows: the next section sets the scene by briefly discussing knowledge, knowledge managing, and KMS; next we present and discuss our conceptualization of strategic knowledge managing within the context of inter-organizational networks. This is followed by a discussion of some of the implications of our conceptualization for the use of ICT/KMS in knowledge managing. The final section presents conclusions and suggests further research.

## **2. Knowledge Managing and Knowledge Management Systems**

Numerous views of knowledge are discussed in the information systems (IS), strategy, management, and organization theory literature. This section briefly presents some of these views, which enables us to uncover some assumptions about knowledge managing and KMS. We also present the views on knowledge, knowledge managing, and knowledge management systems that will form our starting point—in later sections we will extend our views. (We will not enter the debate about whether knowledge managing is a novel idea or just a recycled concept. Arguments in favor of that KM requires the development of new theories, concepts, etc., can be found in, for example, Nonaka and Takeuchi (1995), Alavi and Leidner (2001), Alavi (2000), Spiegler (2000), Nonaka and Teece (2001), and von Krogh *et al.* (2000a, b). On

this issue we adhere to the view of authors arguing that knowledge managing requires the development of new theories, models, and concepts.)

Alavi and Leidner (2001) identified the following views of knowledge:

- Knowledge vis-à-vis data and information. Some authors, most notably in the IS community, address the question of defining knowledge by distinguishing between knowledge, information, and data (Fahey and Prusak, 1998; Tuomi, 2000; Spiegler, 2000; Galliers and Newell, 2001).
- Knowledge as state of mind, where knowledge is described as “a state or fact of knowing” with knowing being a condition of “understanding gained through experience or study; the sum or range of what has been perceived, discovered, or learned” (Schubert *et al.*, 1998).
- Knowledge as objects (things) that can be stored in knowledge repositories (organizational memories) and manipulated (Stein and Zwass, 1995; Wijnhoven, 2000).
- Knowledge as a process of simultaneously knowing and acting (Brown and Duguid, 2000, 2001).
- Knowledge as resource and capability, where knowledge is viewed as a resource and capability with the potential for improving organizational performance (Carlsson *et al.*, 1996; Meso and Smith, 2000).

The different views of knowledge lead to different conceptualizations of knowledge managing and on the roles of ICT/KMS (Carlsson *et al.*, 1996; Alavi and Leidner, 2001). In accordance with the resource-based view (RBV) of the firm, our starting point will be knowledge as resource and capability. The main reason for this choice of the different views is that this is the one that can be used to explicitly address the links between knowledge, knowledge managing, and firm performance. Note, in many cases it is not the knowledge existing at any given time per se, than the firm’s ability to effectively create new knowledge and to share and employ existing knowledge to solve problems, make decisions, and take actions, that forms the basis for achieving competitive advantage.

Different frameworks and models of organizations as knowledge systems suggest that knowledge managing consists of four sets of socially enacted knowledge processes, namely: 1) knowledge creation, 2) knowledge organization and storage/retrieval, 3) knowledge transfer, and 4) knowledge application (Pentland, 1995; Davenport and Prusak, 1998; Boisot, 1998). The frameworks and models represent the cognitive, social, and structural nature of organizational knowledge and its embodiment in the individuals’ cognition and practices as well as the collective (i.e., organizational) practices and culture (Alavi and Leidner, 2001). The four processes do not represent a monolithic set of activities. They are interconnected and intertwined sets of activities.

Knowledge management systems (KMS) refer to a class of information systems applied to managing individual and organizational knowledge. That is, they are ICTs-based systems developed and used to support and enhance the organizational processes of knowledge creation, storage/retrieval, transfer, and application. While not all KM initiatives involve the use of ICTs, and warnings against an emphasis on the use of ICTs for KM are not uncommon (Davenport and Prusak, 1998; O’Dell and Grayson, 1998; McDermott, 1999; Swan *et al.*, 1999b; Walsham, 2001), many KM initiatives rely on ICTs as an important enabler. The literature on applications of ICTs to organizational knowledge managing suggests four common applications: 1) the coding and sharing of best practices, 2) the creation of corporate knowledge directories, 3) the creation of knowledge networks, and 4) knowledge-based support of decision making and action taking. Our stance is that KMS is not a particular type of ICTs in a restricted sense, but primarily a conceptualization (vision) of KM, the role of ICTs as support for managing knowledge and how to realize this vision in practice. There is room for different conceptualizations of KM and obviously also room for different

perspective on KMS. After we have presented our conceptualization, we will briefly discuss its implications for the use of ICTs for knowledge managing.

Summarizing, the KM-literature points out several reasons for KM initiatives, presents different views on knowledge, describes KM and KMS in action, and describes the different activities in knowledge managing. The literature is sparse on how firms actually can manage knowledge to gain and sustain competitive advantage through inter-organizational networks. We will in the rest of this paper address this and will take off from the resource-based view of the firm.

### **3. Knowledge Managing within the Context of Inter-Organizational Networks**

The conceptualization of knowledge managing we present takes its epistemological starting point in business strategy theory. It is, in part, based on extensions of the resource-based view (RBV) and the knowledge-based view (KBV) of the firm. The main proposition of the RBV is that competitive advantage is based on valuable and unique internal resources and capabilities that are costly to imitate for competitors. In the case of the KBV, the resources and capabilities are knowledge-related resources and capabilities. The RBV and the KBV are aimed at explaining, and in part predicting, a firm's market performance by addressing the role of the resources and capabilities on which product/service features are based. The RBV has been criticized. For example, Teece *et al.* (1997) point out that the RBV recognizes, but does not attempt to explain the mechanisms—dynamic capabilities—that enable a firm to sustain its competitive advantage. As noted above, research suggests that an important source for competitive advantage lies in an organization's network of external relationships (Gulati *et al.*, 2000; Nohria and Ghoshal, 1997; Kale *et al.*, 2001). Although, the "original" RBV argues that competitive advantage is an outcome of resources and capabilities residing within the firm the RBV has been extended to inter-organizational relationships (Eisenhardt, and Schoonhoven, 1996; Choudhury and Xia, 1999). The extended RBV argues that competitive advantage is also based on valuable and unique inter-organizational resources and capabilities. Hence, the RBV is a plausible view to take off from.

KM can be addressed from a strategic perspective: managing knowledge as strategic resources and capabilities. Strategy is about the direction and scope of an organization over the long term and strategy theory includes how to configure resources and capabilities of primary concern to senior management, or to anyone seeking reasons for success or failure among organizations (Rumelt *et al.*, 1994; Johnson and Scholes, 1997). According to Barney, strategy is "*a pattern of resource allocation that enables firms to maintain or improve their performance. A "good" strategy is a strategy that neutralizes threats and exploits opportunities while capitalizing on strengths and avoiding or fixing weaknesses. Strategic management is the process through which strategies are chosen and implemented.*" (Barney, 1997). Given these definitions, a strategic perspective on KM means addressing: 1) vision and direction for knowledge managing, and 2) how to organize and manage knowledge-related resources and capabilities for competitive advantage. If we believe that knowledge and knowledge processes are critical, theory and practice on strategic knowledge managing should address how important factors and activities in the management of knowledge and knowledge processes can lead to competitive advantage.

Given the above, the next sections will be devoted to: 1) dynamic capabilities, i.e. an extension of the RBV, 2) an extension of the RBV and KBV to external relationships, and 3) networks as a context for knowledge managing.

### 3.1. Extending the Resource-based and Knowledge-based View of the Firm

In the “new economy,” the sustainable competitive advantage of business organizations flows from the creation, ownership, protection and use of commercial and industrial knowledge assets that are difficult to imitate (Teece, 2001). A knowledge-based view (KBV) of the firm has emerged in the strategy literature (Grant, 1996a, 1996b, 1997; Spender, 1996; Cole, 1998). This perspective builds upon and extends the resource-based view of the firm (Penrose, 1959; Wernerfelt, 1984; Barney, 1991, 1995; Conner, 1991).

The RBV and the KBV postulate that the services rendered by tangible resources depend on how they are combined and applied, which is in turn a function of the firm’s know-how (i.e., knowledge). This knowledge is embedded in and carried through multiple entities including organizational culture and identity, routines, policies, ICT-based information systems, and documents, as well as individual employees (Grant, 1996b; Nelson and Winter, 1982; Boisot, 1998). Because knowledge-related resources and capabilities are usually difficult to imitate and socially complex, the KBV posits that these knowledge assets may produce long-term sustainable competitive advantage. However, in many cases it is not the knowledge existing at any given time per se, than the firm’s ability to effectively create new knowledge and to employ the existing knowledge to solve problems, make decisions, and take actions, that forms the basis for achieving competitive advantage.

The RBV makes two assertions. First, resource heterogeneity, which means that resources and capabilities may be heterogeneously distributed across competing firms. When we focus inter-organizational relationships and networks this assertion is that resources and capabilities may be heterogeneously distributed across competing networks and firms. Second, resource immobility, which means that these resource and capability differences can be stable over time. A firm’s resources and capabilities include all financial, human, physical, and organizational assets utilized by a firm to develop, manufacture, and deliver services and products to its customers.

Most RBV-writings focus on stable rents that are costly, or impossible, to imitate. Recently, some writers have addressed the dynamic nature of resources (Grant, 1996a, b, 1997; Teece *et al.*, 1997; Kogut and Zander, 1992; Eisenhardt and Martin, 2000). This can be viewed as an extension of the RBV as well as of the KBV. From a strategic KM-perspective this extension is critical in that it forces us to focus on the dynamic aspects of knowledge and knowledge processes. Also, we increasingly see that competition in the market gets displaced by the competition for the market: “The pay-off from market insight—figuring out where the market is heading and investing heavily to get there first—is high. ... The ability to sense and then seize such opportunities is in part an organizational capability.” (Teece, 2001). This capability is often referred to as a dynamic capability and means a shift in focus (Teece and Pisano, 1994; Teece *et al.*, 1997; Teece, 2001; Eisenhardt and Martin, 2000; Eisenhardt and Santos, 2002). It also means a shift in unit of analysis as well as unit of design. The focus in RBV is on resources, but in the dynamic capability view focus is on processes, positions, and paths. Teece *et al.* (1997) define dynamic capabilities as “... the firm’s ability to integrate, build, and reconfigure internal and external competencies to address rapidly changing environments. Dynamic capabilities thus reflect an organization’s ability to achieve new and innovative forms of competitive advantage given path dependencies and market positions (Leonard-Barton, 1992).”(Teece *et al.*, 1997). A similar definition is given by Eisenhardt and Martin: “The firm’s processes that use resources—specifically the processes to integrate, reconfigure, gain and release resources—to match and even create market change. Dynamic capabilities thus are the organizational and strategic routines by which firms achieve new resource configurations as markets emerge, collide, split, evolve, and die.” (Eisenhardt and Martin, 2000). The dynamic capability view suggests that profits not just flow from the assets

structure of the firm and the degree of imitability, but also from the firm's ability to reconfigure and transform. This ability is especially critical for organizations in turbulent and high-velocity environments (Eisenhardt and Martin, 2000).

Our conceptualization is based on the RBV and the KVB, but extended by the dynamic capability perspective. To summarize, to gain and sustain a competitive advantage through KM includes:

- The creation and development, through knowledge processes, of knowledge assets.
- The design of strategic knowledge processes—knowledge creation, knowledge organization and storage/retrieval, knowledge transfer, and knowledge application.
- The “design” of means to redesign, reconfigure, and transform knowledge processes. This also includes the capability to decide which knowledge processes to retain, develop, or terminate. Consequently, it also includes how to evaluate knowledge processes.
- The capability of careful selections on what knowledge-related processes to manage and not to manage. This also includes how knowledge relevant for this capability is managed and how to evaluate this capability.

### **3.2 Strategic Knowledge Managing in Inter-Organizational Networks**

More than fifteen years ago, Thorelli (1986) stressed the importance of networks and the need for research on networks. Thorelli used the construct network to refer to relationships between two or more organizations and argued that networks were hybrid intermediate forms and alternatives to markets and hierarchies. Other writers have used the term to refer to networks in an organization as well as between organizations. Following Laumann *et al.*, we define a social network as “a set of nodes (e.g., persons, organizations) linked by a set of social relationships (e.g., friendship, transfer of funds, overlapping membership) of a specified type.” (Laumann *et al.*, 1978). In knowledge managing the social network will be for enabling and supporting different knowledge processes. A network can be enabled and enhanced by the use of ICTs, but we do not view networks as technological networks.

A firm's inter-organizational networks differ in their importance and criticality. Since we focus strategic knowledge managing our main concern will be strategic networks. These networks “...encompass a firm's set of relationships, both horizontal and vertical, with other organizations—be they suppliers, customers, or other entities—including relationships across industries. These strategic networks are composed of inter-organizational ties that are enduring, are of strategic significance for the firms entering them, and include strategic alliances, joint-ventures, long-term buyer supplier partnerships, and a host of similar ties.” (Gulati *et al.*, 2000). The durability requirement can be questioned. In some cases a network, for example, a supplier network, can be enduring, but the network will have participants (suppliers) entering and leaving the network.

Although, the construct ‘network’ can be used to describe and explain observed patterns and processes, we advocate that it is used in strategic knowledge managing as a model and unit of design. We suggest that knowledge managing has to become network-focused if knowledge intensive organizations are to gain and sustain competitive advantage from knowledge managing. Support for our suggestion can be found in a number of empirical studies. Von Hippel (1988) found that organizations' suppliers and customers were their primary sources of ideas for innovations. According to von Hippel, a network with excellent knowledge transfer among users, manufacturers, and suppliers will out-innovate networks with less effective knowledge sharing activities. In a study in the biotechnology industry it was found that the network of firms was the locus of innovation, not the individual firm (Powell *et al.*, 1996). Dyer and Nobeoka (2000) showed that Toyota's ability to effectively create and manage knowledge sharing networks, at least in part, explains the relative

productivity advantages enjoyed by Toyota and its suppliers. Liu and Brookfield (2000) found that Taiwan's successful machine tool industry has a number of network structures. They also found that the networks in part explain the tool industry's success. These, as well as other (e.g., Miles *et al.*, 2000; Richter, 2000; Kale *et al.*, 2001; Wynstra *et al.*, 2001), studies demonstrate the importance of networks and that networks can be effective in all of the activities of knowledge processes—from knowledge creation to knowledge application and use. Castells takes the argument for networks to its limits: "...the network enterprise is neither a network of enterprises nor an intra-firm, networked organization. Rather, it is a lean agency of economic activity, built around specific business projects, which are enacted by networks of various composition and origin: *the network is the enterprise*. While the firm continues to be the unit of accumulation of capital, property rights (usually), and strategic management, business practice is performed by *ad hoc* networks. These networks have the flexibility and adaptability required by a global economy subjected to relentless technological innovation and stimulated by rapidly changing demand." (Castell, 2001).

As noted by several researchers, e.g., Venkatraman and Subramaniam (2002), the notion of inter-organizational relationships and networks is not new; firms do not conduct all their business activities internally. It is well known that firms, based on transaction cost criteria, use outsourcing to lower costs despite the firms having the necessary resources and capabilities internally. In the knowledge economy inter-organizational relationships and networks are also created because firms do not possess the required knowledge-related resources and capabilities internally. Inter-organizational relationships and networks are also created to share and disseminate knowledge, for example, for the purpose of influencing emerging standards. Knowledge-based networks have also been discussed in the KM-literature (e.g., Newell *et al.*, 2000; Swan *et al.*, 1999a), but not, as in this paper, from a strategic and competitive perspective.

Inter-organizational networks can be of different types. For our conceptualization, we define three different types of inter-organizational networks for knowledge managing: 1) extra-networks, 2) inter-networks, and 3) open networks. An extra-network is a network that transcends a firm's boundary. Participation in such a network is restricted, meaning that only specific individuals and organizations are allowed to participate, for example, an extranet for specific R&D personnel in specific telecommunication equipment firms engaged in the development of new Bluetooth applications. An inter-network is also a network that transcends a firm's boundary, but participation in the network is not restricted. This type of network is open to anyone who wants to join and participate. An example is how Fiat used the Internet to test new design ideas for its Punto model. Fiat invited potential customers to select features for the car on its Web-site. More than 3000 people took the chance and gave Fiat valuable design information—this is a good example of co-design using an Internet-based inter-network (Iansiti and MacCormack, 1997). An open network is a network open for anyone interested and willing to participate in knowledge creation and sharing. A good example of this network type is the open source movement and the development of, such as, Linux and Apache (Raymond, 2001). It is estimated that the worldwide development community for the overall Linux operating system exceeds 40,000 developers (Raymond, 2001). Although, we have used ICT-based examples not all networks will use ICTs; and in most networks ICTs will only be one of several critical components and aspects.

Scholars in the strategy field are concerned with explaining differential firm performance. As these scholars have searched for sources of competitive advantage, different views have emerged regarding the sources of above normal returns. Since the views are based on different, and in part contradictory, ideas concerning the primary sources of above normal profit returns and have different unit of analysis, they have different explanatory and predictive power in relation to how to gain and sustain competitive advantage from

knowledge-based inter-organizational networks. Since the RBV and the dynamic capability view have an internal view, they are in their original form less fruitful for inter-organizational networks. Still, some scholars have extended the RBV to alliance formation (e.g. Eisenhardt & Schoonhoven 1996) and inter-organizational networks (e.g. Choudhury and Xia, 1999). This suggests that the RBV, the KBV, and the dynamic capability view can be used for designing knowledge-based extra-networks. For inter-networks, some researchers have suggested learning perspectives (e.g. Larsson *et al.*, 1998; Edwards and Kidd, 2001) or a relational view (Dyer and Singh, 1998). Dyer and Singh's relational view suggests four sources of inter-organizational competitive advantage: "1) investments in relation-specific assets; 2) substantial knowledge exchange, including the exchange of knowledge that results in joint learning; 3) the combining of complementary, but scarce, resources or capabilities (typically through multiple functional interfaces), which results in the joint creation of unique new products, services, or technologies; and 4) lower transaction costs than competitor alliances, owing to more effective governance mechanisms." (Dyer and Singh, 1998). The four sources are related to the different activities in knowledge managing and tentatively the relational view can be used for designing knowledge-related extra-networks.

For inter-networks and open networks, the views discussed above in part break down. Using a knowledge-based inter-network means, for example, that a firm will not be able to control who is participating in the network and the firm will not have specific and restricted agreements with the participants. Furthermore, the firm will not be able to control and manage the knowledge process: what knowledge is created, shared, disseminated, and used. Still, the firm has a degree of discretion in that it can set the agenda, in part manage the knowledge process by setting rules, and in part manage the knowledge process through intervening in the different activities. Given that the firm is able to exercise some discretion, some of the ideas from the relation view are valid for knowledge-based inter-networks. To exemplify, the inter-network can be effective for interfirm knowledge sharing, and the governance discretion used by the firm can be effective. According to the relational view, these two circumstances are primary sources of above normal returns—albeit, they are not the only sources of above normal returns. The firm can use different mechanisms to preserve profits, for example, time compression diseconomies and casual ambiguity. This means that the inter-network will enable the firm to be first in developing critical knowledge-related resources and capabilities and continuously improve these resources and capabilities. Using causal ambiguity means that the firm tries to "blur" the relation between a knowledge-related resource/capability and its effects (e.g., improved quality of a new product or faster to market with a new product). Using the causal ambiguity mechanism makes it hard for competitors to copy the resource/capability.

Moving to the open networks means even less discretion for a firm. The use and governance of this type of network is quite different from the other types of networks. It also means that the views discussed above are less useful. A view that might be informative for this type of network is based on a "gift economy" view (Hyde, 1999; Baird, n.d; Raymond, 2001). The gift economy has been proposed as an alternative to a market and commodity economy, especially in situations where creativity and ideas are crucial (Hyde, 1999). Hyde argues that gift economies are necessary for knowledge creation and dissemination. Gift economies serve to bind people together, which means that they create and maintain social groups within established social boundaries. To become a member of a gift community, a person or organization has to qualify by giving and receiving gifts. Exchanging gifts means initiating and maintaining interactions. As noted, strategic knowledge managing is about firm performance and this means that the gift economy must also exist in a commodity economy. The gift economy and the market and commodity economy have to exist in a fruitful tension.



Although, the gift economy view is, to a large extent, an unexplored view for describing and understanding open networks it seems to be an interesting view to explore further.

### 3.3 Knowledge Managing in Inter-Organizational Networks: Research Issues

Our conceptualization of knowledge managing in inter-organizational networks opens up new research and design issues, for example:

- Under what circumstances are different types of networks effective and efficient for knowledge managing?
- Strong tie versus weak tie networks?
- How to orchestrate the design and management of networks?
- How to support and enable artificial (designed) networks as well as natural and emerging networks?
- How strong explanatory and predictive power does the RBV, dynamic capability, relational, and gift economy views have for the different types of networks?

Liu and Brookfield (2000) identified three basic types of networks: concentrated, dispersed, and multi-centered networks. Given the purpose of a knowledge managing initiative (e.g. knowledge creation or knowledge diffusion), each network type seems to be more or less effective and efficient. Within each basic type, they identified a number of different forms of networks. A relevant question is: under what circumstances are different types of networks effective and efficient for knowledge managing? Related to different types of networks is the question of position in a network and network clustering. Venkatraman and Subramaniam (2002) suggest that the benefits of economies of knowing (expertise) come from firms' centrality in knowledge networks. This is an issue for empirical studies.

Some studies suggest that a highly interconnected, strong tie network is effective for the diffusion of knowledge rather than for creating new knowledge, which is the strength of a weak tie network (Rowley *et al.*, 2000; Dyer and Nobeoka, 2000). Although the studies suggest when strong and weak tie networks are effective for knowledge managing, more research on when strong tie networks and weak tie networks are effective and efficient in knowledge processes is needed.

A problem with inter-organizational networks—especially inter-networks and open networks—is that in many cases there is no higher authority to orchestrate the design and management of the network. In some cases a specific firm will not be allowed by other network participants to function as the governing body for the network (e.g. the open source movement). Research on how these types of networks can be designed and put to effective use is needed. Studies based on “the gift economy” might shed light on this issue.

From a management and design perspective we can distinguish between: 1) artificial (designed) networks, 2) and natural and emerging networks. Examples of designed networks include the design of an electronic communication network, using for example Lotus Notes, or the design of a knowledge repository where best practices from lab tests are registered. But design can also include the design of reward systems and education packages as well as the design of physical meeting places. Some inter-organizational networks emerge naturally or they are causally formed, i.e. they are not designed. An illustrating case is Gongla and Rizzuto's (2001) description of how different communities of practice emerged in IBM's Global Services and how the emerging communities were supported by different means. Von Krogh *et al.*, (2000a) stress that an organization can and should take actions to enable knowledge creation and knowledge sharing. According to Gupta and Govindarajan (2000), a crucial requirement for effective knowledge managing is the development and support of an effective social ecology—the social ecology is the social environment within which people operate. Liu and Brookfield (2000) point out that relationship-building and trust-building are

critical in effective networks. At the same time it should be noted that in many cases it is not easy to “build” knowledge sharing cultures, collaborative cultures, or trust (Huang *et al.*, 2001; Hauschild *et al.*, 2001; De Long and Fahey, 2000)—on these issues, see, Leidner (2002). In these situations different, organizational roles can be used to smooth things out and to function as communicators, negotiators, and brokers (El Sawy *et al.*, 2001; Huang *et al.*, 2001; Carlsson and Schönström, 2001). Research on how a firm can and should involve itself in fertilizing both designed and natural networks is another critical research issue. Research on related obstacles as well as how to deal with the obstacles is also needed.

Future research is needed on how powerful (explanatory and predictive power) the views discussed above are and under what circumstances the views are useful for designing and fertilizing different types of networks. How strong explanatory and predictive power does the RBV, dynamic capability, relational, and gift economy views have for the different types of networks?

To summarize, we suggest that an important aspect of knowledge managing is inter-organizational networks. Consequently, strategic knowledge managing includes managing an organization’s portfolio of strategically important knowledge-related inter-organizational networks. Our suggestion has implications for research on knowledge managing as well as for KM-practice. Although we can find theoretical and empirical support for our suggestions, the KM-field, as noted, still needs much more research on the above issues.

#### **4. Knowledge Management Systems within the Context of Networks**

As pointed out in Section 2, Knowledge Management Systems (KMSs) are not particular ICTs in a restricted sense, but primarily a conceptualization (vision) on knowledge managing and the role of ICTs as knowledge managing enabler and support. Strategic KM within the contexts of inter-organizational networks can be supported and enabled with an array of ICTs, including, the Internet, groupware and computer-mediated collaboration, data warehouses, knowledge discovery in data bases (including data mining), computer-based yellow pages, simulation tools, intelligent agents, video-conferencing, etc. (Different aspects of the use of ICTs in KM can be found in, for example, Liebowitz (1999), Alavi and Leidner (2001), Carlsson *et al.* (2000), and Marwick (2001).)

Generally, ICTs have been used to enable and support a firm in gaining competitive advantage through economies of scale or economies of scope. In the knowledge economy, ICTs will also be used to enable and support a firm in gaining competitive advantage through economies of knowing (expertise). As presented, a critical aspect of strategic knowledge managing includes managing an organization’s portfolio of strategically important knowledge-related inter-organizational networks. Above, we presented our conceptualization. In light of what we have presented, we address the use of ICTs for strategic knowledge managing by discussing:

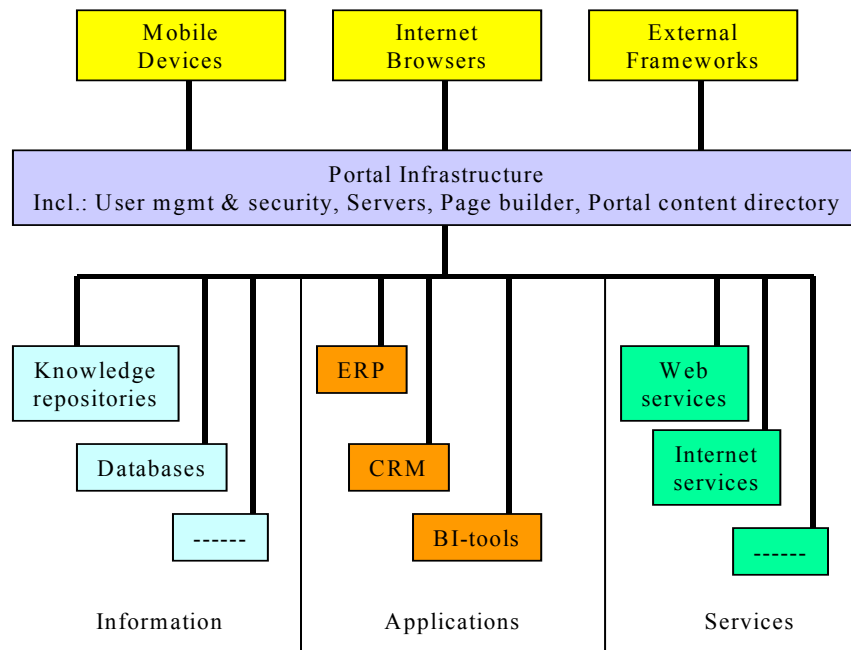
- Knowledge portals and the emerging digital knowledge workplace.
- KMS and mobility.
- Infrastructure and architecture for KMS.

##### **4.1 Knowledge Portals and the Digital Knowledge Workplace**

One consequence of our conceptualization is that enabling, building, and maintaining networks is a critical capability. ICTs can be a significant means for enabling and supporting networks. They can link different nodes (people, organizations) and enable electronic communication across time and space. Increasingly, we will see that the gateway to ICT-

based networks will be one type of Enterprise Portals: Knowledge Portals (KPs) (Vering *et al.*, 2001; Mack *et al.*, 2001; Tsui, 2002). KPs are digital knowledge workplaces which have been designed to provide a single access point to internal and external desired applications, information, and services for an organization's knowledge workers, partners, customers, suppliers, and other persons and organizations that an organization is cooperating with—see Figure 1 for an outline of a Knowledge Portal. Often a KP is an entry point to information, applications, and services available via the Web; and in some cases accessed by a mobile device. The information and knowledge made available through a KP can be personalized depending on participation in different networks. Applications and services made available in a KP can include:

- Technologies to automatically capture and gather documents.
- Document analysis and document organization technologies (incl. technologies for categorization and clustering of documents).
- Technologies for browsing and searching documents.
- Support for analysis, synthesis, and authoring of information (incl., for example, applications like spreadsheets, project management software, and data mining tools).
- Communication tools, including, for example, e-mail, bulletin boards, instant messaging, IP telephone, audio- and video-conferences.



**Figure 1.** Knowledge portal components

A KP keeps track of who in the organization and the extended organization is authorized to do what. The KP presents to each user only those resources and information the user is allowed to see and use, like information related to the specific network a person is a member of. Key elements in a KP are: 1) the width and depth of the KP in terms of what sources and resources can be accessed, 2) how changes can be made to the width and depth of the KP, and 3) how changes can be made regarding the network architecture, e.g. adding and deleting nodes.

## 4.2 KMS and Mobility

A problem with many KMSs is that intended users have to come to the resource, for example, by finding and using a PC hooked up to a WAN. If accessing the KMS this way is easy, users will access the system, but if it is not easy users will not use the system. Increasingly we see that knowledge workers are not tied to a specific place—e.g. sitting at a desk in an office—when participating in knowledge processes. As Keen and Mackintosh (2001) stress: knowledge workers' needs are real-time, situational, personal, and unpredictable. Mobile KMS can be a means of overcoming the real-time, situational, and unpredictable problem. This means that the gateway to a KMS in many cases will not only be a Knowledge Portal, but actually a mobile KP (m-KP). KP makes it possible to have a personal gateway to desired resources and sources. Mobile-KPs can further reduce knowledge workers' burden of getting access to desired sources and resources. An m-KP can be used to quickly and conveniently hook up to a KMS and access information, applications, and services on demand at the moment of relevance and truth. Moment of relevance and truth means providing access to information, applications, and services for knowledge workers at a moment and place when they are needed.

## 4.3 Infrastructure and Architecture

In the last years hardware and software companies, as well as service providers, have been promoting a new approach to organizational information systems. The approach is based on the idea that organizations in the future will buy an extensive part of their ICTs and services over the Internet rather than owning and maintaining their own hardware and software. The approach is launched under a number of different concepts: “.Net” (Microsoft), “Web services” (IBM), “network services” (Oracle), and “open network environment” (Sun). The firms are not only launching the concepts, but are investing heavily in making the new approach work. A result of this is that previous proprietary architecture—where companies built and maintained unique internal KMS—will to a growing extent be substituted by an open architecture where companies can rent data storage, processing power, specific applications, and other services from different types of external service providers. Hagel and Brown (2001) describe the approach as an architecture having three layers: 1) software standards and communication protocols, 2) service grid, and 3) application services. The first layer contains different communication protocols and software standards, for example, SOAP, XML, and WML. This layer allows data to be exchanged easily between different applications and it also allows data to be processed easily in different types of applications. The second layer builds upon the protocols and standards and provides a set of shared utilities. An example of a utility provided by the second layer is data management containing directories, data brokers, repositories, and data transformation. This utility is critical for many KMSs. The application service layer contains different application services, for example, portals used in product development, business intelligence, and portals for cooperation. The approach suggests a number of changes regarding developing and maintaining KMS, for example:

- KMS will increasingly be built and maintained using non-proprietary hardware, software, and data.
- KMS built using non-proprietary hardware, software, and data can be more flexible and dynamic which could make it easier to develop and change inter-organizational networks.

## 5. Conclusions and Further Research

Using a conceptual-analytic approach we developed a conceptualization of knowledge managing. We built our conceptualization on the RBV and KBV of the firm, but these were extended to also include: 1) the dynamic capability view, and 2) inter-organizational perspective. We also introduced networks as the context for strategic knowledge managing. Further theoretical work is needed to tighten the conceptualization. Empirical research will also be critical in helping us understand how firms get to be good at knowledge managing in inter-organizational network, how they sometimes stay that way, why and how they improve their knowledge managing, and why sometimes knowledge managing decline. We also need both theoretical and empirical work on how ICTs can be used for strategic knowledge managing in inter-organizational networks.

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