

Value Creation in Knowledge Intensive Firms

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Abstract

This work is aimed at modeling the link between knowledge and outputs in organizations. Drawing on theories of intellectual capital as well as social capital, we create a model to illustrate different kinds of knowledge at individual and collective level, how this knowledge is created and exploited, for the purpose of transforming it into value-creating activities.

Using the two-dimensional model of Spender (1996) including the tacit/explicit dimension and the individual/collective level of analysis, we argue that linking knowledge to outcomes requires conscious configuring of the different types of knowledge. We argue that at the collective level, productive knowledge is best described and analyzed through the concept of social capital. Further, intellectual capital is defined as human capital at the individual level. Our main conclusions are summarized in a model comprising the main tasks in organizing knowledge as to make it productive. The first is to transform

individual tacit knowledge into explicit knowledge-in-action directed towards organizational objectives and productivity. The second is to transform individual knowledge-in-action and collective tacit knowledge into configured knowledge, the type of knowledge directly related to the production of output, customers and markets.

Key words: value creation, intellectual capital, social capital, knowledge
Exploration and knowledge exploration

Introduction

We are living in times where organization becomes organizing, we speak of the doing of organization (Heimer 1992). There is a need for organizational flexibility, more creative leadership practices and organizational models that pay attention to changing customer requirements. Change and uncertainty is constant in the new economic landscape (Brown and Eisenhardt 1998). There are great opportunities in this uncertainty, and the firm's focus should be on identifying and exploring these opportunities (Shane and Venkataran 2000). Managers are increasingly realizing that the basis of their competitive advantage is found in their knowledge base, and that development and exploitation of knowledge is paramount for the sustainability of such advantages. Hence, better use of existing knowledge and more effective acquisition and assimilation of new knowledge becomes a business imperative. However, creating and sharing knowledge can neither be supervised nor be forced out in people. Such activities can only take place

when individuals cooperate on a voluntarily basis (Hayek, 1945), and lateral cooperation is required at all levels of the organization. Further, the link between knowledge, value creation and bottom line results for the organization need to be addressed and modeled.

A large body of research has addressed the challenges and opportunities inherent in the management of knowledge-intensive firms, from such different perspectives as sociology, strategy, and management theory as well as organization analysis. At the core of these research streams, however, is a collective effort to gain insight into the concept of knowledge, for practical as well as theoretical purposes. This includes definitions of the concept, theories of how knowledge is created and sustained, and the role of knowledge in creating value and strategic positioning. Our aim is to create a simple and parsimonious model of the knowledge intensive firm, suitable for the analyses of the *value creating potentials* of the knowledge base of the firm. These aspects are analyzed through defining two distinct organizational processes: Knowledge exploration or development, fostering innovation and change, and knowledge exploitation as the equivalent to the production process of outputs in the form of services. We argue that a “generic” model capturing the main features of this type of organization, may serve as a common ground for analyses from different perspectives and for different purposes. Further, a general model may work as a conceptual framework within which research of more specific aspects of the link between knowledge and output may take place. Third, a simple, general model may deal with what we perceive as a redundancy of theories addressing knowledge, leaving us with a more

stringent theory of production in modern knowledge organizations. The reasoning behind our effort is a need to focus on the role of knowledge in creating economic value, moving away from the conception of knowledge as useful *per se*. Thus, our analysis goes along the red thread of *usefulness* of knowledge as input factor for production in contemporary knowledge intensive organizations.

A theoretical model is necessarily a huge simplification of the practical reality it intends to map. Thus, we need to make explicit the dimensions of a knowledge intensive firm that we consider to be the most significant, and hence relevant to include as basis for our model. First, our definition of knowledge as the main input factor leads us to apply a framework built on knowledge. We use the two-dimensional model of Spender (1996) to create a matrix of two organizational dimensions: The tacit vs. explicit knowledge dimension, and the individual vs. collective dimension, combined in a matrix of four different elements of the organization's knowledge. Further, we include two structural aspects of the organization in our analysis. First, in knowledge intensive firms, the boundaries are more or less blurred, rendering the internal vs. external perspective less useful. Second, the organization is characterized as a continuously changing configuration of members and stakeholders; and the conception of structure as a fixed pattern is less relevant. Thus, we consider a network model to be the most appropriate in characterizing the collective level of the organization. In addition, the value creation argument implies that both the creation and exploitation of knowledge should be included in the model. We address these dimensions of the knowledge

intensive firm in the next section, where we conclude by presenting our preliminary model based on Spender (1996). In the further sections, we use theory to explain the four sections of our matrix and the interaction between them. We consider intellectual capital and social capital as the most useful theoretical perspectives in explaining the role of knowledge in the creation of economic value in knowledge intensive firms. We argue that a simplification and integration of these two approaches is sufficient to create a comprehensive, but simple and general model of value creation in knowledge intensive firms. Finally, we discuss the usefulness of the model, its strengths and weaknesses, and subsequent work that needs to be done on the refinements and empirical verifications of our theory.

Characteristic of the knowledge intensive firm

The value creating ability of knowledge-intensive firms is the subject of analysis in this article, and we need a definition of the practical reality of such firms, to form the basis for our analysis. We present four assumptions of organizational characteristics that we consider as the main distinctive features, which need to be included in a theory of value creation, and we shall address them in turn. The first is the assumption that *knowledge is the driver for value creation*. Professional work is based on an abstract body of knowledge (Etzioni, 1961). We regard knowledge as a dynamic social process that is created continuously. We suggest that “knowing” (Choo 1998) is used as a concept in order to illustrate an action-oriented work. Knowledge-workers have privileges giving the possibility to produce an outcome those clients either use or sell. They are supposed to act with responsibility in the best

interests of the clients and other interest groups (Løwendahl 2000). The output of knowledge intensive firms is more or less tailor-made, creating the need for specific organizational arrangements in order to pursue efficiency through the production process.

Our second assumption is that *the boundary between the knowledge-intensive firm and the environment is unclear, and more or less irrelevant for the production processes*. The concept of the organization based on a distinction between what is regarded as internal factors and the so-called “environment” is less useful. Value creation in knowledge intensive firms is accomplished through the pooling of resources from relevant actors, irrespective of their location in space. Thus, the organization as a network is the most appropriate approach for our purposes. Our third assumption is that *knowledge intensive firms are heavily depending on both knowledge exploration and knowledge exploitation*. Contemporary theories of knowledge are to a large degree addressing the exploration aspect, stressing the need for organizational innovation and change in modern markets. We argue, however, that the exploration of knowledge represents the organizational output, and as such is the key to survival and firm revenues. A model of a knowledge intensive firm should take into account both these dimensions. The accumulation of knowledge through learning constitutes a driving force in the development and growth of firms because knowledge acquisition opens new “productive opportunities” (Penrose, 1959) and enhances the firm’s ability to exploit these opportunities (Spencer, 1994). The exploitation of knowledge is the result of the production process, whereby outputs responding to market

demands are produced. The exploitation of knowledge thus constitutes the ground for economic surplus and growth.

The fourth assumption about knowledge intensive firms is that the structural configuration of the organization, i.e. the network, is characterized by a *continuously change in participants and stakeholders*. These dynamics are determined by the task at hand, mainly whether the activities are related to exploration vs. exploitation of knowledge. Generally, innovation and creativity requires the pooling of different and complementary resources, while the production process requires efficiency, and thus focus and similarities of knowledge. This corresponds to open vs. closed processes, which calls for different structural configurations. Successful knowledge intensive firms are flexible enough to adjust their configuration of knowledge to meet both these requirements.

A knowledge intensive firm is characterized by the specific ways knowledge is processed and configured, not unlike the “value network” as described by Stabell and Fjeldstad (1998). These characteristics are the foundation for our model presented in the next section.

Conceptual model

Based on the writings of Spencer (1996) we suggest a model of two dimensions: The knowledge dimension and the level of analysis dimension, comprising tacit vs. explicit knowledge, and individual vs. collective level. These constitute a matrix of four specific areas of focus, related to value

creating activities in the knowledge intensive firm. These areas of focus are wisdom and knowledge-in-action at the individual level, and institutionalized mind-sets and configured knowledge at the collective level, as depicted in figure 1. The recognition of these four areas and the interaction between them constitute the foundation for the management of knowledge resources in order to produce economic value for the knowledge intensive firm.

Figure 1 about here

The individual vs. the collective level. A question can be raised as to whether the nature of social phenomena is different from that of the aggregation of individual phenomena (Durckheim 1951; Gowler and Legge, 1982). While Simon (1991: 176) states that “all organizational learning takes place inside human heads”, and that the focus of socialization should take place within and among individuals, Nelson and Winter (1982: 63) mentioned a component called technical “knowledge” that can be regarded more as organizationally oriented than individually oriented. We argue that it is precisely the difference between the aggregate of individual knowledge and the collective knowledge that constitutes the value created in a knowledge intensive firm. Thus, the interaction between the individual and collective level, as well as the configuration of knowledge elements at the collective level is at the core of the production process in this type of organization. However, we agree that all knowledge is rooted in the individual mind. Thus, a separate assessment of knowledge at this level is necessary.

Tacit vs. explicit knowledge. The most persistent theme of the writings on the nature of knowledge is the proposition that there are different types of knowledge. Within the knowledge management field, Polanyi (1958, 1966) has made a distinction between tacit and explicit knowledge. This is a distinction he aligns with the “knowing how” and “knowing what” of Gilbert Ryle (Polanyi, 1967). Tacit knowledge is mainly personal knowledge that is difficult to formulate and communicate to other people. Tacit knowledge has its origins in practical activities and specific contexts and may be idiosyncratic. Tacit knowledge can be developed through participation in a specific activity over a longer period of time. It is most effectively transferred in a close cooperation between the “master” and the “student” (Polanyi, 1966). Explicit knowledge is relatively easily transferred as information from one person to another one, often with help of codes and language. The success of the transfer of explicit knowledge is dependent upon the knowledge of the receiver, for example related to culture, language and technology (Polanyi, 1966). Now we turn to the explanation of the four quadrants in the model: Wisdom, knowledge-in-action, institutionalized mind-sets, and configured knowledge.

Wisdom: At the tacit, individual level we operate with “wisdom” that takes time to develop. High performing professionals are formed through career plans. Technical skills, to a large extent acquired at the university level, is important the first years within an organization because much work is directed toward protection, not innovation. As professionals get more experience, it is assumed that they will be able to develop a better feeling for system-

interactions, and in this way create significant value for various interest groups. The role of senior professionals is to balance quality assurance and direction. Wisdom is related to value creation in the form of knowledge exploitation through the holistic understanding of the underlying principles of production and how it is related to markets and customers. Further, tacit individual knowledge is a major basis for innovation, or knowledge development, constituting the individual ability to combine and exchange different pieces of information (Nahapiet & Ghoshal 1998).

Knowledge-in-action: At the explicit, individual level we use “knowledge-in-action” as a concept. We stress the importance of individuals’ abilities to use explicit knowledge for value-creating purposes. For this purpose it is necessary that the knowledge-intensive firm has an appropriate infrastructure for handling knowledge, for example through combining individual knowledge with technology in order to carry out actions effectively. The role of knowledge-in-action for knowledge development processes is that it constitutes the contents of the pieces of information that are exchanged between the actors in the network, to be combined into novel insights. Further, knowledge-in-action enhances knowledge exploitation through being directly applied in the production process and reflected in the services provided by the firm.

Institutionalized mind-sets: At the tacit, collective level we use this term to denote the idiosyncratic knowledge assets that may be at the core of a firm’s competitive advantage, as they are unsubstitutable and difficult for

competitors to imitate. This type of knowledge is generated through repeated interaction between actors over time, also denoted the institutionalization process (Berger & Luckmann 1966). The institutionalized mind-sets in an organization are much similar to cultural elements, such as common, basic assumptions and beliefs. However, we confine the concept of institutionalized mind-sets to the collective wisdom concerning the purpose and operations of the firm. As such, these mind-sets may enhance innovation or they may act to preserve status quo, and they may support knowledge creation through constituting a taken-for-granted understanding of the production process that minimizes transaction costs and secures coordinated action.

Configured knowledge: At the explicit, collective level we use the term configured knowledge to denote the programmed organizational practices that give a significant value to the talent market, the client market and other interest groups. Thus, the main role of this type of knowledge is not exploration, but rather exploitation of knowledge. Actually, we argue that the upper right quadrant is the end result of the organizational efforts of transforming the knowledge assets of the organization into productive capital. Simply put, the transformation of individual tacit knowledge into collective explicit knowledge in an efficient way is the ultimate challenge of the management of a knowledge intensive firm.

We now turn to the theoretical underpinnings and explanations of the model. We present some mainstream thoughts of intellectual capital and social capital, focusing on how they relate to the productive abilities of knowledge

assets in a network form of organization. First, the organization as a network is addressed, explaining how a network represents resources of different kinds, which enhance the exploration and exploitation of knowledge at the collective level.

Social networks and social capital

Networks have long been considered as a “hybrid” form of organization, between the arms-length relations of a market and the hierarchical relations of a formal organization. We argue that the development of modern knowledge organizations gradually cements the network as a generic organizational form (Podolny & Page 1998), adopting some features of both markets and hierarchies (e.g. the governance mechanisms) but still having distinct characteristics. Our point in this argument is that division of labor and coordination (both being the core functions of markets as well as organizations) is a substantially different task when the main input factor in the creation of value is knowledge. Thus, governance may no longer be the main underlying principle of organizing; the challenge is configurations of knowledge rather than governance of individuals. Despite the focus on organizations as hybrid forms, or maybe due to the persistent focus on governance mechanisms, a coherent network theory of organizations is yet to be built. Social capital theory may represent the basis on which such a theory may arise, following Gabbay and Leenders (2001): “Social capital has grounded the discourse of social networks in a focus on the productive outcomes associated with social structures/social networks”. Thus, with its focus on resources and benefits accruing from social networks, social capital

is fitting well into our aim of modeling the value-creating aspects of knowledge.

The central proposition of social capital theory is that networks of relationships constitute a valuable resource for the conduct of social affairs, providing their members with “collectively-owned capital” (Bourdieu, 1986: 246). There has been some dispute between scholars within this field as to what constitute the network, resources, and the outcomes of the resources. We shall make a distinction between the network as such, the resources embedded within in, and the outcomes of these resources. The network as such is the collection of individuals and the ties between them, similar to traditional fixed structural models of organizations. We have already stated our argument that this network is a structure beyond the internal/external dimension of organizations. The network is including all actors participating in value creating activities at a given point of time. We acknowledge that the totality of members of these networks are more or less undetectable in practice, but we argue that it is still closer to reality than the traditional internal perspective of organizations.

A network may produce benefits and costs for the actors, and we define these as social capital and social liabilities (Gabbay & Leenders 2001). Thus, social capital is the benefits accruing from the network, and is pointing directly to the red thread of our arguments: The value creating capabilities are related to the network. A discussion of the potential liabilities of a network is important, but extends the scope of this article (see e.g. Portes 1998). We will, however,

address the different types resources and the outcomes of social capital, related to our model.

The sources of the benefits produced by a network lies in the individual capabilities and the configuration of these. The configuration, or structure, of a network, has been defined along two dimensions: The “tie approach” and the “structural form” approach (Gabbay 1997). Nahapiet and Ghoshal, on the other hand, define three dimensions of social capital: The relational dimension, the structural dimension and the cognitive dimension (Nahapiet & Ghoshal 1998). They develop a theory of how these three dimensions of social capital contributes to the development of collective knowledge, which is their definition of intellectual capital. We shall adopt this approach in our study, but extend the scope of discussion. We address both knowledge development and exploitation, and social capital is not only considered as a means to create collective knowledge; rather, it is the main collective resource base for value creation and organizational outcomes or service production.

The issue of knowledge exploitation further explores how the structural, relational and cognitive dimensions of social capital are directly beneficial for the bottom line results of the firm.

Structural form

Within social network research, scholars are disputing on what *types* of networks that give the most benefits, through comparisons of different network structures. It appears that in networks where the actors are dependent on rapid diffusion of information from a variety of sources, a network rich in

structural holes, i.e. many disconnected actors, are the most beneficial. The benefits associated with structural holes (Burt 1999 p.3), are the ability of actors to combine information from separate, disconnected sources, facilitating discovery of new opportunities and better coordination, and they are denoted control and information benefits. Several empirical studies report that managers who span structural holes are more successful than managers with smaller, dense networks (Burt 1999, Gargiulo & Benassi 2000). The benefits of information arise as the consequence of the non-redundant information flowing through the network, enabling the actors to connect and combine the information in new and innovative ways. Following this reasoning, the argument is further that dense networks with closure will produce redundant information because all the actors are sharing a common knowledge base, and the information exchange fail to produce added value (Burt 2001 p. 208). Further, dense networks create structural constraints, i.e. the structure impose constraints on the actors' access to novel information from disconnected actors, and further reduce their flexibility in adapting to changing circumstances (Gargiulo & Benassi 2000, Burt 2000).

On the other hand, there are also empirical indications that strong ties produce benefits, e.g. through facilitating cost-effective transfer of complex information and tacit knowledge (Hansen 1999, Nahapiet & Ghoshal 1998). In dense networks with strong ties, the actors know each other well, the direct ties implies a high degree of transparency within the network, and the strong ties imply the development of norms and rules of behavior, that may create trust and reduce transaction costs and risks for the participants (Burt 2001 s.

208, Coleman 1988). Further, the close connections between the actors facilitate the transfer of tacit knowledge (Nahapiet & Ghoshal 1998). As we are addressing both the knowledge creation and exploitation aspects of the organization, we see that these two tasks may require different configurations: Weak ties and structural holes are efficient for exploration purposes, while dense networks are beneficial for the exploitation tasks.

We suggest that the organizational solution to this dilemma is a large network with weak ties combined with productive cliques within the network. But whatever structural form the organization chooses to configure its knowledge, the outcomes of the structural dimension of social capital is configured, knowledge, i.e. the upper right quadrant of our model in figure 1.

Cognitive social capital: institutionalization

Bourdieu's well-known definition of social capital relates the concept to an institutionalized social setting: "...Social capital is the aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance and recognition" (Bourdieu 1986 p. 248). Although Bourdieu's contribution to the development of the concept of social capital has been widely acknowledged among scholars (e.g. Portes 1998), later research has not specifically addressed the question of institutionalization of the social setting in which social capital is embedded. The question of degree of institutionalization may be regarded as the cultural equivalent to the degree of density in structural analyses of networks, and Berger and Luckmann (1966) have given an

excellent analysis of this phenomenon from sociology of knowledge perspective. Our discussion of cognitive social capital is based on their work, and is an outline of how the cognitive dimensions of social capital is created within a network. The theory of institutionalization applied in this setting explains how the cognitive social capital represents a resource in creating a common base of knowledge, as well as unifying the network and making joint action possible.

Generally, institutionalization is a phenomenon occurring through social interaction over time. When people interact, certain patterns of own actions as well as those of others arise, that are manifested in common bases of knowledge, the first stage in making the knowledge collective and explicit. This common knowledge further enhances shared typifications of actions, experiences and actors. Any such typification comprising both actors and actions may be called an institution. An important characteristic of institutions is the degree of diffusion of typifications between the members of the specific social group in which the interaction takes place. The typifications produce gains through e.g. predictability, facilitating efficient use of resources in decision processes, and stable expectations. The results of these institutionalization processes are manifestations of certain cultural elements within the social group, and an investigation of the process will enable us to predict cultural elements we could expect to find within an organizational network, as well as their value as social capital.

Externalization and objectivation

The first stage of the institutionalization process is externalization of individual, subjective behavior. “What I do now” becomes “this is how we do this”. A shared knowledge of how things are done arises within the group. The second step is the transfer of this shared knowledge to other groups not originally participating in the knowledge creation, e.g. to newcomers in the network. For newcomers, the existing knowledge will be objectivated and be perceived as “this is how things are done”; the knowledge has a historical aspect. Thus, for the newcomers, the historical aspect implies that the institutionalized reality existed before their entrance into the group, and it will continue to exist after their exit. The specific reality or knowledge is perceived as external and objective. This is, however, a belief; the institutionalized reality does not necessarily exist outside the group, it is created and re-created continuously through the individuals between whom it is shared. Over time, the perceived objective reality will be internalized by the members of the group, so that it becomes rooted in each members own values and beliefs.

A crucial point is the newcomers’ judgment of how fixed and unchangeable this reality is. The degree of institutionalization at the individual level is determined by the degree of objectivity assigned to the reality as perceived by newcomers. It is a human fact that we in certain situations tend to perceive realities created by people as objective and given. The dialectical re-creation between the individuals and the institution implies that the group members continuously maintain and reinforce the institutionalized elements through their language and behavior.

The institutionalization process within knowledge intensive networks centers on business issues. We suggest that it will comprise beliefs and knowledge about e.g. basic principles for survival and profit maximization and investment preferences, as well as a “higher ground” for the purpose or existence of the organization. Shared knowledge and opinions of these matters are objectified and internalized, so that they come to be perceived within the group as the true recipe for development and success of the firm. It is this shared knowledge base that serves as a condition for common goals and unified action towards customers and markets. Thus, we propose that the benefits accruing from the cognitive dimension of social capital in knowledge intensive firms are cognitive complexity and common ground on which new knowledge may be anchored and based. For the exploration purposes, the cognitive social capital comprises the holistic and collective understanding of the causalities and realities involved in the relationship between the firm, its production and markets. This implies that the new knowledge might be well related to future customer demands from customers, and that exploitation of knowledge is less costly because it is based on a common agreement of its instrumental purposes. Relating this to our model, the result of cognitive social capital will be in the upper left quadrant, as institutionalized mind-sets.

Relational social capital

Any group of people, who interact regularly over time, will develop behavioral norms. According to Portes, the very definition of network closure is the existence of norms: “...Closure means the existence of sufficient ties between

a certain number of people to guarantee the observance of norms” (Portes 1998 p.7). Social norms are regarded as strong guidance for behavior and are generally considered to have an ordering function of the relationships between actors in a social setting. The role of social norms in maintaining and reinforcing the group as an institution, may act as a replacement for traditional hierarchical structural ordering. Three levels of processes in the ordering of the collective can define this role: Framing, negotiating and narrating (Fine 2002), and we shall address them in turn.

Framing is defined as the contextualisation of meaning. According to Fine (2002 p.145), framing is the main mechanism through which behavior is justified. By framing, behavior is installed with meaning, giving it a higher ground. The framing process as creation of meaning includes development of shared perceptions of reality that serve as the basis on which the contents of the norms are developed. Social norms have also been defined as “...meanings produced through negotiations. For people to interact successfully they must share common understandings of the situation they are in, their behaviors, and their roles – for example, it is helpful for the parties to speak the same language” (Horn 2001, p.11). This is in line with the externalization and objectivation mechanisms described earlier as the institutionalization process. Framing thus provides the group with a shared common ground for the contents of the norms, and it also serves as a basis for the internal legitimation of the institutionalized reality as discussed in the section above.

Negotiating is defined as the coordination of lines of action, and is the mechanism through which the core of the norms' contents is constituted within the group. It comprises the specific rules for behavior that are tied to rewards and punishments within the group, and is thus the basis on which a focal actor's general goodwill (or access to the group's social capital), is assessed by the altars. For norms to be effective in governing behavior, some kind of social enforcement must exist. The enforcement mechanisms have the nature of sanctions, that are "...rewards for carrying out those actions regarded as correct or punishments for carrying out those actions regarded as incorrect" (Coleman 1990, p.242). The stronger the norms, the more coordinated action is possible. Research on social capital has so far mainly addressed general relational norms that reduce uncertainty and risk, fosters trust, and reduces transaction costs (Burt 2001).

Narrating is defined as making public claims about the nature of the "ought". Fine (2002, p. 145) calls it the "educational process", i.e. it is the means through which newcomers are socialized into the group. A strong cue for newcomers will e.g. be the existing participants as role models. Narrating refers to how the norms are communicated, and may have a variety of expressions as cultural artifacts. The main function is to buffer the group towards external influences, and serves as a reinforcement function for the group as an institution.

In sum, the value of norms in a social setting depends on the *contents* of the norms. We suggest that the value creating aspects of social norms in a

knowledge intensive firm are tied to both the exploration as well as the exploitation dimension of value creation. The value of norms in exploration of knowledge is their ability to create trust and predictability between actors, and the existence of a tolerance for risk and failure. This motivates the actors to invest in new ideas that might or might not succeed, which is a prerequisite for the development of new knowledge. The value of norms in exploitation of knowledge lies in their ability to coordinate the knowledge-in-Action, reduce transaction costs and increase cooperative efficiency. Thus, the benefits of the relational social capital belongs to both of the upper quadrants in our model: The institutionalized mind-sets, comprising a culture for innovation and failure tolerance, as well as the configured knowledge, comprising efficient, coordinated action. The benefits associated with social capital, i.e. the upper half of our model, are depicted in figure 2.

Figure 2 in about here

Intellectual capital. The use of knowledge within the business world has dynamic, rapid and highly dynamic characteristics. It promises new avenues of the creation of wealth, found in contributions given for example by Choo (1998) and Stewart (1997). It also has the possibilities for transforming the rules of competition for established firms and newcomers within industries.

Economic turbulence coupled with accelerating internationalization, continuous improvements of technologies and deregulation of markets have a profound impact on how we value other resources. Internationalization is

important as knowledge speeds across geographic borders both physically and electronically. Technology is important, as is it speeds up value-creating processes within knowledge-intensive firms. The deregulation of markets is important as it gives knowledge-workers the possibilities to use their full potential in the exploration and exploitation of knowledge.

Firms not only have to organize their operations in new ways within a new competitive landscape. Continuous changes in the state of knowledge produce new disequilibrium situations and, therefore, new profit opportunities arise.

The relative importance of one type of intellectual capital can increase in importance at the expense of other types. Knowledge linked directly to innovation will most likely be given priority among business people. Knowing that something is possible has proved to be extremely important to facilitate action steps in the use of knowledge (Collins 1990).

We strongly support the argument that intellectual capital, being related to individual elements of our self-constructed model, cannot be seen as independent from collective tacit knowledge and collective explicit knowledge. Luthman's (1975) conceptual pairings make it possible for individuals to be simultaneously self-producing in terms of a great degree of autonomy, and still maintain the capability of learning, found through the cognitive openness of a system consisting of individual and collective dimensions. The normative and the cognitive are structurally linked, generating interaction between the two

subsystems. A crucial point is: “closure is a condition for openness (Luhman 1986: 183). It is among other things the link between the normatively closed and the cognitively openness which is Luhman’s contribution to the antipoetic theory for social systems.

The theory of social systems as autopoietical systems, according to Luhman (1986: 186) “is a theory of self-referential systems, to be applied to observing systems as well”. This links social autopoiesis theory to second-order cybernetics, as expressed by Von Geyer and Van der Zouwen (1978: 1992) among others. For us as researchers it becomes just as much a question of self-observation as an observation of a social system. Luthman (1986: 187) says: To combine these two distinctions between autopoiesis and observation, and between external observation and self-observation is one of the unsolved tasks in systems theory.

Intellectual capital is used for the purpose of acquisition and exploration of knowledge at the individual level, where both tacit and explicit knowledge play important roles. We have elected to adopt this terminology because it has clear parallels with the concept of human capital, which embraces persons to act in new ways (Coleman 1988). We partly support the argument that learning takes place within human heads (Simon 1991: 176), however it is not restricted to the “wisdom” among professionals as also the infrastructure surrounding the professionals play an important role (“knowledge-in-action”).

Structural dimensions. Seen from a structural point of view knowledge-intensive firms have the possibilities to due the tacit knowledge of knowledge-workers in creative ways. It is important the creation of knowledge to have a great degree of heterogeneity in the creation of knowledge. For this purpose knowledge-firms use enormous resources to recruitment by heavily screening potential knowledge-workers from different academic disciplines (Liedtka et al 1997).

So-called wisdom has solid traditions with in the theory building of knowledge-based firms, particularly in studies of professional service firms; a firm's property is becoming increasingly dependent upon the knowledge capacity of the professionals (Løwendahl 2000). However, for the individual knowledge worker it is no doubt that other professionals constantly challenge her/his tacit knowledge (i.e. Galbraith 1973, Hagen and Aiken 1970, Per row 1972).

It is also reasonable to assume that the individual tacit knowledge can be challenged by the explicit knowledge base found close by the professional and further away. We argue that the importance of tacit knowledge is regarded as less important in the future as the knowledge workers are more educated. It can be tempting to substitute technology with professional routine even through we will not recommend it.

In the exploitation of knowledge it is necessary to have a great degree of closeness in the use of individual tacit knowledge. We see this in so-called "gray-hair" professional service firms where the individual professional plays

an extremely important role in the value creation (Maister, 1993). Younger professionals can conduct many routine tasks. It is often so the experienced professional who must go into the ring and kill the bull. In reasoning is that experienced professionals have a good overview over so-called system-interactions, and in this way can create significant for clients (Quinn et al 1996).

In the creation of knowledge it becomes important that experienced professionals share the experiences with less experienced colleagues. One day the younger professionals will themselves be responsible for norm setting of the knowledge-intensive firm. For exploitation of knowledge professionals must make sure that what they communicate to interest groups is in accordance with the knowledge base.

In the exploitation of knowledge it becomes of great importance that professionals pool into the resource base so that the tacit knowledge of the professionals can be used for tailor making of services. This means that professionals must have an ability to use each other's tacit knowledge in such a way that the use of resources is used in efficient ways.

In order to focus on explicit individual level and relating this to structural dimensions, we will mention that knowledge-intensive firms have an infrastructure through the supply level. This involves both the exploration and the exploitation of knowledge. The supply level make the individual professional to dig into knowledge so that she/he can concentrate on create

processes, the role of the supply level is to stimulate the constant transformations in the operating core. The logic is similar to the “university” in the machine adhocracy identified by Bowman and Carter (1997).

Relational dimensions. Knowledge-intensive firms rely on a high degree of individual judgment, frequently linked to scientific knowledge. It is of great importance that the individual knowledge is communicated in the way that the management of knowledge-intensive firms.

Knowledge-intensive firms have norms as to how the intellectual capital should be communicated. Within knowledge-intensive firms there may be sanctions which involve group members punishing colleagues who violate common goals, norms and values (Greenwood et al 1995). Such sanctions might range from gossip and rumors to ostracism and sabotage. In addition, there is a lot of informal communication about the performance of people as they feud and struggle to attain promotion and involvement in attractive assignments.

To sum up, we present figure 3 where we regard intellectual capital consisting of “wisdom” and “knowledge –in-action”. In the “wisdom” category we argue that the individuals need a holistic understanding that first comes after many years in business. When it comes to the exploitation of knowledge we argue that this will be dependent upon the younger professionals to regard the experienced professional as a role model. In the “knowledge-in-practice” category we argue that there are strong rules as to how professionals should

act. This can of course set the creativity in danger. When it comes to the exploitation of knowledge there are possibilities for the individual professional to have an infrastructure of explicit knowledge (a so-called supply service) and in this way be able to concentrate on more creative processes.

Figure three about here

Dynamics of the model

Our view is essentially that value-creating processes in knowledge-intensive firms takes place at both a collective and at an individual level. And we argue that social capital and human capital are the concepts best suited for a description of the link between knowledge and outcomes in knowledge-intensive firms. We have tried to depict the specific attributes of human capital and social capital that may contribute to knowledge exploration as well as knowledge exploitation in these kinds of organizations. In sum, the model is a picture of the main aspects of knowledge that should be managed in order to make knowledge productive. The different attributes of knowledge at the two levels are the basis on which decisions on organizing and management should be made. We have suggested that the upper right quadrant of our model is the knowledge form that is directly related to production of outcomes, and the organizing task is to move upwards and to the right, from the other quadrants. Thus, we need to have an idea of the dynamics between the different parts of the model. As stated initially, we suggest that the main challenge of modern knowledge organizations is not governance, but rather configuration of knowledge in order to make it productive. Based on the theory

outlined above, we suggest four principles of organizing, related to the four quadrants in our model. These are specified according to the two main objectives of knowledge management: Knowledge exploration and knowledge exploitation, and are illustrated in figure 4.

Figure 4 in about here

At the collective level, the dynamics for exploration is borrowed from Nahapiet & Ghoshal (1998). The exploitation dynamics are oriented towards pooling the appropriate knowledge for the task at hand, and structuring the network configurations, such as moving towards more density or establishing more structural holes. At the individual level, the dynamics are related to recruiting and socializing. For exploration tasks, diversity is important, and differentiation of knowledge is at the core. Exploitation requires socialization of the individual knowledge-in-action, to direct it toward productive work.

Summary

The theories of intellectual and social capital have gained a lot of support from a broad range of scholars, and are applied on several different practical issues. If we want to make a solid step into more creative analyses of modern organizations, we think that these theories provide new insights into the practice of organizing. In general, experience as scholars tells us that managerial practices are normally well ahead of theories and research within the field. However, theory may contribute by giving structure and simplicity to the practice of organizing, and we think that our model is a part of this contribution.

A good model should be simple, and we think the model presented here has the quality of simplicity. Specifically, the theories of social capital and human capital are applied for the purposes on which they were grounded: The analysis of the resources inherent in the human mind and the social network. Further, we think that practitioners welcome models that are useful for the ultimate business objectives: Producing value. We realize, however, that the modeling of an organization based on knowledge is a huge task, and our work is not more than a sketch for further theoretical refinements. A closer investigation into the dynamics between the different levels of knowledge for more precise modeling is needed. However, we think these dynamics are best described through the traditional elements of structuring and culturing, well-established concepts that take on new meanings in modern network organizations, and hence need theoretical specifications, which we think we have provided to some degree. Perhaps the most important theoretical work in the future should be on the downplaying of governance issues and hierarchical relations, to the advantage of horizontal knowledge networks and the organizational challenges inherent in them.

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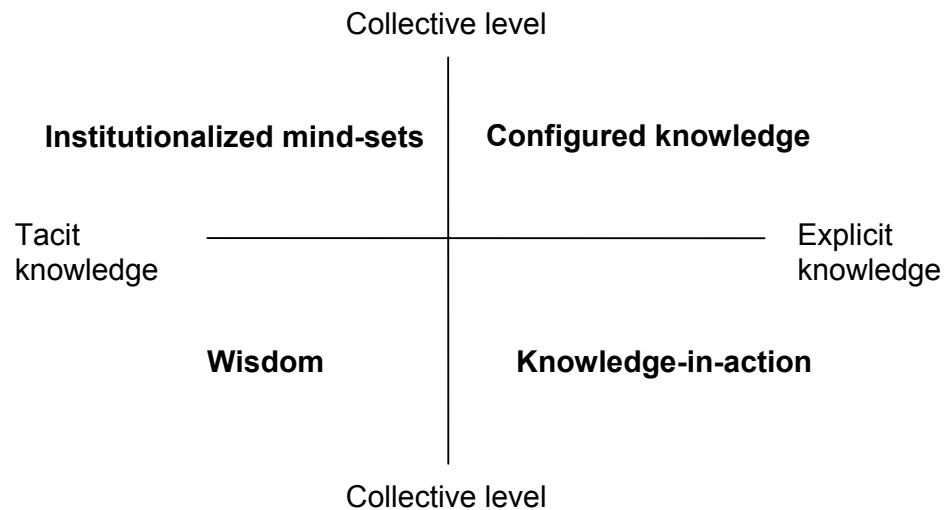


Figure 1: Conceptual model (based on Spender 1996)

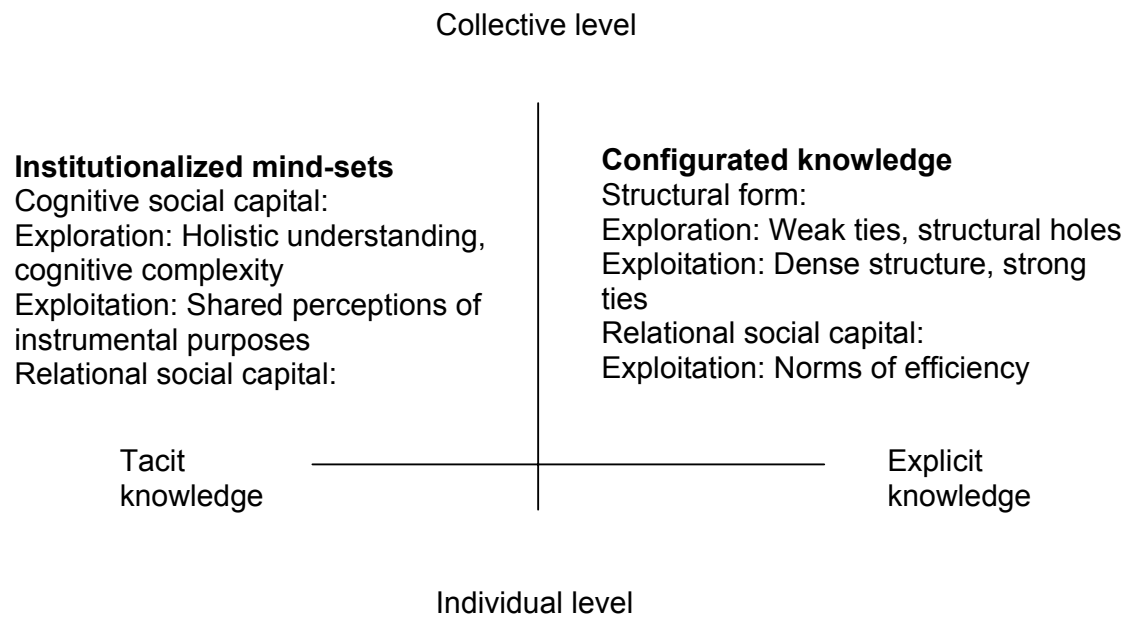
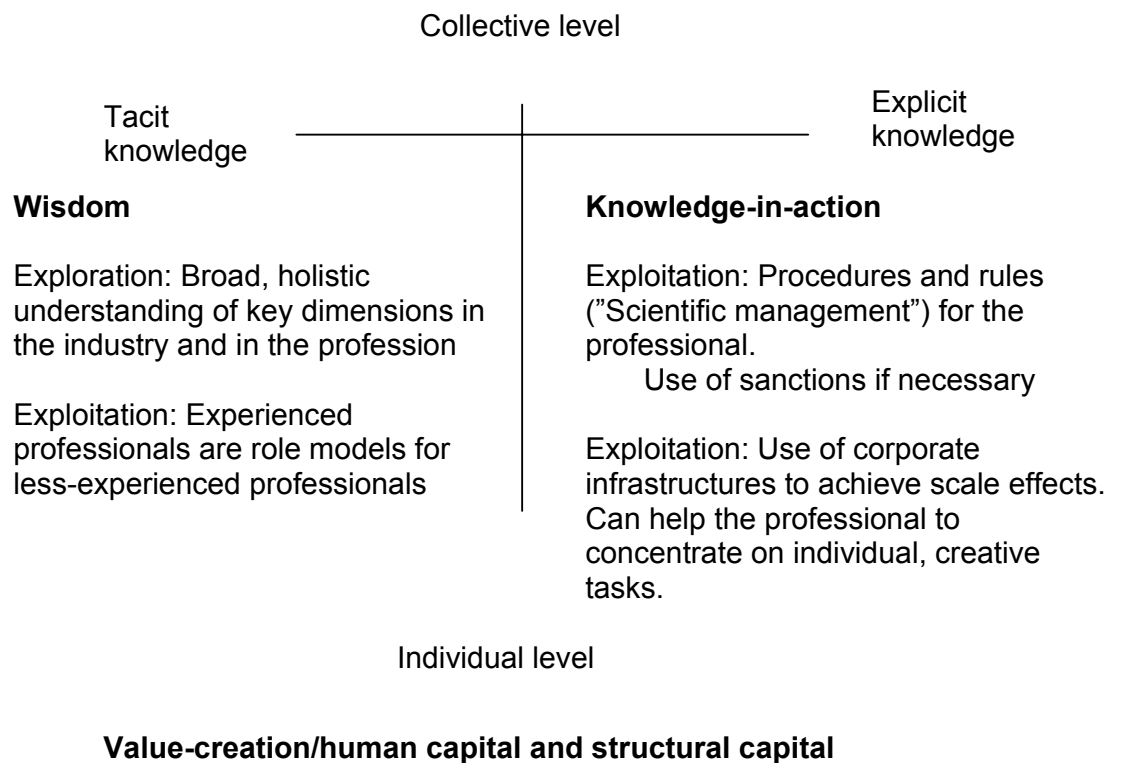


Figure 2: Value creation elements of social capital



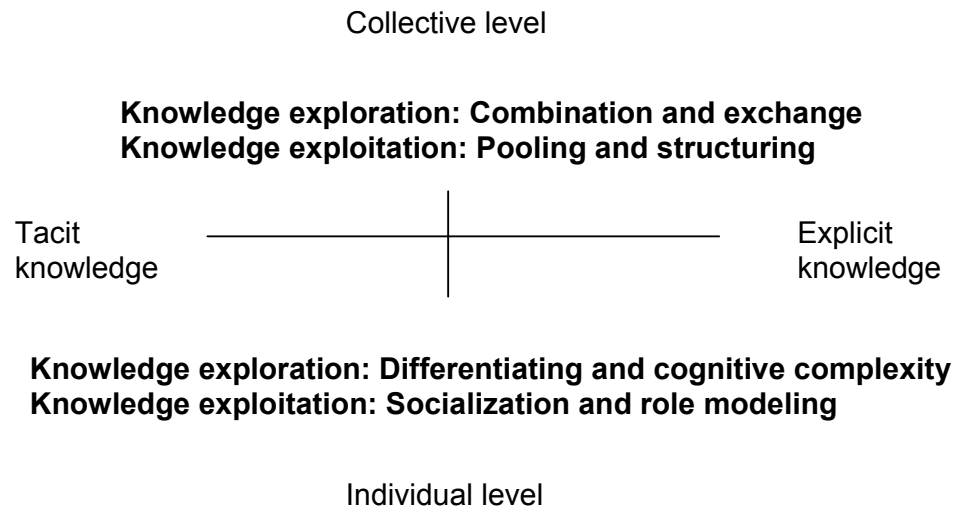


Figure 4: Model dynamics: Organizing principles

