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The knowledge system of a firm: social capital for explicit, tacit and potential knowledge

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Abstract

Purpose – *The purpose of this paper is to bring clarity to the concept of social capital in the value creation in firms from the knowledge management perspective. To discuss the social characteristics of different types of knowledge.*

Design/methodology/approach – *Based on a review of the literature, it is argued that different types of knowledge have the distinctive logic of value creation and social capital. Social capital is seen as a network of individuals with shared norms, beliefs and trust.*

Findings – *The social network structure for explicit knowledge is centralized and maintained by clearly defined rules, beliefs in high quality and trust in organizational hierarchy. The social network structure for tacit knowledge is distributed and maintained by the norms of reciprocity, beliefs in lifelong learning and an incremental trust. Finally, the social network structure for emergent, potential knowledge is decentralized and maintained by liberal norms, beliefs in innovativeness and an enabling type of trust.*

Practical implications – *This paper helps to understand the role of social capital in the value creation of a firm and the connections between different types of knowledge and their corresponding types of social characteristics.*

Originality/value – *This paper presents a holistic approach to explicit, tacit and potential types of knowledge and the argument that all are needed. It is stated that these three types of knowledge form a basis for three management systems of firms.*

Keywords *Knowledge management, Social capital*

Paper type *Conceptual paper*

Introduction

The role of knowledge has been widely discussed in management literature. It has been recognized that the so-called knowledge-based new economy functions on a totally different value creation logic than the old industrial economy. The special attributes of knowledge, including its characteristics of “public good” and endless replication possibilities, has led to the conclusion that knowledge has become the key economic resource and the dominant source of competitive advantage. The traditional factors of production – land, labor and capital – have become secondary to this (Drucker, 1995; Marr, 2005).

Intangible assets in the form of different types of knowledge as resources are not easy to measure and manage. Traditionally, managers have focused almost entirely on tangible assets due to the lack of accounting systems for intangibles. However, economists argue that the use of knowledge as a resource in economic action leads to increasing returns and higher leverage. In order to reach that leverage, firms need constant and parallel integration, construction, and reconfiguration of internal and external competencies (Teece *et al.*, 1997; Eisenhardt and Martin, 2000). Through competencies, the intangible resources that are invisible on a balance sheet can be turned into value that impacts the bottom line.

The literature on knowledge management that has been developing over the past 15 years can be divided into three different phases, or “generations” as Snowden puts it (Snowden, 2002). These three phases started with the usage of explicit knowledge, moved towards

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“The social capital related to each type of knowledge creates its own knowledge environment.”

tacit-explicit knowledge conversions and then realized the role of potential knowledge in business. The phases can be summarized as:

- the efficient implementation of knowledge;
- learning and knowledge transfer; and
- the creation of new knowledge.

Similarly, for the division of the generations of knowledge management as science, Scharmer (2001) uses three categories of knowledge:

1. explicit;
2. tacit-embodied; and
3. self-transcending.

In this paper, it is argued that knowledge has three different value creation logics. There are three types of knowledge resources that each have a different value creation logic and thus need a different kind of social infrastructure in order to be converted into competencies. Codified explicit knowledge assets, such as customer databases, can be turned into value by efficiently implementing them in production. Tacit knowledge assets, such as the professional knowledge embedded in employees, can be turned into value by transferring them and sharing them with others to create learning benefits and increase the efficiency of a firm. Finally, “potential” knowledge assets, such as the reception of a new technology inside or outside the company, or the business nose of innovative individuals, can be converted into value by creating the right infrastructures to utilize these “emerging” bits and pieces of knowledge, in order to form the grounds for new successful innovations.

According to Scharmer (2001), all three forms of knowledge – explicit, tacit and potential – are based on different epistemological assumptions, and all types require different “knowledge environments” to support them (see also Ståhle *et al.*, 2003). The questions that still remain are:

- What do these knowledge environments look like?
- How are they related to value creation and intangible assets?
- What are the characteristics – or the social attributes – that generate value in different knowledge environments?

As a result of this article, it is suggested that there are three different types of social capital to leverage competencies in the knowledge-based economy. First, there is social capital to leverage competencies related to potential knowledge – to create knowledge. Second, there is social capital to leverage competencies related to tacit knowledge – to transfer knowledge. And finally, there is a certain type of social capital to leverage competencies related to codified knowledge – to implement knowledge.

The social capital related to each type of knowledge creates its own knowledge environment. As a whole, these knowledge environments form the knowledge system of a firm, where innovation ideas emerge, are gradually improved and are eventually integrated into an efficient production process. A sketch of the knowledge system of a firm and descriptions of the dynamics of knowledge in this threefold system are presented.

This wholly theoretical article combines the latest views about knowledge management and social capital. It gives a holistic approach on efficient use of explicit knowledge, gradual development of tacit knowledge and handling of potential knowledge, and it argues that the

mastery of all these functions, and not just one, is needed to gain competitive advantage. In the discussion part of the article, it is stated that the social structures emerging from different types of knowledge form the basis for three basic management systems that a firm must harness in order to overcome fundamental management challenges and succeed in the market.

Social capital for knowledge

The term social capital is a concept introduced by social economists. The concept tries to connect inter-personal social relationships to the creation of economic value. At its simplest, social capital is based on the notion that “social relationships have value” (Putnam, 2000, p. 18). According to Burt, social capital can be thought of as “know-who”; it is about “everyone you now know, everyone you knew and everyone who knows you even though you do not know them” (Burt, 1992; Edelman *et al.*, 2002). Hjerpe (2003) states that social capital can be considered as being among the institutions (the legal structures and normative “rules of the game”) that influence the economic performance of nations, regions, communities and companies (North, 1990; Hjerpe, 2003). Broadly speaking, in the field of organizational studies, social capital can be understood as equivalent to the concept of “informal organization”; a social structure that lies behind the formal hierarchy of a firm.

Adler and Kwon (2002) have useful notions of capital metaphor and social capital. Similar to traditional forms of capital, social capital has, for example, expectations of a future flow of benefits; social capital can be converted into other kinds of capital; and social capital can substitute or complement other resources. Unlike financial capital, social capital needs maintenance and unlike physical capital, it does not have a predictable rate of depreciation. Furthermore, social capital is a collective good and it is located not in the actors, but in the relations between actors. Robison *et al.* (2002, p. 5) argue that “if the capital goods metaphor is to be useful to analyze social relationships, it must take seriously the transformative ability of capital to turn one thing into another.” In other words, to be called capital, social capital has to function as a mechanism turning raw material into a finished product. In doing so, social capital produces economic wealth, as well as producing more of itself.

Like other forms of capital, social capital can yield disutilities, as well as benefits, for the actors involved (Adler and Kwon, 2002). This has led to a notion of “negative social capital” (see i.e. Portes, 1998; Edelman *et al.*, 2002). An example of “negative social capital” at a national level is the Mafia. The Mafia has strong internal social capital, but causes negative externalities on the surrounding society. Likewise, social capital can have negative effects on internal actors, and an example of this would be the drugs trade. Thus, social capital always has both internal and external consequences.

According to Blyler and Coff (2003), management literature usually approaches social capital from the point of view of the rent generation of the firm, whereas sociologists see social capital in terms of the benefits that actors obtain through their social ties. Indeed, social capital has these two roles. For a firm, social capital is both a resource and a value driver. For example, employees may have contacts with persons working in another company, and this is what makes the connection a resource for the firm. On the other hand, the firm has a special set of norms, beliefs, trust and network structures inside the company that enable resource management. Furthermore, Blyler and Coff (2003) state that social capital allows firms to acquire, integrate, recombine and release resources – the key tasks that Eisenhardt and Martin (2000) identify as being important in the management of the firm’s resource base. This highlights the role of social capital not only as an asset of the firm, but also as a critical value driver in knowledge-based business.

In the field of strategic management, and especially in the resource-based view of the firm, three themes are repeatedly discussed. It has been said that in order to succeed in competition, a firm has to simultaneously be competent in first, managing its existing businesses efficiently, second, ensuring growth with these businesses, and finally, developing new businesses (Fitzroy and Hulbert, 2005). Fitzroy and Hulbert (2005, p. 266) call these “the fundamental management challenge of a firm.”

The fundamental management challenge of a firm results in the firm having to handle three different modes of operation simultaneously. First, existing businesses have mainly to be managed by using well-specified, explicit and codified knowledge to improve efficiency. Second, gradual improvements to existing businesses have to be done by gathering experience-based knowledge from inside the firm and from different interest groups, and by then applying this to existing business processes. In gradual development, tacit forms of knowledge are thus highlighted. Thirdly, in the innovative mode of a firm, new business is developed by using bits and pieces of information from many different sources and then condensing this information into a new, innovative idea. At the innovation level, a potential and emerging type of knowledge is dominant. From the social capital point of view, this means that the firm has to have the right social capital to manage its existing businesses efficiently, to incrementally improve existing businesses and to consciously innovate for new businesses.

It is obvious that in the new economy, knowledge assets are grounded in the experience and expertise of those individuals working in a company. A firm has to therefore provide the right structures to shape knowledge into competencies. According to Teece (2000), besides physical and resource allocation structures, social structure is also an important driver in creating the right competencies to ensure the commercial success of a firm.

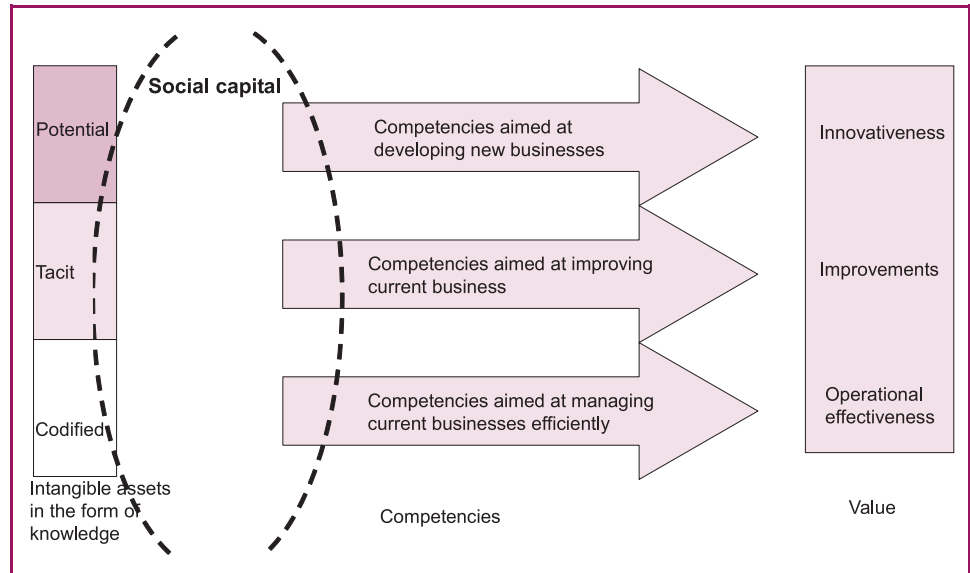
A knowledge-based view can then be taken to elaborate the different strategies for explicit, tacit and potential knowledge. The knowledge-based view functions similarly to the resource-based view, and sees the knowledge resources of a firm as valuable, rare, inimitable and non-substitutable. Therefore, as the resource constellation is to some extent fixed, the resources can be thought of as dictating the strategic options of a firm. According to the theory of increasing returns in the knowledge-based economy, the use of knowledge resources produces more knowledge resources. In the traditional, physical resource-based economy, the use of resources wears out existing resources and consequently, at a certain point in time, starts to decrease the profit gained from the product produced.

The theory of increasing returns has led to the concept of "network externalities", according to which "what gets ahead in the knowledge-based economy, stays ahead" (Teece, 2000). In the network view, introduced by Shapiro and Varian (1999), markets are dominated by networks that gain strength as more actors join the network. In an economy dominated by alliances and networks, the value of a product is dependent upon the amount of its users (Teece, 1998). Typical examples of positive network externalities are the use of communication technologies, such as the telephone, email and fax (Shapiro and Varian, 1999). Positive network externalities, also often referred to as Metcalfe's law, combined with the law of increasing returns in the new economy have dramatically changed the perception of how the markets of today create economic value.

The comprehension that a firm can succeed in competition once it realizes the type of its initial knowledge resources immediately follows the above-mentioned concept. Once the type of knowledge resources accessible today is realized, the competitive advantage of tomorrow comes along "automatically" when the knowledge assets used in value creation accumulate and renew themselves through their very use. Since every type of knowledge has its own logic in producing value, it can be argued that potential knowledge is more important in new innovations than codified knowledge. Codified knowledge can be stated as having the most important role in reducing transaction costs in production processes. Tacit knowledge is best used when something is incrementally improved. As shown in Figure 1, social capital lies in between the knowledge resources of a firm and the competencies which aim at realizing different goals. The value of the suitable competencies for explicit, tacit and potential knowledge resources is then realized in innovativeness, gradual improvements and operational effectiveness.

In order to create the competencies for innovativeness, improvements and effectiveness, a particular (and corresponding) type of social capital is needed to benefit from knowledge assets embedded in the human resources of a firm. By thinking of social capital as more of a value driver rather than a resource supports the positioning of social capital in between of

Figure 1 Social capital as a value driver in a firm



the knowledge resource base and competencies (Figure 1). In the following section, the components of social capital and the ideal types of social capital for potential, tacit and explicit knowledge are examined separately.

The components of social capital

The emergent and systemic nature of social capital causes confusion among scholars. There are many definitions of social capital, as well as many different perceptions of the components of social capital. The systemic and emergent nature of social capital means that, for example, “trust” can be both a source (Putnam, 1993) and an outcome (Coleman, 1988) of social capital. Fukuyama (1995) even states that trust is social capital. Ruuskanen (2001) handles the problem of the emergence and systemic nature of social capital by dividing the concept into sources, mechanisms and outcomes. Portes (1998) and Adler and Kwon (2000) have also presented a similar division of social capital into causal chains. Portes (1998) presents the concept by dividing it into sources, definitions and consequences. Furthermore, Nahapiet and Ghoshal (1998) argue that social capital creates new intellectual capital through mechanisms of knowledge exchange and combination.

Based on an extensive review of contemporary social capital literature, Adler and Kwon (2000) define networks, norms and beliefs as the sources of social capital. This definition is also adopted in this paper. Social networks are the most important source of social capital, because social capital is understood as being found in the connections between and among individual people. Norms form the context where the participants of the network are able to perform functions. Putnam (1993) and Portes (1998) consider norms, especially the norms of reciprocity and particularly “general reciprocity”, as very important.

In the norms of general reciprocity, the donating actor provides access to resources in the expectation that they will be fully rewarded in the future (Portes, 1998). Beliefs come in the form of shared visions of strategy, common interpretations and meanings. Beliefs are also essential to the formation of social capital, because social capital hardly exists among people who do not understand each other’s motives. If the common objectives and motivations are missing, people do not co-operate willingly. Shared beliefs are emphasized by scholars such as, for example, Nahapiet and Ghoshal (1998) and Portes (1998) (Adler and Kwon, 2000).

Nahapiet and Ghoshal (1998) divide social capital into three components: the structural, cognitive and relational. Broadly speaking, the structural dimension corresponds to networks and forms the context in which norms and beliefs are formed. The cognitive dimension corresponds to norms and defines the common rules of the game that the collaboration between actors is based on. Finally, the relational dimension embodies beliefs by forming the motivational element in the network enforced by norms. Shared beliefs ensure that actors are aiming for the same goal, and they can also be thought of as a shared vision of the participants. Nahapiet and Ghoshal (1998) bring in the concept of trust as a source of social capital. Citing Misztal (1996), Nahapiet and Ghoshal (1998, p. 254) point out that trust can be defined as a belief in other individuals and especially in the belief that the “results of somebody’s intended action will be appropriate from our point of view.”

The optimal structure of the social network is one of the main sources of dispute in the literature on social capital. The main article on the structure of the social network is Granovetter’s (1973) “Strength of weak ties”. According to Barabási (2002), Granovetter’s, 1973 article is one of the most cited and most influential writings in contemporary sociology. The structural hole theory, developed by Burt, is related to the strength of the weak ties theory. Burt’s main argument is that social capital is found at its best in a network with many structural holes. This way an actor can benefit from both information and control benefits (Burt, 1997). On the contrary, Coleman (1988; 1990) has stated that a dense social network structure is better mainly because of the higher degree of reciprocity and the self-enforcing norm structure (Johanson, 2000).

Differences between the networks of many and few structural holes can be illustrated with the three types of networks presented by Baran (1964), and later presented by Barabási (2002). These three archetypal networks are illustrated in Figure 2. By taking these network types as a starting point, the role of social capital as a value driver for explicit, tacit and potential knowledge can be presented using social network structure, beliefs, norms and trust as components of social capital.

Social capital for potential knowledge

A decentralized network structure (Figure 3) is a structure with many structural holes and weak ties. This type of network structure makes it possible to gain a lot of information and weak signals from different directions, thus handling emerging and potential knowledge. A weak signal can be thought of as being the first indication of a new innovation. It may seem

Figure 2 The three types of networks as according to Baran (1964)

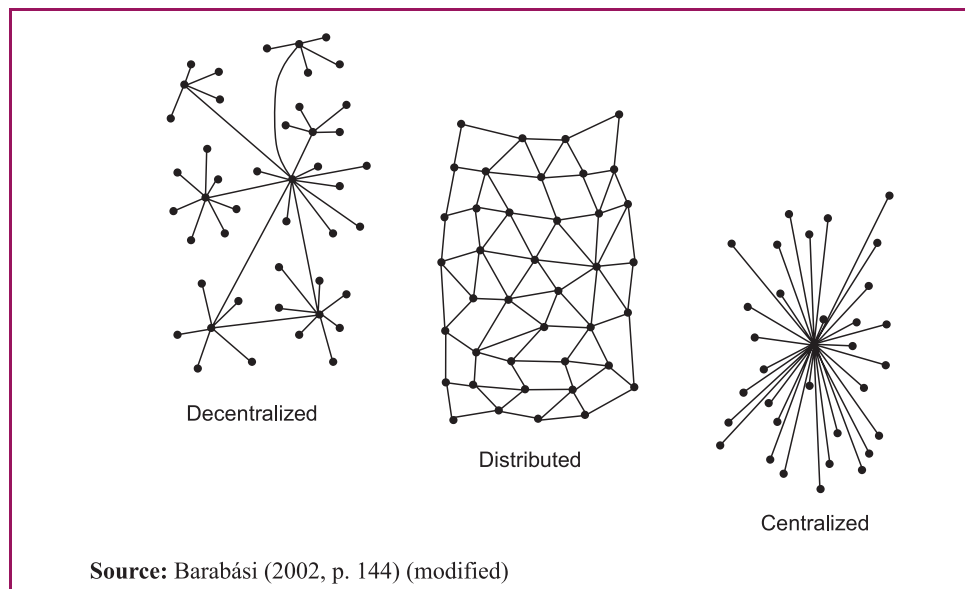



Figure 3 Social capital for potential knowledge is decentralized

Social capital for potential knowledge	
Social network structure	 <p>Decentralized structure (Barabási, 2002).</p>
Beliefs	The belief that innovation is needed. The belief that innovativeness is rewarded. Myths about successful innovations.
Norms	No punishments for failure. Acceptance of mistakes. The freedom to try things and fail. ‘Forget the past and concentrate on the future’ mindset.
Trust	Fast trust. Thin and fragile. Enables and initiates a relationship. Creates interest. Short-term affairs.

unimportant but still have a critical impact on the formation of the future. (see i.e. Uskali, 2005) Most of the relationships are “second-hand” relationships. According to Powell (1998), new innovations are not created inside individual organizations anymore. Instead, innovations are created in the networks of heterogeneous actors.

Research carried out by Fleming and Juda (2004) support Powell’s argument. Among the inventors in the Boston area, the network of innovators is filled with “gatekeepers”. These gatekeepers link diverse groups in the network together and bridge the gap between different institutions and disciplines. In Burt’s terms, the gatekeepers fill in the structural holes of a network. Burt has recently argued that structural holes and brokers (gatekeepers) between different groups in social networks provide more ideas for innovation than in a dense social network structure (Burt, 2004).

When new knowledge is created in a decentralized network, the belief in innovation has to be strong. This can be achieved by an effective reward system that takes innovativeness into account. Beliefs in the social system can be influenced by organizational myths. These myths can be stories about past successes or failures, and they constitute the values of the organization. Cohen and Prusak (2001) use 3M as an example of an innovative company. 3M encourages their employees to spend 15 percent of their working time in individual experimental projects. According to Cohen & Prusak, this value is supported by the myth of Art Fry, the inventor of post-it notes. Art’s legend, and his example of successful innovation, is passed around the employees in 3M by word of mouth.

Innovativeness and the combination of heterogeneous resources and knowledge require liberal social norms. Similar to the common method of “brain storming”, mistakes have to be accepted and possible failures left unpunished. The freedom to try new things and fail has to exist.

Since the decentralized social network is in constant change and relationships are often short, trust therefore has a very special form in innovative environments. Relationships in the innovation network are often “asymmetric”, meaning that the participating actors are different in terms of size and other qualities. In these kinds of temporary partnerships, there may not be clear common goals of co-operation, or the goals may change over time.

Relationships in the innovation network require “fast trust”, the ability of participating actors to engage in short-term co-operation at short notice. Fast trust enables and initiates a relationship, it creates interest and enables initial investments, but it is also thin and fragile (Blomqvist, 2002). According to Cohen and Fields (Cohen and Fields, 2000; Blomqvist, 2002), the trust found in the Silicon Valley is similar to the concept of fast trust. It is not based on common history, but rather on the reputation of actors. It is generated by performance and not by personality, which allows outsiders to join the network and makes the formation of

networks of heterogeneous actors possible. The characteristics of a knowledge-creating, decentralized social network structure are summarized in Figure 3.

Social capital for tacit knowledge

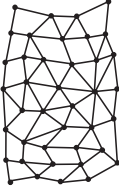
The characteristics of social capital for tacit knowledge are summarized in Figure 4. The distributed social network structure does not have weak links or structural holes. Every actor is connected to a couple of others in the network with strong links. A distributed structure is best used in situations where tacit knowledge – the experience-based knowledge – is shared in a trustworthy and stable atmosphere. A distributed network represents “closure”, to use Coleman’s (1988; 1990) terms. According to Coleman (1988), a dense network structure creates trust and commitment to the community, which in turn makes transactions easier. A distributed, closed network does not offer information and control benefits like a decentralized structure but, in turn, it makes commitment and long-term relationships possible.

The distributed social network resembles the concept of the “community of practice” introduced by Brown and Duguid (1991). Similar to a closed network, a community of practice has strong internal social capital, but only a few external links. Over time, a community of practice builds its own values and shared meanings that create boundaries around the community (Edelman *et al.*, 2002).

Beliefs in a social capital of tacit knowledge are “noble” in a way, since other actors are seen as important long-term partners rather than resources that can be exploited for short-term information benefits. A shared vision of the development network should include values such as “lifelong learning” and “personal growth”. Myths that support a dense network structure include heroic stories about people who have taken personal risks and sacrificed themselves for the company and other employees. For example, according to Cohen and Prusak (2001) people at UPS tell and retell stories of co-operation and devotion to get the job done. The stories include a “legend” about a center manager who was eight months pregnant and who, when one of the drivers did not show up, delivered all the packages herself. Another tale concerns drivers who made deliveries in weather so bad that their competitors at FedEx were kept off the road.

Norms in the distributed network are based on closure. Closure means the existence of sufficient ties between certain numbers of people in order to guarantee the observance of norms (Portes, 1998; Coleman, 1988). In a distributed social network, norms of reciprocity are self-enforced by the community. An example of this kind of networking, as provided by Coleman (1988), is the Jewish diamond market in New York. In this community, individual diamond dealers are, at least in principle, competing with each other in the same market. To speed up the transactions with diamonds, exchanges of material are made without cumbersome legal contracts.

Figure 4 Social capital for tacit knowledge is distributed

Social capital for tacit knowledge	
Social network structure	 <p>Distributed structure (Barabási, 2002).</p>
Beliefs	Beliefs in lifelong learning and personal growth. Myths about successful service and helping others.
Norms	Reciprocity; everybody has to contribute. Unwritten rules. Social sanctions for those who break the rules.
Trust	Incremental and dense trust makes relationships more durable. Enables risk and adaptation. Enforceable trust.

“The fundamental management challenge of a firm results in the firm having to handle three different modes of operation simultaneously.”

In the diamond market example (Coleman, 1988), the dense social network functions as a sanctioning system for those who break the rules. The sanction is simply to leave the violators outside of the community. The dense network structure is a source of general reciprocity, a kind of reciprocity where the actors do not expect the repayment of a favor to happen instantly. According to Portes (1998), generalized reciprocity is different from purely economic exchange in two aspects. First, the currency with which obligations are repaid may be different from that which was used in the first place. Second, the timing of repayment is unspecified. In a distributed social network, the goodwill that others have towards each other is emphasized. Adler and Kwon (2002) even suggest that the whole concept of social capital can be explained with goodwill.

Portes (1998) calls the type of trust in dense social networks “enforceable”. Obligations that actors have to each other in the distributed network are enforceable through the power of the community. The idea of enforceable trust has its roots in Durkheim’s theory of social integration. In this setting, the transactions between actors are embedded in the common social structure and they have two special characteristics. First, the donor’s returns may not come directly from the recipient, but from the collectivity as a whole in the form of status, honor or approval. Second, the collectivity itself acts as guarantor that whatever debts are incurred will be repaid (Durkheim 1984; Portes, 1998).

Besides enforceability, other qualities of trust in the distributed network structure are its degree of concentration and even its unconditional nature. According to Blomqvist (2002), incremental trust enables risk and adaptation and makes relationships more durable. Furthermore, a more in-depth evaluation of the other party’s goodwill has to be done in order to develop incremental trust. Boisot (1995) also highlights the importance of trust in the transfer of tacit knowledge: “When the message is uncodified, trust has to reside in the quality of the personal relationships that bind the parties through shared values and expectations rather than the intrinsic plausibility of the message” (Boisot, 1995, p. 153; Nahapiet and Ghoshal, 1998, p. 255).

Social capital for explicit knowledge

The third archetype of a social network structure, besides the decentralized and distributed models, is the centralized structure. The centralized social network structure is formed around a focal actor. The focal actor has dyadic, strong links to other actors, but the other actors are not linked to each other. It can be argued that the centralized social network structure is optimal for implementing codified and explicit knowledge – to make things happen efficiently and in a predetermined manner. The focal actor is a manager who knows exactly what the other actors in the network are doing.

The beliefs of the actors in a centralized social structure include the idea that high quality and discipline is needed for success. At an international level, some cultures in the world seem to adopt a centralized structure better than others. Japanese working ethics and the fear of losing face in front of managers are powerful drivers in Japan for the efficient implementation of rules and they form the detailed blueprints for work. The belief that hard work and discipline pays off in the long-term is created with future-oriented stories and myths. A future-oriented myth can be, for example, a story about somebody from any background becoming extremely wealthy with hard work (see Horatio Alger myth).

Social norms in the centralized network are a set of clear, defined and explicit rules. The obligation to follow the rules is enforced by instant sanctions from the managers. This is possible due to the simple nature of the relationships. As all the information related to work is in an explicit and well-defined form, an employee is considered as part of the machinery and can be hired, fired or outsourced at virtually any time.

Trust in the centralized social network is based on the clearly pre-defined roles and the hierarchical relations. Trust in other people is perceived through the formal hierarchy and rules. In the centralized social network, it is important to feel that everybody “plays by the book”. In this way, employees have a feeling of material and spiritual security, and their obedience to authority is a way of achieving this security (see Adler and Kwon, 2002). The characteristics of the centralized social network structure are summarized in Figure 5.

The knowledge system of a firm


The three types of social capital described above are the archetypes of the social structures found in a firm. A firm is likely to have multiple overlapping informal networks for potential, tacit and explicit knowledge, and its informal organization rarely resembles any one of these archetypes alone. In fact, all archetypes are needed. Together, the three types of social capital for codified, experience-based and potential knowledge form a system that is called the “knowledge system of a firm” (in a regional IC context, see Smedlund and Pöyhönen, 2005). The knowledge system is based on three types of social networks: a network for potential knowledge, a network for tacit knowledge and a network for explicit knowledge.

According to the idea of the knowledge system of a firm, everyone in the firm can be a member of every type of social network. These networks also include members from outside the firm. This means that individuals must simultaneously deal with intra-firm and extra-firm relationships that are related to the efficient use of codified knowledge, the gradual development of experience-based knowledge and the handling of potential, not-as-yet invented knowledge. These three relationships form the three networks of a firm that were referred to earlier as centralized, distributed and decentralized (Barabási, 2002) network structures.

In the centralized social network, the knowledge type is mainly documented, explicit knowledge that is related to the efficient production of pre-designed services or products. In the distributed social network, the knowledge type is tacit, experience-based knowledge that is shared in order to gradually improve the products or services of the firm. In the decentralized social network, knowledge is still to a large extent emergent, potential and in a not-as-yet invented form. In the decentralized network, bits and pieces of information and “weak signals” are condensed from many different sources.

Ideas for new innovations are born in every social network in the firm. Most of the ideas are formed in the decentralized social network where information is purposefully sought from different sources. Important sources of innovation also include relationships in the

Figure 5 Social capital for explicit knowledge is centralized

Social capital for explicit knowledge	
Social network structure	 <p>Centralized structure (Barabási, 2002).</p>
Beliefs	Beliefs in high quality and discipline. Future-oriented stories.
Norms	Clear, defined and explicit rules. Hard and instant sanctions.
Trust	Trust in the hierarchy. Agreements are meant to be followed faithfully.

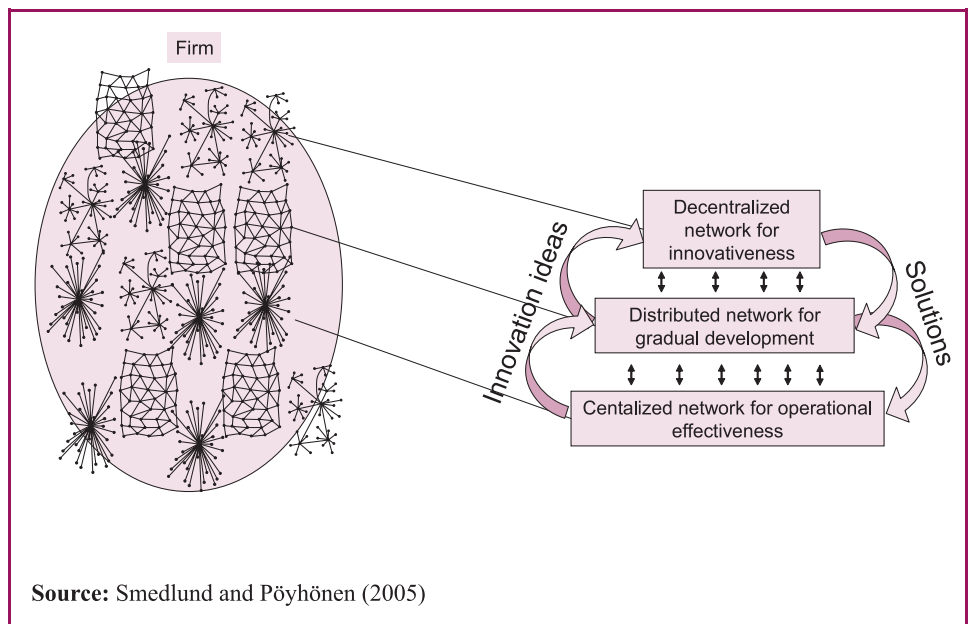
centralized structure and developmental relationships in the distributed network. Below, in Figure 6, a model of the knowledge system of a firm is illustrated. In this model, an idea for innovation born in the production of a centralized social network is transferred to the innovative, decentralized social network through a developmental, distributed social network. At the innovation level, a solution to the problem is invented and then diffused. Before long this idea comes back to the firm's production function through the distributed network. It can be said that core value is produced in a hierarchical production-related network, incremental innovations are achieved in a horizontal, gradual developmental network, and radical innovations are created in a diagonal innovative network (see Möller and Svahn, 2003).

With the simple model of the firm as a knowledge system of explicit, tacit and potential knowledge, it can be argued that all knowledge types are needed in order to create and maintain competitive advantage. In the decentralized social network, new ideas for business are generated from the vast amounts of information. Ideas can be inventions for new products, production methods and production processes. The role of the distributed social network is to function as an intermediary between a firm's innovation and production. With the learning function that the distributed network provides, new ideas are gradually improved and transferred to actors who can use them in the production function of the firm. Besides innovation ideas invented in the decentralized social network, feedback and new ideas from the shop floor are also transferred across the firm because of the knowledge transferring nature of the distributed social network (see Smedlund and Pöyhönen, 2005).

Discussion

The competitive advantage of firms in today's economy is increasingly based on intellectual capital resources. IC resources form the knowledge that gives the firm its value and, accordingly, the firm uses this knowledge to make a profit. IC resources alone do not create economic rent. In this article, it was suggested that a firm is a three dimensional knowledge system of: explicit, tacit, and potential knowledge. All these types of knowledge resources require different kinds of social network structures in order to create competencies. Competencies further produce value from knowledge resources through innovation, gradual development and efficient production.

Figure 6 The knowledge system of a firm



By reviewing some of the latest writings on social capital, it was argued that social capital consists of four components:

1. social network structure;
2. norms;
3. beliefs; and
4. trust.

Social capital is found in the connections between people in a social network. Norms form the common context for the functions performed in the social network. Shared beliefs function as a motivational element; a common vision of the future. Finally, trust among individuals or in the system ensures that the activities of others are somewhat predictable (Nahapiet and Ghoshal, 1998; Portes, 1998; Adler and Kwon, 2000).

From the literature on social capital, it was noted that the social network structure for the efficient use of explicit, codified knowledge in the production function of a firm resembles the centralized network structure (Barabási, 2002). This centralized structure is maintained by clear, defined and explicit rules, hard and instant sanctions and beliefs in high quality. The type of trust in the social structure for explicit knowledge is directed towards the hierarchy and written agreements.

The social network structure for the transfer of tacit, experience-based knowledge to the gradual development function of a firm is distributed in Barabási's (2002) terms. A distributed social network structure is maintained by the norms of reciprocity, unwritten rules and social sanctions. The beliefs in a distributed structure are directed towards lifelong learning and personal growth. Trust is incremental, dense, and enforceable by the community.

Finally, the social structure for potential knowledge is decentralized (Barabási, 2002). A decentralized structure in a firm is apt to create totally new knowledge to initiate innovation. This structure is maintained by the norms of accepting mistakes and the freedom to try new things. It also is supported by the belief that innovativeness is rewarded. The type of trust found in the decentralized structure is thin and fragile and functions as an enabler to initiate multiple relationships.

Together, the three types of social networks inside a firm form structures for:

- operational efficiency;
- gradual development; and
- innovation.

According to organizational theories, the first two modes of organization were recognized long before the discussion on the management of knowledge in firms even started. Burns and Stalker (1961, p. 119) divide the management systems of a firm into the "mechanistic" and the "organic". For them, mechanistic and organic systems represent "two polar extremities of the forms which such systems can take when they are adapted to a specific rate of technical and commercial change." With the management systems they introduce, a firm's human resources can be managed according to the circumstances. A mechanistic management system represents hierarchy and specialized functional tasks, and it is designed for stable conditions. An organic management system is designed for changing conditions and functions with the logic of continuous adjustment and the re-definition of individual tasks through interaction with others (Burns and Stalker, 1961, p. 121).

The discussion around "loosely coupled systems" gives another example of the dual strategy – of efficiency and improvements – of a firm. According to the "loose coupling" concept, "organizations appear to be both determinate, closed systems searching for certainty and indeterminate, and open systems expecting uncertainty" (Orton and Weick, 1990, p. 204). In other words, there is a paradox in the functioning of an organization. The paradox is that a successful organization has to be rational and indeterminate at the same time. According to loose coupling, a firm is a system of interdependent actors that is both

open and closed at the same time. This means that in any part of a firm, the system functions at both a technical level that is closed to outside forces, and at an institutional level which is open to outside forces (Orton and Weick, 1990).

The model of dual strategy only covers the efficient production of pre-designed products and the gradual improvement of a product, a production method or production process. In the traditional economy and during the time that the above-mentioned dual strategies were developed, the cycle of renewal was much longer than today. This was mainly due to the intensity of physical capital in the economy. The firm that possessed the most monetary capital, land, labor and machinery was able to reach the benefits of scale with only slight modifications to existing products over time. However, the new knowledge-based economy functions on a totally different logic. This has led to theories on "increasing returns" and the "new economy". Due to the special characteristics of knowledge, including its characteristics as a "public good" and endless replication possibilities, knowledge has become the dominant source of competitive advantage (see i.e. Drucker, 1995).

The third mode of organization has been recognized in the twenty-first century in knowledge management literature (Snowden, 2002; Scharmer, 2001; Stähle *et al.* 2003). Instead of a dual strategy, the third mode states that there are three strategies. Besides efficient production and gradual development, a firm needs also a separate management system to initiate innovation. Thus, the firm needs to enforce all three strategies simultaneously to reach competitive advantage. However, the firm can emphasize one strategy more than the others to better meet the functioning logic of the market (see Eisenhardt and Martin, 2000). In fact, in those markets functioning on the logic of increasing returns, the firm is more likely to succeed by emphasizing decentralized social networks to gain innovation benefits. On the other hand, in those markets with decreasing returns, centralized social networks are more likely to produce the most efficient outcome. Finally, in those markets based on steady returns, incremental improvements in the distributed social network structure provide the best prerequisites for success.

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