

DEVELOPING A COMPREHENSIVE KNOWLEDGE MANAGEMENT APPROACH FOR ICT-BASED PROFESSIONAL SERVICES COMPANIES Case study

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“Rather than viewing firms as vehicles for processing information, making decisions, and solving problems, the core capabilities of organizations are based increasingly on knowledge-seeking and knowledge creation. In technologically intensive fields, where there are large gains from innovation and steep losses from obsolescence, competition is best regarded as a learning race.”

Powell, W.W., 1998, 393

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1. Introduction

Success in business is believed to be dependent more and more on company's knowledge management (KM) abilities. Such companies as Nokia, Microsoft, Canon, or Toyota have achieved their market positions thanks to their capability to innovate continuously, adapt to the needs of the market, implement emerging technologies, and quickly develop new high-quality products. In such companies, knowledge is recognized and well managed asset, which is incorporated in all activities of the corporation.

Numerous benefits that organizations gain due to their KM initiatives have been identified. They comprise better decision-making competencies, improved responsiveness to customers, better product and service offerings, as well as enhanced effectiveness of employees, operations and processes resulting in company augmented performance (Charney and Jordan 2000; Chase 1997; KPMG 2000; Croteau and Dfouni 2008; Law and Ngai 2008). Breu et al. (2000) add to the list increased innovation and growth potential, organizational responsiveness, more efficiency in supply network, and organizational internal quality.

In addition, knowledge grows exponentially, which is transmitted into the exponential company growth. Thus, if a company gains a competitive advantage, its competitors find it more and more difficult to catch up. The firm attracts the most competent and talented people, continuously grows its ability to solve ever growing in complexity problems, and increase its profits. (Quinn et al., 1996)

In addition, introducing and developing a knowledge management system (KMS) in a company enhances the creation of knowledge-based competencies, which stimulate the harmonization and diffusion of tacit and explicit knowledge within and outside an organization (Zornoza et al. 2008). A successful implementation of a KMS generates the infiltration of knowledge principles and practices into all processes, routines, activities, and employees, which enhance organizational memory and ability to collect, analyze, disseminate and apply knowledge to company's advantage. As a result, knowledge competencies and assets affect company's present and future performance. However, the development of KM specific

competencies within an organization can be successful only if KM principles get implanted into practices, which enforces more in-depth approach to KM issues.

Thus, generating a knowledge sharing system forces the developers to research the company business environment, operations, processes, resources and products from different viewpoints. The research then has to encompass economic, organizational, social, technological, sociological, and sometimes geographical factors. Moreover, knowledge diffusion and management takes place at organizational, group and individual levels and is relevant to numerous stakeholders. Therefore, KM development schemes are found very challenging, and yet most crucial, especially for knowledge-intensive organizations, such as IT professional services companies.

That said the following question may arise: Is it possible to develop a comprehensive approach helping organizations to develop their KM systems through separating out the most important factors influencing knowledge sharing abilities, and dimensions for assessing their effectiveness? This thesis is the attempt to answer this question and create a method for holistic KM development scheme.

In this chapter, we will start by defining the research purpose of this research. Then, the focus of the thesis will be specified and the relevance of the subject to the present business world explained. Finally, the methodology and structure of the thesis will be described.

1.1. Research purpose

The purpose of this thesis is to find out *how to develop a comprehensive and coherent knowledge management system in an information technology-based professional services company.*

1.2. Thesis focus and restrictions

The main focus of the thesis is the KM System (KMS), which is a complex and dynamic organism. Therefore, in order to study KMS, it is necessary to take a closer look at its elements: knowledge resources, technology, processes and environment, and research all these interrelated management systems presented in

Figure 1.1. All mentioned areas will be described in detail and their roles within a KM system analyzed.

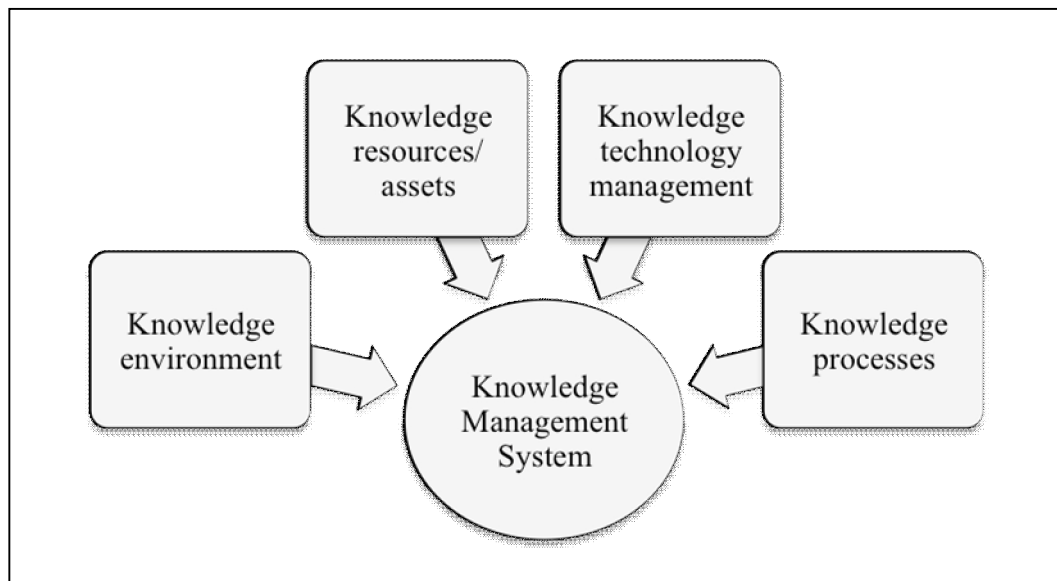


Figure 1.1: Main elements in comprehensive approach to knowledge management

Knowledge diffusion and management will be analyzed mainly from the perspective of IT-based professional services companies. Since they operate in the most knowledge-intensive environment, they are strongly affected by KM problems, and therefore they are strongly in need for effective KM solutions.

However, the thesis does not take any historical perspective on the rise and development of KM. The issues dealing with different business strategies, innovation enhancement, or change management will obviously be mentioned in the research, but they will not be tackled in detail. Various tools for knowledge sharing will not be discussed closely as well. No comparative studies between knowledge systems in different industries will be included. Finally, we will try not to discuss all elements that might have some influence on KM system development, but try to concentrate on the key issues, factors and dimensions.

1.3. Relevance of the thesis

The importance of knowledge as a key factor in creating competitive advantages is strengthened in knowledge intensive industries, where innovations are being generated continuously (Alversson 2000; DeCarolis and Deeds 1999; Abou-Zeid

2008; Herand and McFadyen, 2008). And yet, organizations hardly find their KM systems adequate in meeting their knowledge requirements. In 1998 only 12 percent of organizations were content with their knowledge sharing practices in the U.S., according to Ruggles (1998). Moreover, Stewart (2001) found that over 87 percent of KM projects did not meet their return-on-investment considerations, which causes the high turnout of CKOs and CIOs (Szulanski and Capetta 2005). At the same time, the increasing growth of knowledge requirements and complexity in multiplying knowledge-intensive organizations forces companies and researchers to face the problem and develop relevant and efficient KM systems.

In this thesis, we are mainly interested in KM systems in professional services firms, since KM is especially significant in their business context. As Davenport and Smith (1999) notice, “the professional services (PS) industry, which includes legal, accounting and tax, consulting, and system integration services, is knowledge-intensive. What PS firms sell clients are their knowledge and its application to specific client problems” (Davenport and Smith 1999, 284).

PS KM is difficult and complex. Knowledge is widespread over an organization and it is not always easy to find its most accurate source. It is also fragmented and multi-dimensional, which is caused by organizational modular structures (e.g. according to clients, practice areas, industries, or technologies). PS firms’ knowledge structures need to be able to incorporate changes taking place in their dynamic business environments, so it has to be flexible and updated regularly. Additionally, PS companies’ knowledge quality and value differ in varying contexts.

The service character of operations imposes the need to exchange expertise with customers on daily basis, which requires a vast command and use of knowledge utilizing skills. PS knowledge is also tacit by character and owned by individual professional, who may have their time, distance, motivation, or other constraints to deliver or share it. Finally, PS firms’ employees are often bound by the confidential nature of their clients’ business, which puts constraints on knowledge sharing. Consequently, due to the listed characteristics of PS knowledge, the KM approach needs to be equally comprehensive and multi-leveled. (Davenport and Smith 1999)

PS companies operate in very complex and competitive business environment. Their key to success lies in ingenuity and uniqueness. However, the majority of organizations use the same kind of knowledge components and competence available at the workforce market. It is not enough to recruit high-class specialists in different areas. If a PS company wants to gain a sustainable competitive advantage over its competitors, it has to create a unique and context-bound network of knowledge processes, which do not only generate creativity and innovation, but are also very hard to imitate (Herand and McFadyen, 2008). The aim of this thesis is to provide PS firms with a framework to cope with this task.

1.4. Research methodology

This research aims at providing a comprehensive model for constructing an effective and efficient KMS within a PS company and means to measure its success. In addition, the long-term goal is to equip the company with a basis for its valuation, stimulate management to focus on what is important, and justify investments in KM activities (Turban and Aronson 2001).

Every company has different business context and needs to facilitate information and knowledge. There is no universal scheme to create a KMS (Nonaka et al. 2000; Tseng 2008; Hartley and Bennington 2006). However, it could be possible to develop a common scheme for carrying out a process for the KM system generation.

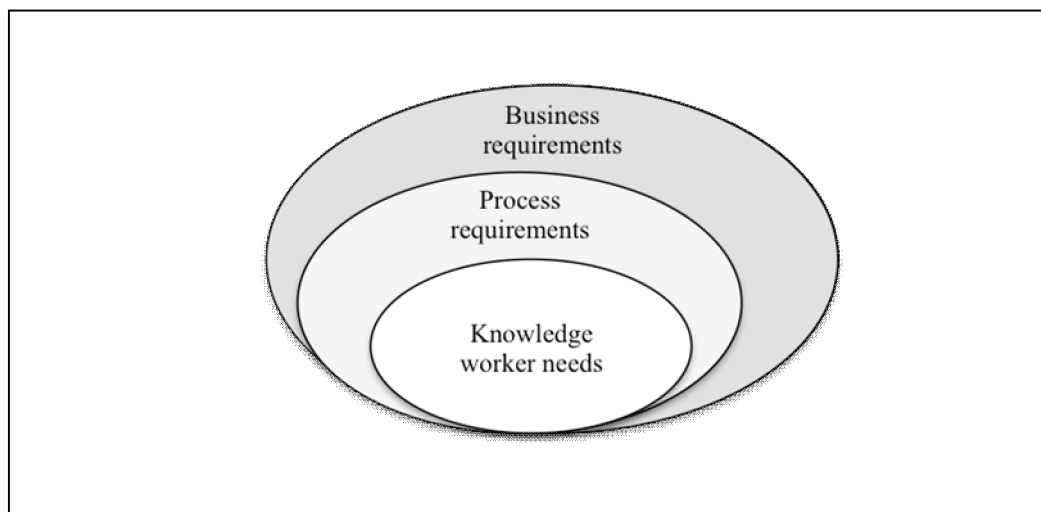


Figure 1.2: Logic of the research methodology (Based on Massey et al. 2008, 301)

Since the knowledge context plays a crucial role in formulating knowledge needs and goals, we will be analyzing knowledge contexts at three levels: starting from business requirements, moving on to business and knowledge sharing processes demands, and finally analyzing knowledge-workers' competence needs for satisfactory completion of their duties and responsibilities on daily basis. [Figure 1.2]. In the study we will also take into consideration organizational, group and individual points of view.

1.5. Structure of the thesis

In chapter 2, the basic theories of the thesis are presented. In chapter 3, the key definitions and concepts of the work are described in detail and their relevance to KM and to the thesis is explained.

Chapters 4-6 consist of detailed discussion on three main KMS areas: KM environment, knowledge sharing and KM processes, as well as KM ICT infrastructure and tools. The debate follows the generation of the comprehensive KMS model, defining research dimensions, and the explanation of its contextual usage (chapter 7), which constitutes the basis for the empirical research conducted in the case firm.

The empirical part of the work starts by describing the research methodology. It is followed by the report on the research: workshops, interviews, and surveys. This section is finalized by the summary of the study results, analysis, and the creation of the KMS development plan for the case company.

Conclusions regarding the developed scheme for analyzing, diagnosing, and developing KM systems in PS firms end the thesis.

2. Theoretical background of the thesis

To cater for the complexity of the studied area, three main theories have been utilized and combined: the knowledge-based theory of organizational capability, the complexity theory, as well as the theory of dynamic knowledge conversion. These theories are presented in the following sub-chapters.

2.1. The knowledge-based theory of organizational capability

The recent approach towards strategy creation is based on the perspective of company's dynamic capabilities, which has been being developed during the last 20 years (Dosi et al. 1989; Prahalad and Hamel 1990; Hayes and Wheelwright 1984; Dierickx and Cool 1989; Porter 1990). The approach takes a lot from the resource-based perspective generated by Rumelt (1984), Chandler (1966), Wernerfelt (1984), and Teece (1980, 1982). It is based on planning, creating and fostering firm's resources and capability to acclimatize to quickly changing business environment. The analyses supporting strategy building are mainly focused on *managerial and organizational processes, firm's specific assets, and strategic choices* available to the company. (Teece et al. 1997)

In accordance with the dynamic theory, organizational processes allow for operational coordination and integration, organizational learning, as well as reconfiguration and transformation of knowledge, activities, processes etc. Specific assets are characterized by a high degree of stickiness, and can include specialized plant, equipment, intellectual property, customer base, knowledge, technology, and their complementary assets. They can also contain the market current situation, firm's present position based on its past, and possibilities offered by technology, which influence the company strategic choices. All mentioned dynamic capabilities are continually assessed and revised. (Teece et al. 1997)

As Teece et al. (1997) sum-up, the main concern of the dynamic capabilities approach lies in the abilities to use competencies and capabilities in a way that provides competitive advantage. This can happen through specific asset accumulation (e.g. routines, skills), their replication and imitation in another economic context, as well as their emulation, through developing new ways to employ them.

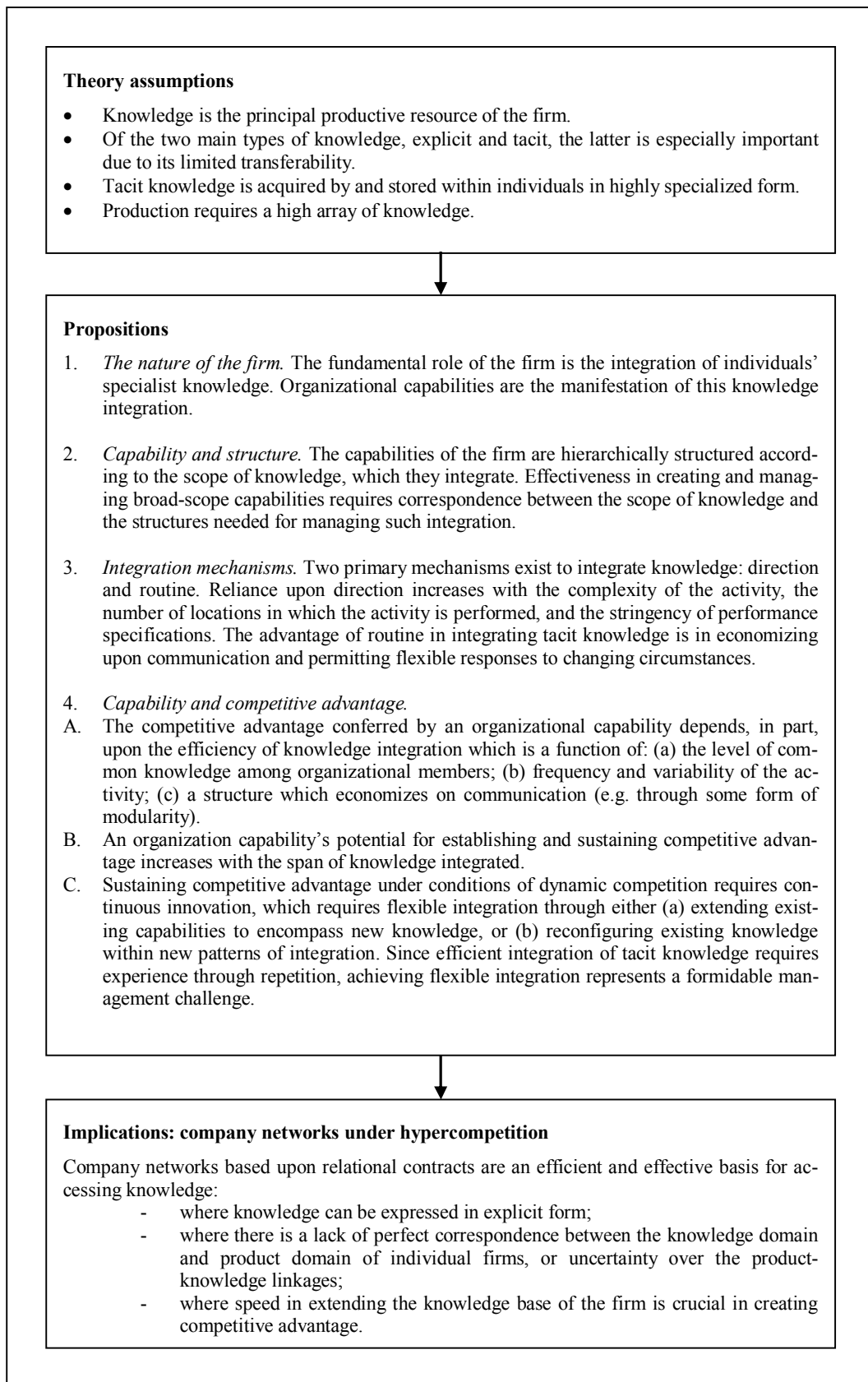


Figure 2.1: The knowledge-based theory of organizational capability (Grant 1996 , 149)

Spender (1994) supports the dynamic capabilities approach arguing that resources as such are not enough to gain a competitive advantage, since the main potential lies in the organizational collective knowledge. Thus, the application of resources and the firm's resource coordinating capability create the basis of success. These capabilities are developed through learning and KM practices, which means that knowledge rises to the position of the most important strategic resource.

Grant (1996) also bases his theory on organizational potential of knowledge. His knowledge-based theory of organizational capability provides a more plausible understanding of firm competence and analyses more precisely than previously the relationship of organizational capability to competitive advantage in business contexts where market leadership and power is continually threatened by competition and external change (Grant 1996, 148). Grant argues that the ability of integrating and implementing specialized knowledge is the forthright condition to gaining and upholding competitive advantage. The knowledge-based theory of organizational competence is presented in Figure 2.1.

In the face of the focus of this work, Grant's (1996) approach provides excellent input to the theoretical background for the research.

2.2. Complexity theory

There is another newly emerged approach, apart from the knowledge-based theory of organizational capability, which provides a legitimate rationale for the studies on KM researched in this study. It is the complexity theory developed by Anderson (1999), Chiles, Meyer and Hench (2006), Cilliers (1998), Kutz and Snowden (2003), Lewin and Volberda (1999), Morel and Ramanujam (1999). The theory is based on the concept of a complex adaptive system (CAS), which is made of heterogeneous agents (individuals, groups) operating in the same environment and interacting with each other. Agents undergo changes, adapt to them, and evolve causing transformation of their environment, which again affects individual agents, and so on. The bigger is the diversity of the agents, the richer and more complex is the CAS. In addition, no agent is able to comprehend and control the system, which has endogenous emergent and self-regulating abilities. (Bodhanya 2008)

The CAS is characterized by:

- *Fitness landscapes*, which describe relationships between individual agents and the landscape. An agent interacts with the environment and adjusts himself aiming at maximizing his fitness (performance). However, the context is dynamic and keeps changing, which keeps the agent (that is never able to reach the maximum) at constant move. Therefore, the agents are in a continuous process of co-evolution at their micro-level.
- *Co-evolution* characterizes the environment itself as well. The system interacts with other systems at the macro-level, and undergoes continuous co-transformation with the outside world.
- *Emergence* belongs to the system's basic features as well. The transformation of all agents, localities and the entire system is comprehensive and continuous. It arises from the interaction between agents, which co-evolve simultaneously transforming the environment, that influences the agents in turn.
- *Self-organization* capability also emerges from within the system. It does not mean that the system is well organized. It rather means that it does not fall into chaos and stays at the state of dynamic equilibrium. This state can be also defined as bounded instability, or the edge of chaos (Beinhocker, 1999). (Bodhanya, 2008)

The CAS approach adds a new dimension to the understanding of organizational life and KM. Agents can be viewed as individuals, groups, departments, physical artifacts (e.g. tools, products, machinery), or knowledge-based artifacts (e.g. plans, procedures, blueprints, and routines). The organizational system constitutes of different ecologies, and the knowledge ecology is one of them. It is a dynamic environment of heterogeneous agents acting in accordance with their own scenarios and knowledge. There is no subjective knowledge, but knowledge is strongly agent-, and context-based. It gets adapted through the process of sense making and explication. Each organization is an emergent ever-changing environment, which co-transforms and co-emerges spontaneously together with all agents. This means that knowledge, which is a part of this system, has the same features of fitness landscapes, co-evolution, emergence, and self-organization. The fact that an employee (= agent) always simultaneously follows his own agenda, but acts with-

in organizational knowledge structures, adds to the complexity of the picture. (Bodhanya 2008)

To sum up, the organization and all its constituencies are in the constant process of evolution, which changes the way of understanding business environment. Bodhanya (2008) suggests that approach based on strategic choice, which leads to its implementation in KM area as well, is outdated; and suggests more dynamic approach. Thus, it is better to assume that business and knowledge strategies, although designed and implemented, are continuously influenced and stimulated by the environment (= context) and interplay between actors inside and outside the organization. As a result, business and knowledge strategies are in a dynamic and constant process of co-evolution. For these reasons, managerial approach in all organizational areas, including KM, “must shift from a preoccupation with the ordered, rational, analytical, and the fixed towards a tolerance of ambiguity, subjectivity, flux, and the transient nature of organizational life” (Bodhanya 2008, 17).

2.3. Merging individual, group and organization expertise: Nonaka's SECI model of dynamic knowledge conversion

The concept of expertise has also become more complex. Experts are expected to master a variety of different domains of knowledge, which are utilized in a complicated way creating a matrix of used competencies. A major part of expert's knowledge is explicit and it has been acquired through formal education. However, in the work environment, this explicit knowledge is always used in a unique, task-and-situation specific way, creating tacit knowledge, which “is personal and hard to verbalize or communicate. Tacit knowledge, such as bodily skills or mental models, is rooted in an individual's action and experience as well as in the ideas or values he or she embraces. The conversions of these two kinds of knowledge are the essence to knowledge creation” (Nonaka et al. 2000, 89-90).

Tacit knowledge becomes explicit, if it is recognized, described and shared with others. But this is a long process, so an expert always possesses knowledge that others do not share. Because cognitive evolution leading to tacit knowledge development in a lengthy process, it takes years to develop expertise in any area. For these reasons, tacit knowledge creation and control is problematic, but its uniqueness and difficulty to imitate make it one of the main corporate competitive ad-

vantages. In the light of the above, it is understandable why knowledge-centered organizations, on the one hand, promote knowledge creation and, on the other, try to develop systems and processes encouraging knowledge sharing. In order to do that, they try to recognize core competencies every expert should have to be able to create and share knowledge. Knowledge-based organizations also try to equip their employees with tools to enhance knowledge development and diffusion.

The nature of explicit and tacit knowledge will be elaborated on in the later part of the thesis.

SECI model

Nonaka, Takeuchi, Reinmoeller and Senoo (1995, 2000) have developed the SECI model, which describes four main knowledge conversion modes: from tacit to tacit, tacit to explicit, explicit to explicit and explicit to tacit [Figure 2.2].

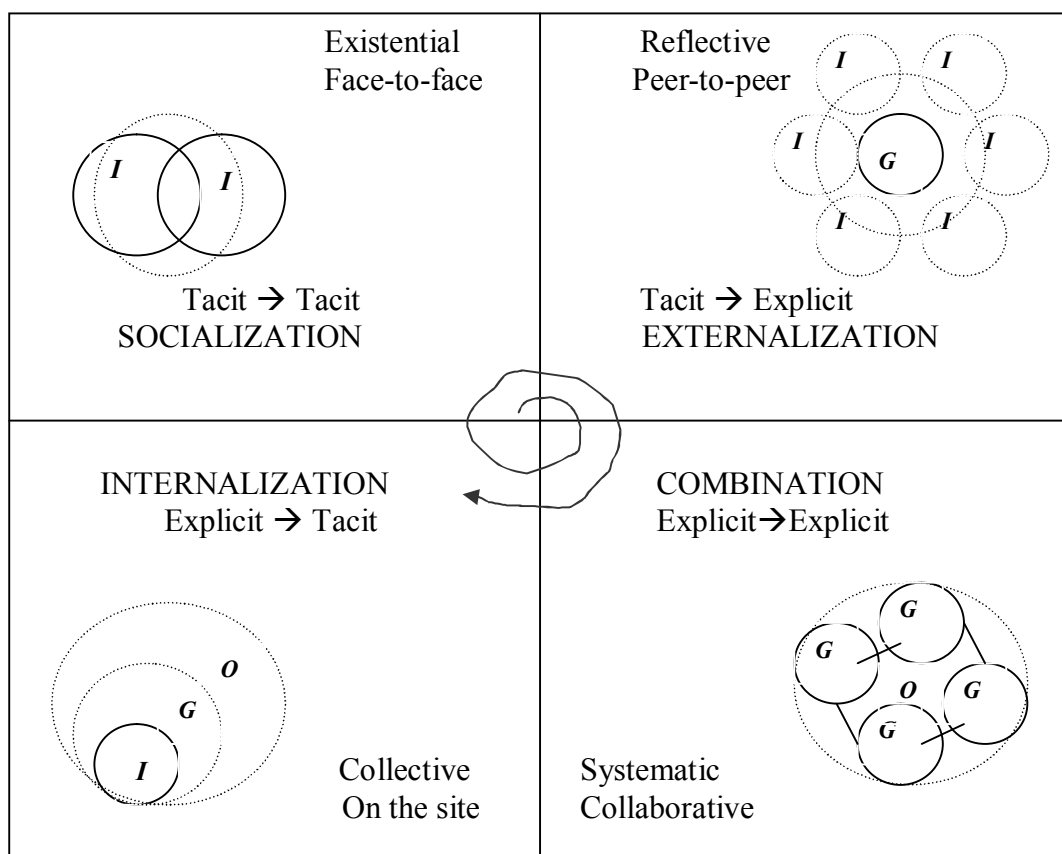


Figure 2.2: SECI as a self-transcending process (Adapted from Nonaka et al. 2000, 90)

The SECI model provides a concrete development scheme and describes both the processes of knowledge creation and sharing, and transformations taking place

within and between individuals, groups and organizations, which are all interconnected.

Socialization presents a process of tacit knowledge sharing between individuals working in the same environment and understanding it. *Externalization* is the process of transforming tacit knowledge into forms (symbols, analogies and metaphors), which can be understood by other group members. As a result, individual's tacit knowledge become a group's asset. Then, through *combination*, knowledge is organized, edited and systemized; it is shared with other groups and finally becomes a "common property" in the organization. When it is put into practice and used by employees, it is embedded in individuals' skills and competencies, which may lead to a generation of new tacit knowledge. Nonaka et al. called this last stage *internalization*. (Nonaka et al. 2000)

This dynamic and continuous process happens within an organization, but it also often extends beyond organizational boundaries. Nowadays companies develop their production processes in cooperation with their partners, customers, suppliers and other stakeholders through the process of socializing, externalizing, combining and internalizing knowledge, which has to be recognized and expressed by one side, systematized by both, and finally implemented and embedded by the other part.

Nonaka's et al. (2000) model may seem rather wide in scope, however it responds very well to Browaeys and Baets' (2005) perspective on cultural complexity presented earlier in this work. The SECI model reflects interrelations and processes taking place between an individual and an organization in the context of knowledge creation and diffusion.

However, the mechanical nature of Nonaka's et al. (2000) theory has raised a wave of criticism among scholars interested in organizational KM. Many question the rigid division between tacit and explicit types of knowledge, which will be discussed in more detail in the thesis later. Moreover, Li and Gao (2003) claim that the model is valid only in some manufacturing fields rather than all industries. They also stress that the "nuance between implicitness and tacitness of knowledge as well as the composite of individual behavior, organ-

izational culture and institutions may misdirect strategy planning and resource allocation” (Li and Gao 2003, 13). Roy and Gupta (2007), on the other hand, distinguish the model’s differences in Indian context and find similarities as well as differences. Glisby and Holden (2003), on the other hand, claim that Nonaka’s modes of knowledge creation can only be understood in the Japanese context of work culture, where they originate. Therefore, Glisby and Holden (2003) advise caution while using the theory and treat the SECI model as a guideline to the processes of KM, rather than a strict model. In this thesis, the intention is to follow Glisby and Holden’s (2003) approach to Nonaka’s et al. (2000) theories taking into consideration organizations’ varying business and cultural settings.

“Ba”-space

Nonaka et al. (2000) describe the multi-dynamic KM within and between firms using the concept of *ba*, which has been developed by the Japanese philosopher Kitaro Nishida. “*Ba* describes the existential contexts of human physical being” (Nonaka et al. 2000, 93), and can be defined as a platform for knowledge creation, or a space where knowledge is generated. It can be physical (such as an office), virtual (for example e-mail, or a web chat room), or mental (common knowledge, experience, or ideals). “Knowledge is embedded in *ba*, where it is acquired through one’s own actions or reflections on the experiences of others. *Ba* is the world where an individual realizes itself as a part of the environment on which its life depends. Such *ba* of knowledge can emerge in individuals, working groups, or on the shop floor. It is such *ba* where the knowledge embedded in the ambient affords specific conversion” (Nonaka et al. 2000, 94). *Ba* is a platform enhancing the interaction of individual and collective knowledge, which leads to new knowledge creation.

The four types of *ba* distinguished by Nonaka et al. correspond to the four stages of SECI model: *originating ba*, *dialoguing ba*, *systemizing ba*, and *exercising ba*. The knowledge creation process begins in *originating ba*, which correlates with the socialization SECI-phase. It is where people meet and build up their relationship: share emotions, experiences, feelings, as well as their mental and cultural models. *Dialoguing ba* provides a platform for the externalization process. It

prompts dialogue stimulating the sharing of different individuals' mental models, which leads to reflection and analysis of one's own knowledge elements. Knowledge adaptation takes place if the right blend of people with specific expertise and competencies get together. The combination stage takes place in *systemizing ba*, where new explicit knowledge is merged with already existing knowledge. It is most efficiently provided for by information and network technology. *Exercising ba* provides conditions for knowledge internalization through learning enhancing action patterns existing in the company, such as on-the-job training, mentor-apprentice set-ups, or other learning schemes. (Nonaka et al. 2000)

In the light of Nonaka, Reinmoeller and Senoo's (2000) theory, the fluent continuous flow between consecutive *bas* and the stages of the SECI process is possible due to the ART systems: action, reflection and trigger. Action leads to reflection on the achieved result and triggers new ideas causing, in turn, new action. However, the ART system ought to be supported by an efficient level of autonomy, trust, flexibility, variety, redundancy and intention on individual, team and organizational levels. Bearing these conditions in mind, it is possible to build effective *bas* into the company's organization and processes, which would create the base for knowledge creation, diffusion and differentiation. However, it is not possible without generating a varied repertoire and adaptive flexibility in company's KM development practices.

2.4. Knowledge converting model and its moderators

Laupase (2003) develops the SECI model further and describes the moderating influences of organizational structure, culture and technology on the process of converting tacit knowledge into explicit. In doing so, Laupase (2003) refers to the same factors of knowledge sharing enhancement as Wright and Taylor (2003) do in their research [Figure 2.3].

Organizational structure

Organizational structure is defined as "the formal relationship and allocation of activities and resources among people" (Mc Kenna 1999, 215). Thus, it has a considerable influence on operations within the organization and its performance in business, along with authority over KM. Laupase (2003) refers to Lessem and

Palsue's writings (1997), in which three types of knowledge conversion characterizing organizational structure are distinguished:

- *Hierarchical structure* existing at the top management level characterized by explicit nature of knowledge (e.g. decision making actions followed instructions to employees, often in written form).
- *Flat structure* occurring in low and middle management levels. Knowledge obtained from the top management is being transferred to other organizational levels and converted into different context by managers, whose role is supportive to a great extent. Hence, it is mainly tacit knowledge that exists within the flat structure.
- *Hybrid structure* combines the characteristics of both hierarchical and flat knowledge structures. Knowledge has explicit and tacit characteristics, and it helps to convert top management's instructions into concrete ideas, action, innovations etc.

Laupase's (2003) research shows that the use of hybrid structures, characterized by employee flexibility ("loose" structure) allowing for creating matrix operational organization, and network architecture enabling project-based working style enhance knowledge convention processes.

Organizational culture

According to Laupase (2003), organizational culture is characterized by common goals, as well as behavioral and value patterns, which create the sense of identity among the members of a community. Culture which allows for informal communication and extensive rewarding also influences knowledge conversion positively. Similar impact has extensive use of metaphor, analogy, and narrative.

Information Technology

"IT in organization is defined as the means by which it acquires, stores, and distributes information with computerization that can be done quickly and easily" (Margitta 1996, 216). It is constructed of email, groupware, videoconferencing media, data warehouses, networking tools; as well as Internet, intranet and extranet systems. If wisely and adequately used, IT can have a substantial effect on boosting knowledge systems. In Laupase's opinion (2003), the use of groupware

software helps to keep the expressed tacit knowledge for later use, and thus speeds up the process of knowledge conversion.

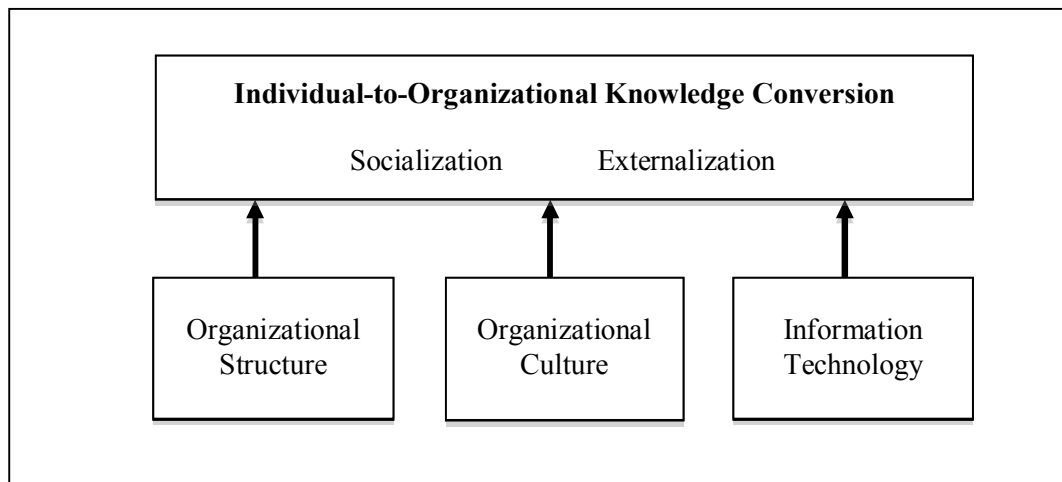


Figure 2.3: Factors influencing individual-to-organizational knowledge conversion (Adapted from Laupase, 2003, 216)

This research is an attempt to combine all three theories: the knowledge-based theory of organizational capability, the complexity theory, and the SECI model, in the creation of one comprehensive KM approach. Resources and assets provided by knowledge, the changing and complex nature of organizational environment, as well as the dynamism of knowledge conversion will be taken into account. Laupase's (2003) suggested course of applying Nonaka's (2000) ideas will be extended onto the whole organizational KM. Thus, we will replace Laupase's (2003) organizational structure with *knowledge sharing and KM processes* (including the aspects of organizational structure), organizational culture will extend over the *KM environment* (containing culture), and *CIT* will be analyzed as an enabler and value-adder for KM. It will be presented how these three areas interact and merge in the creation of one holistic KMS.

3. Main concepts of the thesis

The key concepts of this thesis are:

- relations between data, information and knowledge
- tacit and explicit types of knowledge
- relations between knowledge, knowing, and knowing-in-practice
- expert knowledge, competence and skills
- intellectual capital
- knowledge levels in organizational context
- intelligent organization, and
- knowledge management.

In this section of the thesis, these key concepts will be defined and their relations discussed.

3.1. Data, information and knowledge

Data, information and knowledge are the basic terms in the studies on KM. Their nature and interrelations have been discussed widely, however the approach and definitions used in this work are based on analyses in Boahene and Ditsa' (2003) writings. *Data* is defined as “invariances with potential meaning to someone who can interpret them” (Hirschheim et al. 1995, 14). Invariances get encoded, conveyed in different manner (e.g. waves or email), and apprehended through human senses (e.g. hearing or vision). Thus, “what is expressed as data may be represented as a word, sentence, number, sign, symbol or some other form of representation”. However, Boahene and Ditsa suggest concentrating on “the invariances created by humans through observations or cognitive capabilities” (Boahene and Ditsa 2003, 16), which are most relevant to KM.

Since not all received data is being chosen for further analysis and usage, there exists an automatic filtering process. Thus, data investigation starts with data emergence. Boahene and Ditsa (2003) call this phenomenon *capta* (knowledge base). When already selected and formulated, data is put into context, or get attribute meaning. It turns into context-focused and meaningful *information*. So, information is much more individual and specific, falling into the sphere of concrete per-

son's or group's interests. If, on the other hand, *capta* becomes *knowledge*, it gets transformed and takes a new constant and regular form. The relations of the described terms are presented in Figure 3.1 below.

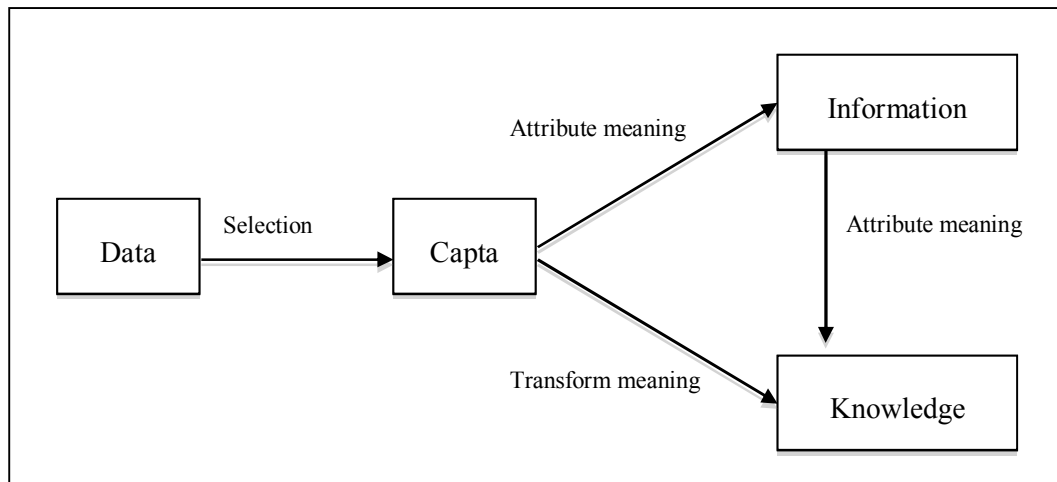


Figure 3.1: Data, capta, information and knowledge relationships (Boahene and Ditsa 2003, 19)

However, in KM studies, *knowledge* is usually approached through its contextual aspect. Davenport and Prusak's (1998) definition of knowledge is the most commonly referred to. They interpret knowledge, as an organizational asset constituted of "a fluid mix of framed experience, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experience and information. [...] It originated and is applied in the mind of knowers. [...] In organizations, it often becomes embedded not only in documents or repositories but also in organizational routines, processes, practices, and norms." (Baets 2005, 216)

Huseman and Goodman (1999) add more depth to the understanding of knowledge. They describe five elements, which characterize knowledge and create its value:

- *Experience* creates a continuum between past happenings and present situation;
- *Truth* represents the actual state of affairs and helps to relate to things and happenings objectively;
- *Judgment* describes the capability of apprehending unfamiliar situations;

- *Intuition* is a strong aid in acting in new and changing circumstances and environment; and finally
- *Values*, which assist in evaluating the importance of actions, processes, pieces of information, operations etc., and help in their testing.

These characteristics are human-generated. Thus, it is easy to comprehend why knowledge is of such great value especially for organizations, such as PS companies. Knowledge-workers constitute the core asset of PS companies operating in dynamic and continuously transforming business environment. Therefore, the quality of knowledge utilization plays a central role in firm's success, or failure.

3.2. Tacit and explicit knowledge

It has become clear by now that company knowledge takes different forms. The notions of tacit and explicit types of knowledge were already introduced in subchapter 2.3. However, the discussion concerning their nature and eligibility of their use has been very vivid. Therefore, it seems appropriate to elaborate on the subject in more detail.

Tacit knowledge makes it possible for an individual to understand matters and known solutions to problems without being able to explain the rationale of her/his "knowing". It is unconscious, personal and local. "The philosopher Polanyi (1967) described tacit knowledge as knowing more than we can tell, or knowing how to do something without thinking about it, like ride a bicycle" (Smith 2001). According to Smith (2001), tacit knowledge is made up of mental models, assumptions, perceptions, beliefs, values and insights. At individual level, it is used to manage oneself, others, and one's tasks. In larger context, it can be implied to create and control larger pictures, such as an organizational global administration system.

Smith (2001) also discusses the notion of implicit knowledge, and comes to the conclusion that tacit is the same as implicit knowledge. However, Fred Nickols (2000) makes a distinction between them. He defines the *implicit knowledge* as knowledge that can be observed in a performance of a good professional – his/her approach, methods, or actions. However, it has not been articulated and presented

in an explicit form yet. In comparison, explicit knowledge has been expressed in some physical form, while tacit has not and cannot be articulated [Figure 3.2].

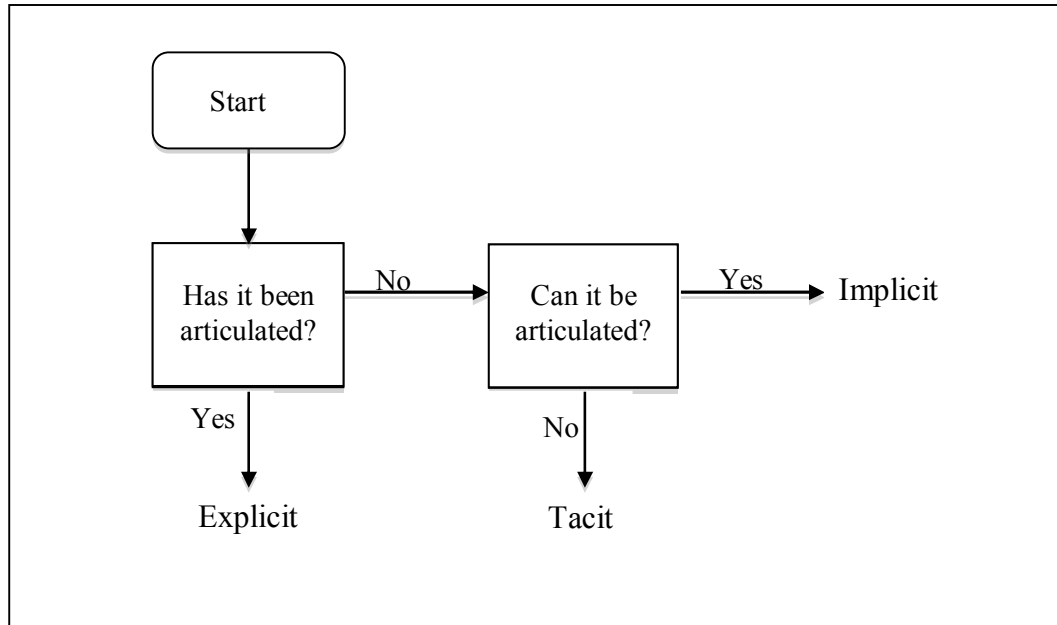


Figure 3.2: Relationship between explicit, tacit and implicit knowledge (Adapted from Nickols 2000, 14)

Explicit knowledge, on the other hand, is academic or technical data or information that exists in a concrete form of a manual, book, copyright, patent, or mathematical expression. It is carefully and systematically codified, stored in databases and shared through print, electronic methods, formal education, and other formal means. It is commonly used and can be freely reused to solve similar types of problems. (Smith 2001)

Thus, “tacit knowledge is mainly based on lived experience while explicit knowledge refers to the rules and procedures that a company follows” (Baets 2005, 59). They both play very important parts in knowledge creation, sharing and storing processes. Baets (2005) adds *cultural knowledge* to the list of the essential knowledge categories and defines it as “the environment in which the company and the individual (within the company) operate”. Conversion and creation of knowledge occur based on explicit, tacit and cultural knowledge a person possesses or has access to (Baets 2005, 69).

The comprehension of tacit and explicit knowledge presented above is based on Nonaka's et al. (2000) SECI model and knowledge definitions related to it. However, ideas developed by Nonaka and Takeuchi (1995) have been strongly criticized by other scholars (e.g. Cook and Brown 1999; Tsoukas 2002). Tsoukas claims that Nonaka and Takeuchi's understanding of "tacit knowledge as knowledge not-yet-articulated [...] is erroneous: it ignores the essential ineffability of tacit knowledge, thus reducing it to what can be articulated. Tacit and explicit knowledge are not the two ends of continuum but the two sides of the same coin: even the most explicit kind of knowledge is underlain by tacit knowledge" (Tsoukas 2002, 15-16). He also states that it is impossible to focus on particulars out of context, therefore tacit knowledge exists only in action. It is possible to discuss it, but it "cannot be 'captured', 'translated', or 'converted' but only displayed, manifested, in what we do". According to him, humans create new knowledge not through turning tacit into explicit, but through everyday performance and social interaction.

One has to agree with Tsoukas (2002) to some extent; however his approach seems rather mechanical, although he himself accuses Nonaka and Takeuchi (1995) of being automatic. The SECI model, first created by Nonaka and Takeuchi, is a simplified representation of the knowledge conversion process. Tsoukas does not take into consideration the evolutionary and dynamic character of Nonaka and Takeuchi's schema describing how individual knowing is shared, generalized, and used in designing of operational tools, which help to coordinate individuals' cooperation within an organization. For instance, a project management software tool is an outcome of a long process of exchange of bits of tacit and explicit knowledge between individuals and groups. It probably started from one person's (or a group's) idea to describe and share his or her project management experiences. But in order to create the tool, many other people had to join in with their knowledge (both tacit and explicit). However, this ready-made tool is used both in standard (explicit) and individual (tacit) way by each individual, which again prompts the creation of new tacit and explicit knowledge.

The way Nonaka et al. (2000) present tacit and explicit knowledge is not exclusive, but inclusive. Some of tacit knowledge becomes explicit, some not. They are

not “two ends of continuum”, neither “the two sides of the same coin”, but they coexist within the same sphere of knowledge. There are no beginnings and ends in the continuous process of knowledge evolution, and the boundary between tacit and explicit is always blurred and changing, as shown in Figure 3.3.

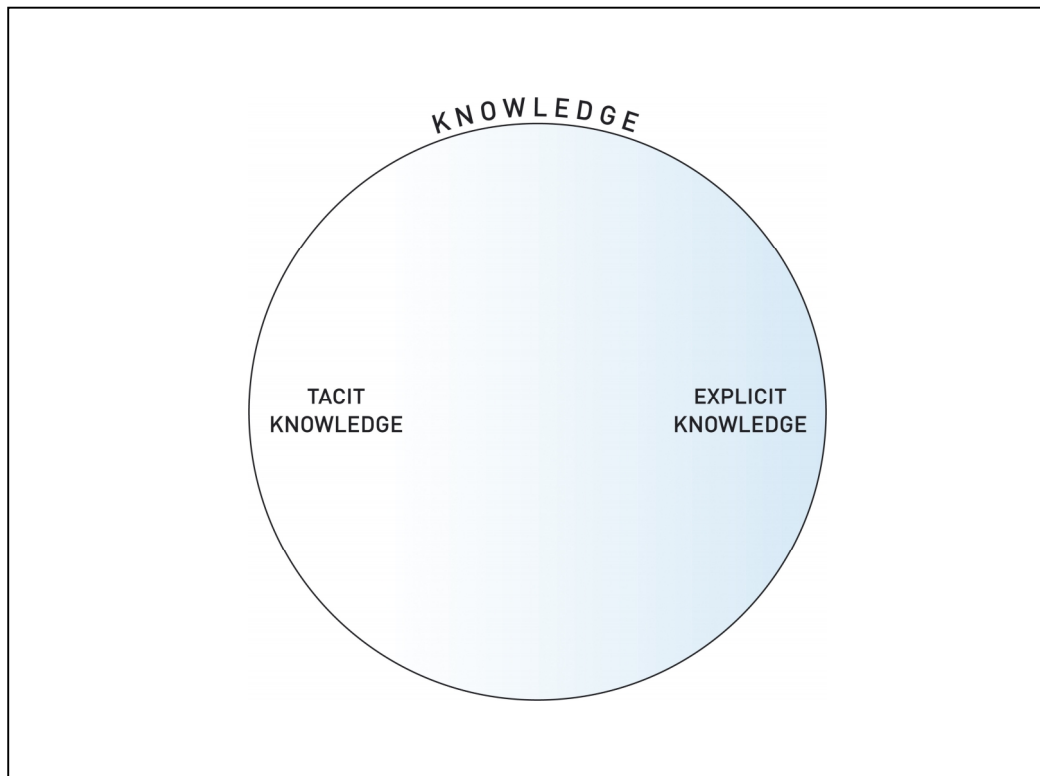


Figure 3.3: Tacit and explicit knowledge coexist within one knowledge sphere

New tacit and explicit knowledge are created not only through social interaction, as Tsoukas claims, but also through generalization and standardization processes, as well as through systemic and organized, or individual, ways of working and learning, through using different tools etc. The process is dynamic, involves individuals, groups, and organizations, and uses different channels, such as social interaction, databases, human and digital networks, and the combinations of these three.

3.3. Learning at work

The area of learning and knowledge transfer is complex and difficult to describe in definite terms. It consists of various types of cognitive processes and contexts. Therefore, more and more attention is being paid to the contextualization of learn-

ing processes through the integration of learning and work. In knowledge-intensive industries, employees' tasks and activities require continuous acquiring of new skills, competencies and knowledge. Koopmans (2005) pays a lot of attention to adult work-associated learning, and quotes Holton et al. (2001) as well as Knowles et al. (1998) in presenting the guidelines for adult learning:

1. "The learner should know the why, what and how of the learning.
2. The self-concept of the learner is autonomous and self-directed.
3. The previous experiences of the learner form a source, which is based on mental models.
4. The learner is willing to learn when the training is related to real life and when there is a developing task.
5. The orientation of a problem is centered on a clear problem statement and it is context bound.
6. The motivation to learn is intrinsic and personal results are of importance."

(Koopmans 2005, 169)

In knowledge-intensive companies, such as professional service organizations, learning accompanies work-related activities on daily basis. In intrapersonal activities, a person performs alone either consciously (over activities), or subconsciously (mentally). However, s/he interacts with other members of his/her working community when performing interpersonal activities. And again, s/he can do it unintentionally (mentally), or intentionally (overtly). Different examples of mental, overt, intrapersonal and interpersonal activities are presented in the Table 3.1.

	Intrapersonal Activities	Interpersonal Activities
Mental Activities (e.g., the extent to which employees...)	<ul style="list-style-type: none"> • assimilate • explore • view learning and work situations holistically • reflect on their actions 	<ul style="list-style-type: none"> • depend on other people • are inclined to work with other people • strive for competition • reflect on others' actions
Overt Activities (e.g., the extent to which employees...)	<ul style="list-style-type: none"> • seek information on the internet or from other sources • practice new skills • keep up with specialist journals • create action plans 	<ul style="list-style-type: none"> • seek feedback • collaborate • ask others for information • exchange knowledge and experiences • observe others

Table 3.1: New categorization of on-the-job learning style dimensions (Adapted from Berings et al. 2005)

Baets (2005) also sees learning as strongly contextual process happening in concrete time and space. It results in knowledge creation through the process of contextual new experience followed by observation and reflections, which lead to the formation of abstract concepts and generalizations, and finalizing them in testing and experiencing of the new ideas. Moreover, according to Baets (2005), individual learning is strongly connected to both individual mental model frameworks, being the reference area for new experiences, as well as organizational setup grounded in organizational routines and shared mental models [Figure 3.4].

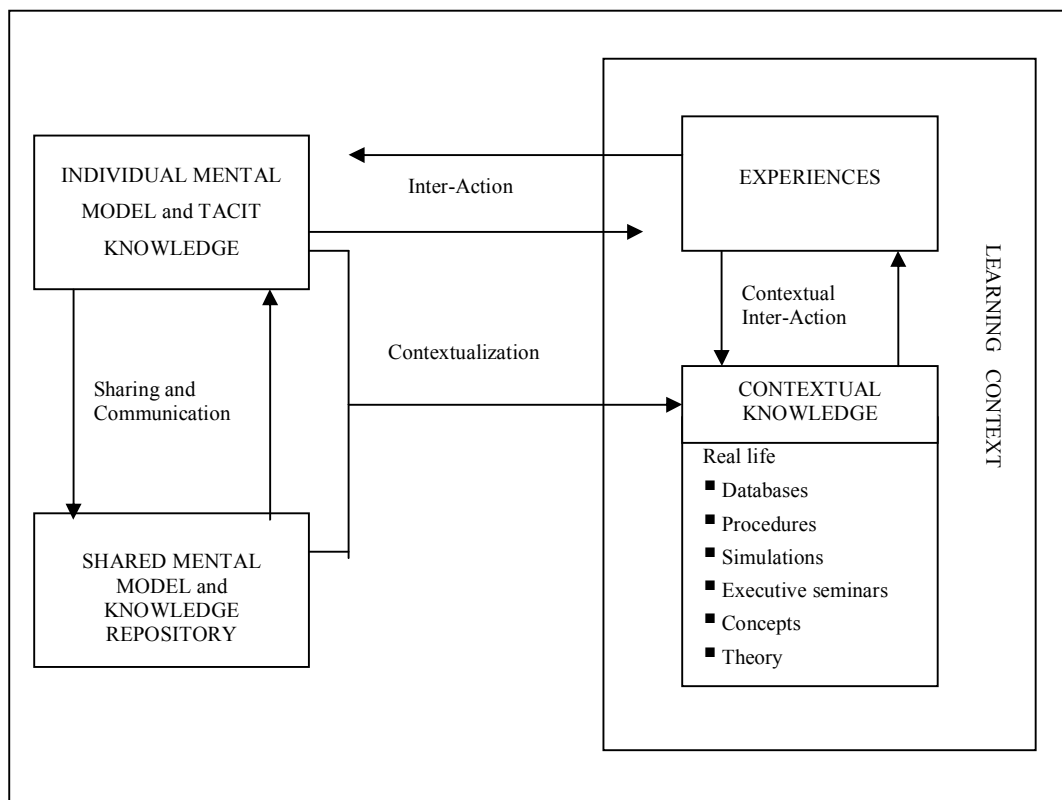


Figure 3.4: A schematic model of knowledge creation and learning (Adapted from Baets 2005, 74)

Eddy et al. (2005) stress the importance of interpersonal knowledge exchange in learning processes. They point up that “a strong continuous learning environment leads to demonstration of peer mentoring behaviors, which leads to individual learning, which ultimately facilitates the continuous learning processes. The circular process can benefit both individuals and organizations” (Eddy et al. 2005). Both the learning and the teaching agents benefit from knowledge sharing situa-

tions. It makes both parties reflect on the information that is being transferred, which leads to its better analysis, understanding and re-formulation (Cortese 2005).

In knowledge-based organizations, there is a visible drift towards Renken et al. (2006) ideas. It has led to a clear shift from a training direction to a learning direction, which is conditioned by participation in a working community influencing the nature and direction of employee's learning process. Therefore, on-the-job learning schemes seem to be of the highest value in highly specialized PS companies.

3.4. Knowledge, knowing and knowing-in-practice

According to Vera and Crossan (2003), *knowledge* and *knowing* construct the content of the learning processes, so they constitute what we learn to get to know. The main distinction between knowledge and knowing is that knowledge is mainly cognitive, including the facts and the skills we possess, while knowing is mainly behavioral, it is knowledge as action." (Vera and Crossan 2003,126). Thus, knowing is expressed in employees' routine and non-routine everyday actions.

Orlikowski (2002), on the other hand, concentrates mainly on *organizational knowing* (practical usage of knowledge) and describes how experts create and maintain knowledge in their complex and global working environment. She extends Lave (1988) and Hutchins' (1991, 1995) theories, and comes to the conclusion that knowledgeability or knowing-in-practice does not exist without human context and is acted out through people's daily actions. It is socially based, dynamic, and temporary, so competence is not given, but acquired.

Also Cook and Brown (1999) stress the dynamic and evolutionary character of knowing, along with its intermingling relationship with knowledge, which Cook and Brown call "bridging epistemologies". Due to these epistemologies, the performance of one activity engages four types of knowledge: individual, group, explicit, and tacit. An expert, or a group of experts, working in an organization involves all four types of knowledge simultaneously when working on a new challenge. During the activity all his/her competence and expertise (knowing-in-action) is engaged in natural interaction [Figure 3.5].

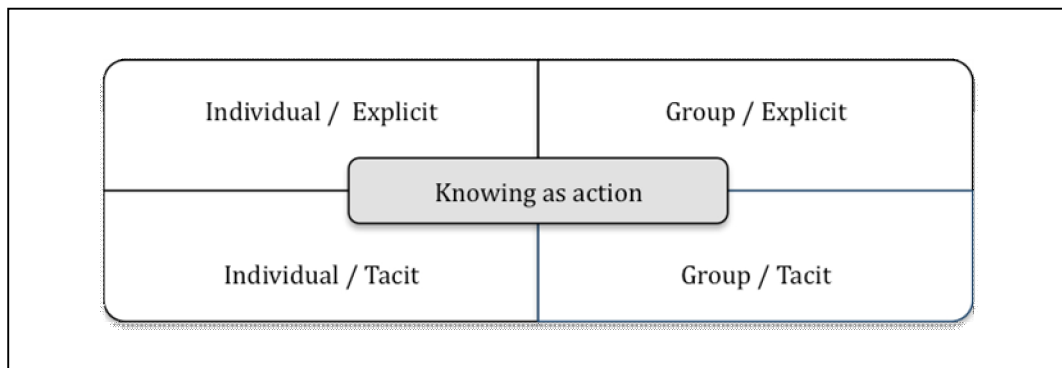


Figure 3.5: Adding knowing to knowledge (Cook and Brown 1999, 393)

Orlikowski’s (2002), along with Cook and Brown’s (1999) ideas support the main principles of the SECI model of dynamic knowledge conversion. We can deduce that knowledgeability is constructed of both tacit and explicit knowledge simultaneously enacted in a unique and complex context by an expert. Tacit knowledge would be represented then by knowing (knowing-how) and explicit knowledge by shared knowledge (knowing-what). Thus, tacit and explicit types of knowledge are interrelated and they undergo continuous transformation composing users’ skills, competence and expertise.

3.5. Expert knowledge, competence and skills

People in organizations generate knowledge, tacit or explicit. Organizational knowledge exists in skills, competence and expertise of employees. Learning and knowledge diffusion are in the core of their work, which combines operating within the organizational system of knowledge, strategies, rules and routine skills with experts’ cognitive styles of knowledge acquisition and implementation.

Experts, as all employees, are expected to have *general skills* and *competencies*, such as social skills, co-operation skills, language skills, computer skills, or technical skills. They provide knowledge and tools helping to cope with a wide variety of tasks and situations. A *competence* is “the ability to successfully meet complex demands in a particular context. Its manifestation, *competent performance* (or effective action), depends on the mobilization of knowledge, cognitive and practical skills, as well as social and behavioral components such as attitudes, emotions, values and motivations” (Hakkarainen et al. 2004,17).

Employee's *domain knowledge*, such as basic knowledge of business, psychology or engineering, is also included in the generic area of competencies. Domain knowledge, though, is the core of one's expertise. In experts' competence matrices, domain knowledge, dominates experts' own assessment of their expertise. However, the importance of some general knowledge areas, such as language skills, is growing due to changes in working environment. (Hakkarainen et al. 2004)

As Hakkarainen et al. (2004) observe a person can function at the *skills level* (routine actions), task or organization rules level, or knowledge level, which is less schematic and more creative and tacit. The individual's function level is determined by the relationship between him/her and the task s/he is performing. New problems and situations require the use of knowledge level, but more common and procedural tasks call for rule- and skill-level practices. However, the knowledge of rules and ability to use the listed skills is only a background for those engaged in knowledge work. As mentioned earlier, increasing knowledge intensity of work, non-routine situations, chaotic and uncertain work environments increase the need for high knowledge-level competencies and conceptual understanding, which is called *expertise*.

Expertise goes beyond the concept of competence. Expertise is the capability of finding solutions to new problems by combining vast areas of old knowledge with existing new information. It is done in controlled and deliberate progressive problem-solving processes of goal setting, activity planning, decision-making, and solution analyses (Hakkarainen et al. 2004). The higher the knowledge-level the more controlled, conscious and efficient the problem-solving processes are. Expertise is often regarded as an individual's asset although there are also examples of group expertise. Expert knowledge consists of a very complex combination of tacit and explicit knowledge acquired through work experience. It is usually abstract and informal, sketchy, flexible, dynamic and self-regulatory in nature. Moreover, due to its tacit nature, it is not always consciously transferable.

Skills, competence and expertise constitute individual knowledge and knowing, thus they also construct group and organizational knowledge and assets. Their

growth automatically increases the potential of KM. Hence, KM schemes need to have in-built tools, means and processes enabling learning, training, as well as knowledge sharing and diffusion, which facilitate the enhancement of employees' skills, competences and expertise.

However, according to Henard and McFadyen (2008), there is no possibility to gain a sustainable competitive advantage over other knowledge-intensive companies, unless organizations do not invest in widening and deepening their knowledge workers' expertise. Such programs facilitate the formulation of blends and use of interdisciplinary specific knowledge hard to copy and imitate. If this unique knowledge is integrated into a complex and exclusive business context, a company can gain a sustainable competitive advantage impossible to overcome by its competitors.

3.6. Intellectual capital

Knowledge is an intangible asset existing and developing on individual, group and organizational levels. Since we are going to analyze KM at a company level, we have to clarify the content of organizational *intellectual capital*. It is knowledge accumulated within a company in various forms and of different origin. Ross' et al. (1997) categorization of company intellectual capital helps to comprehend its scope and nature.

INTELLECTUAL CAPITAL					
HUMAN CAPITAL			STRUCTURAL CAPITAL		
Competence	Intellectual Agility	Attitude	Relationships	Organization	Renewal and Development
Skills Experience Education	Motivation Behavior Conduct	Capability of imitation Capability of innovation Adaptability Capability of packaging	Customers Suppliers Partners Shareholders Other stakeholders	Infrastructure Processes Organizational culture	Intangible resources influencing knowledge value in the future

Table 3.2: Model of intellectual capital division (Adapted from Ross et al. 1997)

According to Ross et al. (1997) intellectual capital can be divided into two main parts: *human capital* and *structural capital* [Table 3.2]. Human capital contains individual traits such as competence, intellectual agility and attitude. Structural capital, on the other hand, is made up of organizational relationships, organiza-

tional infrastructure, processes and culture, as well as organization’s renewal and development capabilities. Intellectual capital is the core resource of knowledge creation and diffusion. Therefore, it will be discussed and analyzed throughout the whole thesis.

3.7. Intelligent organization: from organizational learning to KM

Tsoukas and Vladimirou (2001) stress the central role of human factor in knowledge generation. According to them, knowledge is “the individual ability to draw distinctions within a collective domain of action, based on an appreciation of context or theory, or both” (Tsoukas and Vladimirou 2001, 979). Thus, knowledge becomes organizational simply due to the fact that it is generated, developed, and maintained by individuals within organizations. Members of an organization have an inborn capability to draw distinctions in concrete contexts, because of their collective understandings and experiences allowing for deducting contextual generalizations.

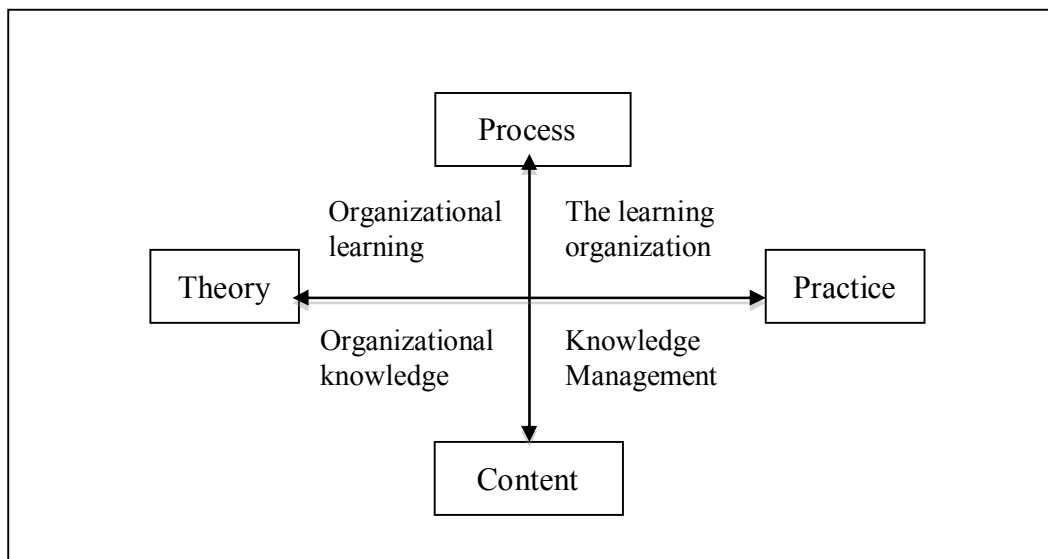


Figure 3.6: Mapping the area of organizational learning, organizational knowledge, the learning organization, and KM (Adapted from Easterby-Smith and Lynes 2003)

Due to the fact that knowledge is an organizational trait, the science of organizational learning and KM emerged, and it has been developing quickly. Numerous new concepts have come into view, which have been mapped by Easterby-Smith and Lynes (2003). They use two continuums: theory vs. practice and process vs. content, to differentiate between four main terms used by scholars: organizational

learning, organizational knowledge, the learning organization, and knowledge management [Figure 3.6].

As Easterby-Smith and Lynes stated, “*organizational learning* refers to the study of the learning process of and within organizations, largely from an academic point of view. (...) On the other hand, the *learning organization* is seen as an entity, an ideal type of organization, which has the capacity to learn effectively and hence to prosper. Baets (2005) stresses that a learning organization provides means for its members to continuously learn, which helps to create new ideas and thinking patterns. Those who write about learning organizations generally aim to understand how to create and improve company’s learning capacity, and therefore they have a more practical and performative agenda” (Easterby-Smith and Lynes 2003, 2).



Figure 3.7: Boundaries of organizational learning and organizational knowledge fields (Adapted from Vera and Crossan 2003) within an intelligent organization.

Correspondingly, *organizational knowledge* deals with theoretical studies trying to comprehend and describe the essence of knowledge that is accommodated within organizations. “Hence many of the discussions relate to distinctions between individual and organizational knowledge, or whether the distinction between tacit and explicit knowledge is useful” (Easterby-Smith and Lyles 2003, 3). On the other hand, according to Easterby-Smith and Lyles, *knowledge management* deals with technical aspects of creating ways of disseminating and leveraging knowledge in order to enhance organizational performance” (Easterby-Smith and Lyles 2003, 3).

Vera and Crossan (2003) describe the rapport between organizational learning and organizational knowledge as follows: “organizational learning focuses on learning as a process of change, while organizational knowledge stresses knowledge as a resource that provides competitive advantage and studies the process associated with its management” (Vera and Crossan 2003, 127). Yet, they are interconnected and correspond with each other. Vera and Crossan propose an integrative framework of organizational learning and organizational knowledge, as presented in Figure 3.7.

All elements discussed in this sub-chapter: the excellent command of information and knowledge, expertise and competence development, enhancement and management of organizational learning, and knowledge transfer are the parts of the same system, defined as *an intelligent organization*. Haeckel and Nolan (1993) define an organization’s intelligence as its “ability to deal with complexity”. Organizational intelligence “takes place when each employee’s intelligence works toward shared-level goals, and people are allowed and encouraged to pursue these goals. (...) It depends on whether members of an organization have relevant knowledge, whether this knowledge is adequately distributed, and whether the organization uses what its members know. (...) An intelligent organization encourages the participants to engage in gradually deepening, progressive problem solving, and dynamically develop their expertise” (Hakkarainen et al. 2004, 96).

3.8. Knowledge levels in organizational context

As an organizational resource, knowledge plays different roles in organizational context. It is utilized at all company levels, but in varying schemes and for different purposes. The knowledge hierarchy pyramid (Hussein and Wahba, 2003), presented in Figure 3.8, shows how knowledge changes its nature and is processed within business context.

Knowledge generation starts with collecting highly detailed and fragmented encoded transaction data. It gets grouped and used to perform operations by organizational functions. When knowledge reaches the level of management information, it has already been lightly summarized and aggregated, classified, filtered, and stored in relevant forms and locations. At this level, it is the most important tool aiding middle managers in their decision-making.

Highly summarized and dimensioned information stored after data and information have been selected, filtered, processed, organized, correlated and analyzed is used for the purposes of business intelligence. It facilitates the analyses of knowledge flow and processes and their impact on company performance at high managerial level.

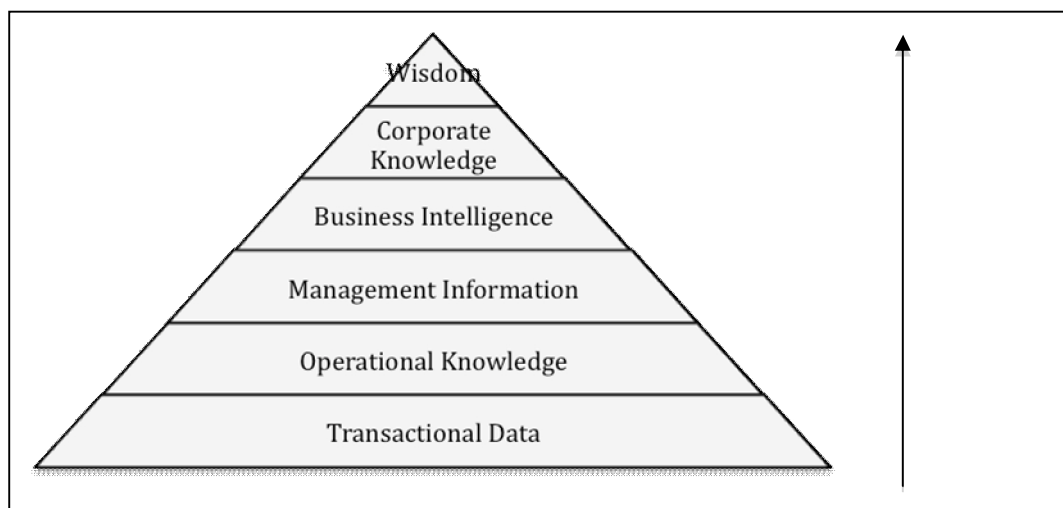


Figure 3.8: Knowledge pyramid and characteristics of different knowledge levels (Adapted from Hussein and Wahba, 2003, 244)

Knowledge becomes corporate knowledge when its insights derived from the information and data are shared throughout the organization and implemented through organization-wide schemes. It exists in a highly abstracted and conceptual

form. At this level, organizational knowledge and KM concepts are generated and communicated to employees. In its final form, knowledge turns into organizational wisdom when it gets internalized throughout all organizational levels and functions and is automatically acted upon on daily basis. It becomes a timeless and abstract quality of an intelligent organization.

3.9. Different views on Knowledge Management

Easterby-Smith and Lynes' (2003) understanding of *KM*, presented in unit 3.7, describe it as structuralized ways of creating, disseminating and leveraging knowledge. However, the majority of scholars have a broader view of the notion. *KM* should not be reduced to providing tools for employee competence development, since it is not effective without deeper understanding of correlative mechanisms between an individual and his/her dynamic working environment.

Choenni et al. (2005) approaches the subject of *KM* from two perspectives: a cognitive approach and a community approach. According to the cognitive model, knowledge is captured, analyzed, developed, created, organized and shared by individuals with the use of ICT. In the other approach, social interaction, communication and collaboration are in the center of *KMS*. Thus, knowledge is the result of actions of different communities performing in the same, or similar contexts. For this reason, it is highly related to a concrete context and situation, therefore dynamic and changeable by nature.

Jennex and Olfman (2006) follow the views of Alvi and Leidner (2001) and extend their *KM* approach over organizational memory (*OM*). According to Jennex's definition, "KM is the practice of selectively applying knowledge from previous experiences of decision making to current and future decision making activities with the express purpose of improving the organization's effectiveness" (Jennex and Olfman, 2006, 53).

Tsoukas and Vladimirou (2001) also stress the organic and heuristic nature of organizational knowledge, which requires holistic and contextualized approach to organizational *KM*. They suggest that *KM* "is the dynamic process of turning an unreflective practice into a reflective one by elucidating the rules guiding the activities of the practice, by helping to give a particular shape to collec-

tive understandings, and by facilitating the emergence of heuristic knowledge”. Thus, KM should aim at creating guidelines, procedures and tools for knowledge generalization helping to enhance organizational collective knowledge.

The quoted theories are either human-oriented, or technology- and process-oriented. They stress areas and processes of great importance to KM. However, when looked at separately, they provide only fragmentary solutions to the process of creating, utilizing and maintaining a KMS. Therefore, in this project, we take a holistic approach to KM by combining the ideas presented by Easterby-Smith and Lynes’ (2003), Choenni et al. (2005), Jennex and Olfman (2006) and Tsoukas and Vladimirou (2001). By merging the quoted theories and the areas they underline, as shown in Figure 3.9, we can develop a comprehensive KM approach.

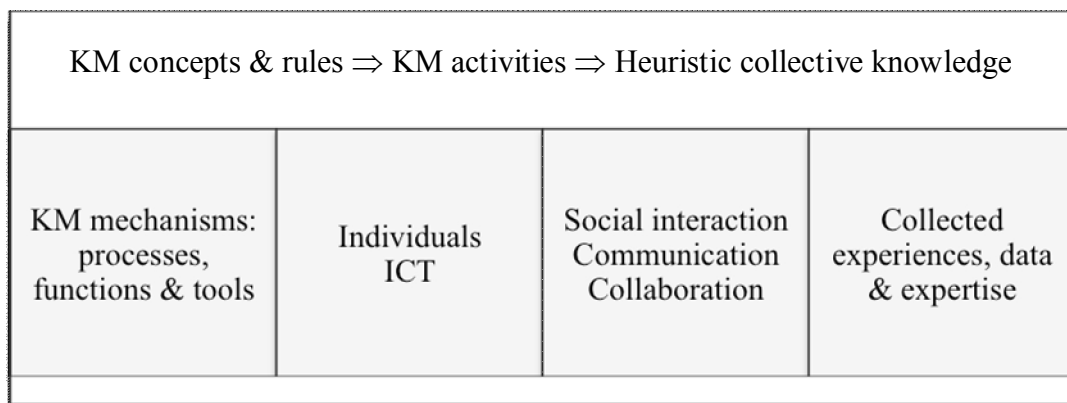


Figure 3.9: The constituents of the combined KM theories

The new KMS scheme will enable the development of KM concepts and rules, as well as activities, which will lead to the generation of heuristic collective knowledge and its sharing mechanisms within the company. Moreover, the listed constituents will be incorporated into the created KMS within the frames, set up in the previous chapter, of three main KM segments: KM environment, knowledge sharing and KM processes, as well as KM information and communication technologies (ICT). These components will be discussed in detail in the following consecutive chapters of the thesis.

4. Crucial aspects of knowledge-management environment

There are several elements of the KM environment, which are especially important for organizational knowledge sharing efficiency:

- company business strategy,
- firm structural capital,
- intangible resources,
- information management,
- learning and knowledge transfer,
- innovation, and
- cultural complexity.

These elements will be discussed in the following sub-chapters.

4.1. Knowledge Management and business strategy alignment

It has become clear by now that KM is an essential system incorporated into all organizational managerial and operational constituents.

While preparing to construct an efficient KM system, we need to remember that successful KM should derive from the company strategy in a dynamic manner, which means that changes in business strategy immediately cause readjustment processes within the KMS. The logic of the alignment of a company business strategy with its KM strategy leading to changes in KMS structures and operations has been well presented by Abou-Zeid (2008). Following Henderson and Venkatraman's (1993) ideas, Abou-Zeid has developed the KM Strategic Alignment Model (KMSAM) presented in Figure 4.1.

According to the model, KM is constituted from its external domain and internal domain. The external domain (knowledge strategy) is impacted by the firm's business strategy. The internal domain (knowledge infrastructure and processes), on the other hand, derives from the knowledge strategy and is built to match the organizational infrastructure and processes. This interaction sequence allows for efficient and flexible alignment of the business and KM strategies, which is the core principle of the KMS creation process. (Abou-Zeid, 2008)

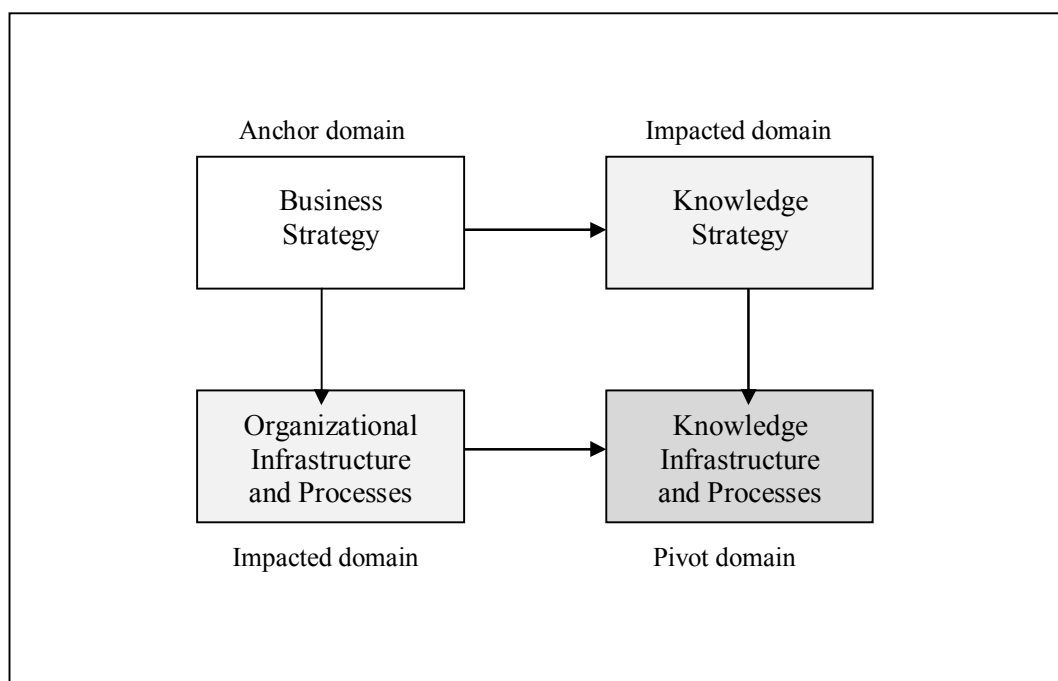


Figure 4.1: Alignment of Business and KM Strategies (Adapted from Abou-Zeid 2008, 361)

According to Hansen et al., (1999), there are two alternative strategies that PS firms can follow while developing their KM approach: *codification* and *personalization*. The codification strategy is strongly ICT-oriented and aimed at accommodating an organization with a high quality, efficient, and stable information system, which is based on the reuse of codified knowledge. It requires heavy investments in ICT and the development of computer-centered working culture. The personalization strategy, on the other hand, is strongly communication-oriented. Its goal is to provide tools and means for networking and exchange of tacit knowledge and ideas on personal level. This strategy stresses the uniqueness and high quality of provided services.¹

Hansen et al. (1999) stress that these two strategies should not be followed at the same time, thus it is unproductive to mix them. Jennex and Olfman (2003) also recommend that service-oriented and knowledge-intensive organizations should apply these strategies; however they question the principle of their separation. The scholars argue that both strategies can be implemented and utilized for different

¹ The summary of codification and personalization strategies is presented in Appendix 1

purposes in one organization. Still, one of them should be chosen as the main policy, while the other ought to take the supportive role. In the light of previous analyses, it would be difficult to argue with Jennex and Olfman's suggestions. It is impossible to bet on one strict KM policy, if we first stress the multi-level, complex, and dynamic nature of knowledge and its management. As it was also pointed out earlier, KMS needs to be flexible, aligned with other company activities, and ready to change. Therefore, we recommend the application of Jennex and Olfman's approach in choosing the KM strategy for any PS company.

4.2. Structural capital

KMS needs to be holistic and dynamic to be well incorporated not only in the company business strategy, but also into its structural capital. There are several ways to define structural capital of a company; however, Saint-Onge's (1996) approach will be followed in this research. Saint-Onge divides structural capital into four parts: *systems*, *culture*, *structure*, and *strategy* [Figure 4.2].

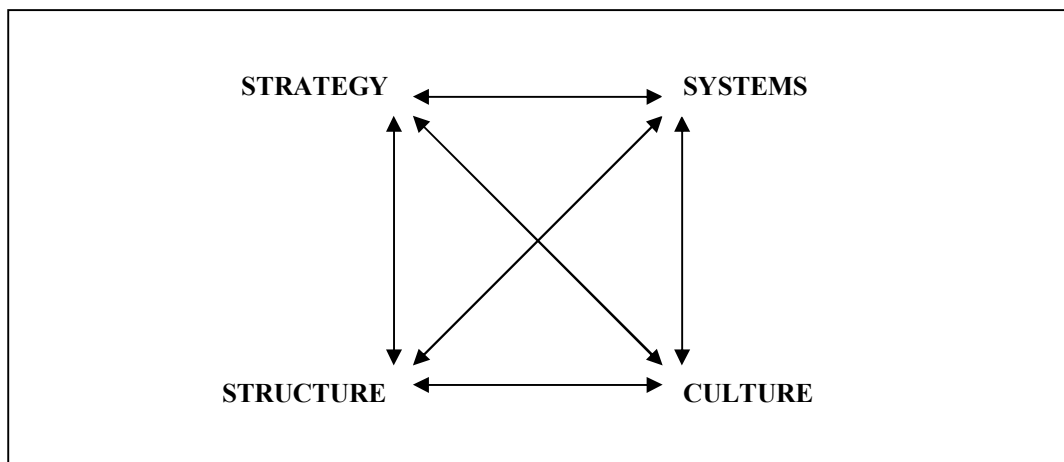


Figure 4.2: Elements of structural capital (Saint-Onge, 1996, 227)

Saint-Onge's (1996) describes the structural capital elements in the following manner:

- “*Systems* – the way in which an organization's processes (information, communication, decision making, [KM processes]) and outputs (products/services and capital) proceed.

- *Structure* – the arrangement of responsibilities and accountabilities that defines the position of and relationship between members of an organization.
- *Strategy* – the goals of the organization and the ways it seeks to achieve them.
- *Culture* – the sum of individual opinions, shared mindsets, values, and norms within the organization.” (Saint-Onge 1996, 227)

The elements of the structural capital coexist in one coherent system influencing one another. Knowledge is formulated in each of the elements, and it also influences their formulation. The mode and activity of the processes taking place between the system elements resemble the dynamic evolution that complexity theory is based on.

4.3. Competitive intangible resources

The dynamic capability theory (described in section 2.1) is based on the assumption that company resources are the main source of its competitive advantage. Thus, when discussing KM systems, we need to define the assets we are dealing with. The knowledge playground can be found from within intangible resources, which have been studied and defined by Hall (1992).

Hall (1992) divides intangible resources of a company into assets and competencies. Assets can exist within a legal context (e.g. contracts, licenses, intellectual property, trade secrets, and owned physical resources) or without a legal context (networks, databases, and reputation). The other resource group consists of employee, supplier and distributor know-how, together with organizational culture incorporating, among others, the perception of quality, ability to manage change, or service principles. Know-how and organizational culture amount to company competencies (Hall 1992). Functional capability differentials of the resources presented in Figure 4.3 originate from “the knowledge, skill and experience of employees, and other in the value chain such as suppliers, distributors, stockbrokers, lawyers, advertising agents etc. Groups’ and individuals’ habits, attitudes, values and beliefs constitute the cultural differential. Positional differential is the company reputation, which is the outcome of the past actions. The proprietorship of legal entities (e.g. intellectual property rights, contracts, or trade secrets) constitutes the regulatory differentials.” (Hall 1992, 182-183)

All mentioned and described assets play their part in the KMS and need to be taken into consideration during its creation. They influence each other and knowledge generation processes. Hence, we need to keep them in mind while discussing other aspects of KM systems.

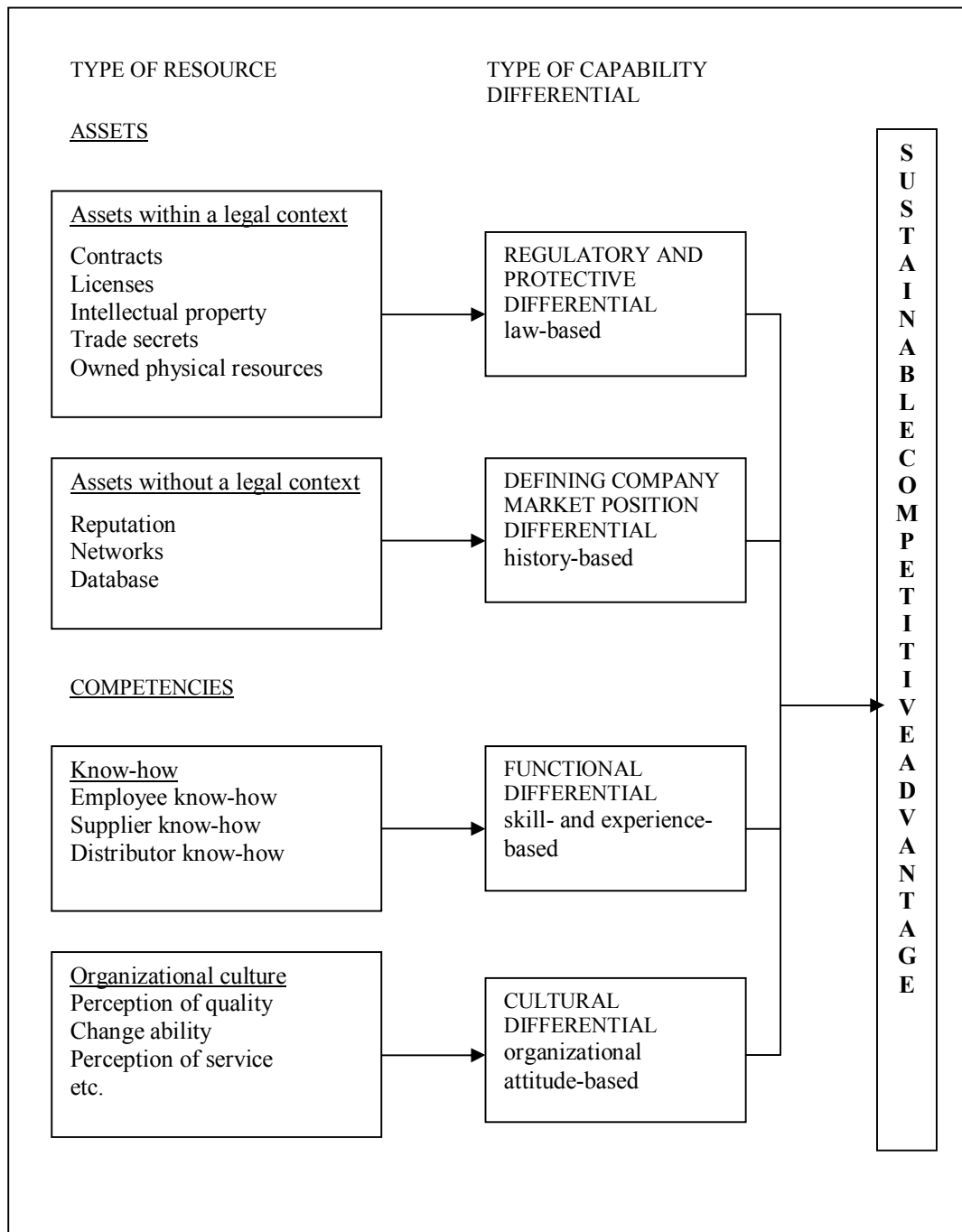


Figure 4.3: Intangible resources, capability differential and sustainable competitive advantage (Hall 1992, 193)

4.4. Information management

Information constitutes the basis for knowledge creation and management; therefore it is useful to take a closer look at its management process. Choo (2002) sees the process of information management as a non-ending cycle of related activities: recognizing information needs, information acquisition, information storage and organization, information dissemination, and information use. All mentioned activities cause adaptive behavior within employees, groups and the organization as a whole, which many scholars define as learning behavior. Choo's paradigm presented in Figure 4.4 shows the dynamic and changing nature of information.

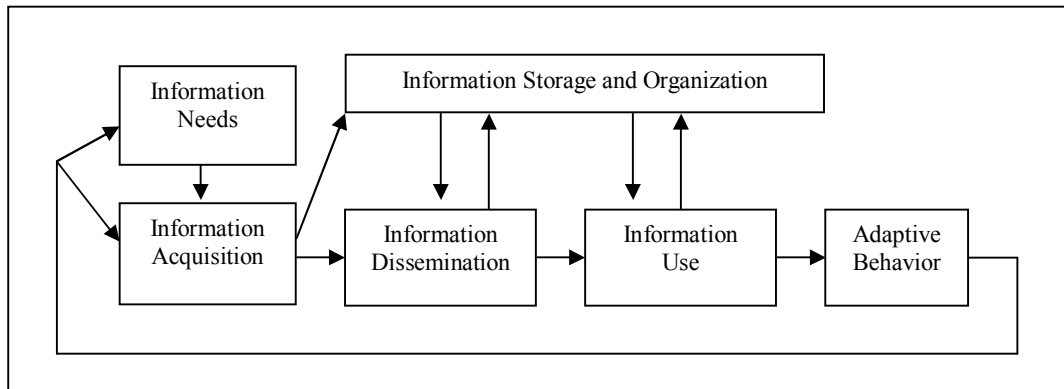


Figure 4.4: Information management process (Adapted from Choo 2002, 237)

In accordance with the model developed by Choo (2002), information users need to be defined first and the way they use the acquired information described. It helps to contextualize, organize and coordinate the information collection process. After information gets stored and organized, the system accessibility ought to be ensured, and information sharing and retrieval processes and tools developed. Information should be categorized and indexed in accordance with users' needs and the nature of its use to enable its effective utilization. When information is shared, it raises the level of knowledge within the organization and aids in decision-making. There are numerous media used to serve information distribution, which will be discussed in the thesis later. Finally, information is put into use by individuals, groups, and user networks, which perform activities aiming at achieving organizational goals. The quality of the information management process influences the level of awareness and knowledge within a company, which affects in-

dividual and group behavior. A new paradigm arises new information needs and starts the process again. (Choo 2002)

4.5. Innovation as emergent learning

Innovation has become one of the hottest subjects of the modern business life. In this thesis, it is defined as a “knowledge process, which is geared towards the creation of new knowledge that becomes embodied in new products and services. By implication, the knowledge creation process is geared towards the development of commercial and viable solutions. Learning plays a crucial role in this process” (Harkema 2005, 288). Thus, learning and innovation are interconnected.

Moreover, Harkema (2005) claims that both processes are characterized by non-linearity and dynamism, which are interrelated. Individual elements interact with the parts of the system, and as a result, both get transformed and a new system emerges naturally. The scholar’s approach can be directly connected with the complexity theory and the knowledge-based theory of organizational capability (discussed in the second chapter). According to Harkema (2005), knowledge “emergence and self-regulation are connected in the sense that the interaction underlying emergent phenomena tends to behave in a self-organizing way” (Harkema 2005, 303).

Harkema’s (2005) structure of learning processes resulting in innovation and development is closely related to the one constructed by Baets (2005) and discussed in chapter 3.3. Human action is usually caused by emotions and experience, but also by facts. There is a clear distinction between internal (cognitive and tacit) and external (behavioral and explicit) worlds on the individual level. The organizational level, on the other hand, is modeled according to structural and cultural aspects. According to Baets (2005), it is necessary to take into account all aspects of innovative learning and knowledge creation in order to understand these phenomena well.

4.6. Cultural complexity in knowledge-based economy

Browaeys and Baets (2005) develop Sackmann’s (1997) definition of cultural complexity, that allows for coinciding existence of varying cultures supporting the creation of both homogenous and divergent, as well as coherent and pluralistic

environment. Thus, in the light of Browaeys and Baets' (2005) ideas, organizational culture is by nature complex and full of contradictions.

In accordance with the principles of the complexity theory (presented in the second chapter), organizational cultural complexity derives straight from the multiplicity of the environment it operates in. Browaeys and Baets (2005) build their organizational complexity understanding on Morin's (1990) complexity principles: the *dialogic principle*, the *hologrammic principle* and the *principle of recursivity*. In compliance with the dialogic principle, individual and organization's differences in interests are natural. The inborn need for self-production and self-organization existing both in individuals and organizations is expressed by the principle of recursivity. As a result, individuals influence their environment (organizational culture), and organizations modify individuals' ways of thinking and acting. Thus, as the hologrammic principle states an organization is mirrored in its members; as well as its members are reflected in an organization.

According to Zack (1999), *complexity* is one of the knowledge-processing problems. The approach presented in this work is based on the complexity theory, which places complexity as the central feature of the reality knowledge exists in. Moreover, the other knowledge-processing problems distinguished by Zack: *uncertainty* concerning the amount and quality of gathered information, *ambiguity* of its understanding, and *equivocality* of its conceptual frameworks, feature also the cultural complexity in knowledge-based economy.

Since shared mental models can differ entirely from individual mental models, operation- and process-integration tools and schemes are necessary to clarify the cultural complexity by enabling a common approach to knowledge generation and diffusion. Thus, it is necessary to build knowledge-friendly corporate culture, invest into management education, assimilation of KM tools and processes, as well as context analysis and understanding. However, this development needs to be well harmonized with the maturation of an integrated approach to knowledge and education within a company.

5. Knowledge sharing and knowledge management processes

Before going into details on knowledge sharing it would be useful to define the difference between knowledge sharing and knowledge transfer, since these two terms are often mixed up. Knowledge transfer describes purely technical process of moving knowledge from one location to another. No change in knowledge properties occurs. Knowledge sharing, on the other hand, deals with generic exchange of ideas, information and knowledge, described as knowledge flows. While sharing knowledge, agents participate in its generation, join with others and utilize it separately or together. As a result of knowledge sharing, knowledge gets reshaped or improved (Collins and Hitt 2006; Ensign and Hébert 2009). Knowledge sharing can be formal and informal, while knowledge transfer is formal by nature. However, both can occur between individuals, peers, and groups, across or within organizations.

A vast study covering over 700 companies, which was conducted in the U.S. at the end of the 1990s, showed that the amount of easily sharable knowledge (existing in electronic forms) is quite modest, since only 12 percent of knowledge was to be found in electronic knowledge bases, and around 20 percent in electronic documents. On average, as much as 42 percent of company knowledge was owned by employees. The rest, around 26 percent was available in paper documents (Hickins 1999). The situation has hopefully improved since then, however it clearly shows how crucial it is to develop the culture and mechanisms of knowledge sharing within an organization.

The value of knowledge increases when it is shared (Cabrera and Cabrera 2002). Since knowledge belongs to assets that grow mainly exponentially, the benefits of knowledge sharing are much bigger than anticipated. “As one shares knowledge with other units, not only do those units gain information (linear growth) they share it with others and feed back questions, amplifications, and modifications that add further value to the original sender, creating exponential total growth. Proper leveraging through external knowledge bases, especially those of specialized firms, customers, and suppliers, can create even steeper exponentials” (Quinn et al. 1996, 277).

An intelligent organization uses in-built organizational memory system which helps to share knowledge and achievements. It is used to facilitate learning among newcomers and reuse of shared knowledge across boundaries within the company. Knowledge-intensive companies are no different. As Adamides and Pomonis (2008) found out, knowledge-intensive companies' modular structures, though less hierarchical, but characterized by stronger boundaries between modules, can have a hindering effect on flexibility in knowledge diffusion, as well as learning and innovation. Thus, it is necessary to develop mental models and practices of intensive information and knowledge sharing throughout the whole organization and across modules.

To advance this process, Adamides and Pomonis (2008) suggest *the involvement of employees and tools facilitating the coordination of work* between different modules and units through the harmonization of correlating and overlapping activities. They should not only aim at enhancing the efficiency and effectiveness of knowledge diffusion, but also at increasing the accuracy of matching resources and needs across the organization. In other words, their task would be to scan the available knowledge, ensure its fluid flow, and encourage its imaginative use. The engagement of *collaboration-supporting methods and systems* facilitating and activating diverse participation between employees should help to grow the efficiency of problem solving and planning.

To complete the picture through developing dynamic and process-based KM, Adamides and Pomonis (2008) advocate the engagement of *the participative scenario planning* methods and tools. The approach is often used to aid in the process of scenario construction and testing, knowledge creation, developing a comprehensive understanding of the internal and external environment, impel strategic thinking, and nourish organizational flexibility and speed in responding to environmental changes. Factors enabling and enhancing the utilization of these methods and tools will be discussed later in this chapter.

5.1. Knowledge sharing barriers: knowledge stickiness and social dilemmas

Collective organizational knowledge derives from a company specific context; therefore it is unique, socially determined, and history-based. Thus, collective

knowledge is *sticky*, which makes it hard to appropriate and imitate by a third party (Sanchez and Heene 1997; Nanda 1996). As we can see, knowledge stickiness can be a strong market asset for a company, however it can be a serious hindrance of knowledge diffusion processes within an organization. Since knowledge is rooted in a compound network of formal and informal social relationships, rules and beliefs, it is also sticky on individual and group levels

It is clear that the *knowledge stickiness problem* is quite complex and it concerns many areas. The nature of knowledge may be very tacit, or context specific and complex, which hinders its transferability. It might be also hard to codify due to its complex nature, or ambiguity (e.g. non-routine behaviors). Moreover, knowledge stickiness grows if the source, or the recipient, lacks experience in the domain, or motivation for his/her actions. The source might be found unreliable and its knowledge undesired. Finally, even if knowledge gets received, the recipient might not have the ability or capacity to absorb and store it for later usage. (Joshi and Sarker 2003)

In addition to knowledge stickiness, numerous *social barriers* may obstruct knowledge diffusion. Employees may not see any personal or organizational benefits of sharing knowledge, nor have enough time to exchange their ideas and experiences. Parties involved might not have interpersonal and communication skills, or opportunities to collaborate and communicate. It is also common and understandable that knowledge workers do not want to give up their autonomy and anonymity, and loose control over personal assets they have developed. The top management's lack of support and commitment to knowledge sharing also restrains employees from implementing new ideas into their work. (KPMG 2000; Joshi and Sarker 2003; Wang et al. 2007)

Some researchers have conceptualized knowledge sharing as a case of *social dilemma* (e.g. Connolly and Thorn 1990; Connolly et al. 1992; Kalman 1999; Kollock 1998; Van Lange et al. 1992; Wasko and Faraj 2000), which portray contradictory situations in which rational individuals aim at maximizing their individual benefit and cause collective irrationality. One type of social dilemmas, *the tragedy of the commons* (or *resource dilemma*), occurs when intensive consumption of re-

sources by individuals, without simultaneous fueling their development, leads to a dangerous risk of the diminution of future resources. There are goods, such as knowledge, which are open to benefit from its use and do not decrease in the process. Their utilization causes another type of social dilemma, called *the public-good dilemma*, which encourage individuals to free-ride. Dawes (1980) claims that such non-contributing defecting behavior is the strategy yielding “immediate positive returns to any participant, at any time during the interaction, regardless of the actions of other participants” (Cabrera and Cabrera 2002, 693), and it would be a primary tactics in the public-good dilemma. The ultimate outcome of the described dilemmas in a PS company can be strong individualistic benefit pursuit, lack of cooperation, and narrow expertise scope of employees. These negative effects usually lead to serious slowdown in innovation and product development, imbalanced use of resources, and the loss of the company’s competitive advantage.

Knowledge-intensive organizations are continuously challenged by knowledge stickiness and social dilemmas. Numerous scholars and consultants (e.g. Costigan et al. 1998; Davenport et al.1998; Davenport and Prusak 1998; DeLong and Fahey 2000; Gupta and Govindarajan 2000; Laupase 2003; Lubit 2001; Quinn et al. 1996; Wright and Taylor 2003) highlight the crucial role of work environment in combating these barriers of knowledge diffusion. Therefore, we would like to have a closer look at their ideas of promoting cultural, structural, procedural, and organizational traits diminishing knowledge stickiness and individual defection, and simultaneously increasing knowledge sharing within companies.

5.2. Environmental factors reinforcing knowledge sharing

There are several basic factors adding to the creation of innovative organizational environment, which is the basis for knowledge sharing and diffusion within organizations: *trust, communication, network density, and change readiness*.

Trust

According to Costigan et al., *trust* is “the essential ingredient of collaborative effort. [...] High performance teams are characterized by high mutual trust among members. [...] An organizational climate of trust enables employees to surface

their ideas and feelings, use each other as resources, and learn together. Without trust people assume self-protective, defensive postures that inhibit learning” (1998). If employees trust their co-workers and managers, they accept mistakes as learning tools, and their readiness to take risks increases (Costigan et al. 1998). Trust is of great value especially in self-leading teams, in which members value autonomy and the possibility to regulate their work together with other fellow experts (Hakkarainen et al. 2004). Moreover, work community members’ trust in the top management decreases their readiness to voluntarily leave the firm (Costigan et al. 1998), which prevents the loss of tacit knowledge.

The results of the IBM research show, that apart from trusting employees’ benevolence, it is most essential to trust their competence, especially when knowledge is very sticky and hard to codify. Finding knowledgeable people in specific areas and encourage them to share their expertise for their personal and organization’s benefit is usually the most challenging task of all. Therefore, “promoting an environment in which employees have the opportunity to develop both competence- and benevolence-based trust needs to be a central part of an organization’s knowledge management agenda.” (IBM 2002)

Communication

Laupase’s (2003) research reveals that intensive informal face-to-face communication considerably increases the likelihood of tacit knowledge sharing. Direct communication and a possibility to discuss issues without pressure and directly are conducive to creating the atmosphere of trust and openness to face and analyze current problems in cooperation. There is a general consensus about the importance of all forms of communication being the corner stone of all information exchange and cooperation enhancement (e.g. Cabrera and Cabrera 2002; Davenport and Prusak 1998; DeLong and Fahey 2000; KPMG 2000; Joshi and Sarker 2003).

Individual relationships

“Competitive advantage is more likely to develop when firms use intangible resources, such as tacit knowledge to combine tangible resources in unique ways” (Spender 1996). Since tacit knowledge is difficult to manage, unthinkably hard to

document and transfer, it is beneficial that individual relationships are strongly embedded within a firm's social structure (Lubit 2001). This fact explains the growing popularity of communities of practice within knowledge-intensive working communities.

Both, informal communication and individual relationships, strengthen the sense of group identity, increase individual and group commitment, intensify the frequency of interactions, and grow expectations of other's participation (Cabrera and Cabrera 2002).

Network density

Droege and Hoobler (2003) suggest that social network density, and high levels of interaction and collaboration help to advance distributive cognition and tacit knowledge expansion. Networking, community participation and strong building of ties are also indispensable in the creation of unique and innovative knowledge. However, the knowledge within dense networks is often redundant (Susskind 1998). Thus, the exchange of information between different units, or even organizations, is essential for knowledge inception. Still, complex knowledge transfer is impossible along weak social and professional ties, and that is why "firms with an optimal mix of weak and strong ties will experience greater tacit knowledge diffusion than firms which do not possess this optimal mix" (Droege and Hoobler 2003).

If the number of contributing employees is too small, the individual cost of knowledge sharing may be too high to trigger individuals' actions. Therefore, a critical mass of contributors to the knowledge sharing system is needed to make it a norm (Cabrera and Cabrera 2002; Marwell and Oliver 1993). The higher is the network density, the higher the probability of reaching the critical mass. Although, the volume of the knowledge network facilitation grows with the increase of the managerial commitment to knowledge sharing schemes.

Change readiness

"Change and innovation are closely linked. If an organization has an innovative culture that generates new ideas, it also needs to be able to implement the consequent changes to working practices and behaviors. This requires people to have a

forward-looking and positive attitude toward doing things differently, rather than maintaining the status quo” (Wright and Taylor 2003, 195). Employees should have trust in their management to dare to try new ideas, and power to put their theories and plans into practice. Consequently, empowerment reinforces commitment and involvement, which are crucial for organization’s knowledge sharing and creativity.

Wright and Taylor (2003) stress the managers’ crucial role in building and maintaining change-friendly culture in a company. It belongs to the management’s responsibilities to follow company’s performance indicators and recognize signals for a change need. Managers are also obliged to keep their staff updated and well informed at all times and communicate emerging problems, the nature of the change, as well as its benefits.

However, before starting to allocate resources into knowledge-sharing initiatives, managers ought to analyze the workplace environment to find out whether there are no bottlenecks in knowledge sharing caused by lack of motivation, opportunity, or ability, or their combination. In the presence of such bottlenecks, assigned resources become unproductive, KM goals are not met, and employees become more discouraged towards knowledge sharing schemes (Siemsen et al. 2008). Therefore, knowledge sharing development might need to start from creating a knowledge-friendly environment in the company.

5.3. Structural and procedural factors reinforcing knowledge sharing

Some scholars (e.g. Cabrera and Cabrera 2002; Kollock 1998; Van Lange et al. 1992) stress the crucial role of the *pay-off function* in employees’ knowledge diffusion activity. According to Cabrera and Cabrera (2002), cooperation increases if benefits connected with sharing knowledge grow. Therefore, either the costs of contributing should be reduced, or cooperation benefits increased. One straightforward way to reduce costs of knowledge exchange is to develop processes and tools facilitating easy knowledge sharing by safeguarding the high *quality of information*, creating and using *strategic connections*, increasing *accountability*, *the clarity of responsibility*, as well as *training* schemes (Cabrera and Cabrera 2002; Wright and Taylor 2003).

Quality of information

The significance of information quality in KM schemes is unquestionable. The more reliable, updated, structured and clear information, the better work environment and results. It provides good basis for everyday tasks, seamless process work, as well as communication and cooperation between individuals and groups. It also speeds up work by reducing time spent on searching for correct information. However, information quality is often a reason for disappointment in organization. It is mainly caused by the unclear concept of information role, structures, and filtering systems, which are brought about by the lack of clarity of responsibilities and performance measurement indicators. (Wright and Taylor 2003)

Strategic connections

Strategy does not work and cannot be implemented if it stays on the managerial level only. Thus, it needs to be communicated and discussed throughout whole organization. If it leads to understanding employees' roles and responsibilities, as well as their deployment, the network of strategic connections has been established. In addition, the process of setting up the network of connections should be of ongoing nature with adaptive qualities helping to face environmental and strategic changes. (Wright and Taylor 2003)

Accountability

Accountability is not important only in the partnership context described by Wright and Taylor (2003). Competitive tendencies and the lack of cooperative spirit are common problems in all kinds of organizations. Cross-functional and cross-departmental collaboration is nowadays a necessity. Knowledge needs to be shared over domains and other traditional organizational boundaries. Moreover, it has to be made clear who is accountable for actions and performance at all organizational levels.

Clarity of responsibility

No mentioned structural or procedural factor will be met, unless there is a clear division of roles and responsibilities among employees. People need to understand the relationships between their work and the organization. The interconnected human network of responsibilities and roles has to work smoothly, which means

that time and effort should be spent on clarifying responsibilities, because benefits gained are much bigger. (Wright and Taylor 2003)

According to Wright and Taylor (2003), clarity can be reached if there is a clearly formulated and communicated business and organizational strategy, along with the service value chain. Moreover, employees' role should be reexamined regularly, and interdepartmental performance measures developed. Still, the roles and measures should derive straight from the business and KM strategies.

Rewarding

Laupase (2003) claims that reward systems play a central role in enhancing the willingness of knowledge sharing within the organization. Cabrera and Cabrera (2002) sum-up their research on incentive motivators by suggesting that employees could be rewarded for their contribution to knowledge sharing on individual and collective (group) bases. Employees' participation can be evaluated according to their contribution volume, or the value of their contribution to the organization. According to Cabrera and Cabrera (2002), the value approach is more effective, since it emphasizes the knowledge quality factor and strengthens the sense of community within the organization. The scholars also suggest that the concept of employee *performance* could be extended from pure business results over "contributions to building the organization's strategic capabilities". The nature of rewards can be intrinsic, such as participation in decision-making, satisfaction with job content, and better career prospects, or extrinsic, e.g. contribution-, job-, or skill-based pay or bonus system.

Training

Employees' efficiency and willingness to participate in knowledge sharing increase automatically if they have the knowledge of how to contribute, how to facilitate the available knowledge-sharing tools effectively, how to efficiently search for required information, what types of knowledge are most valuable to the organization, and how to codify and share it. Thus, training increases the quality of the whole knowledge-sharing system (Cabrera and Cabrera 2002). In addition, Du et al. (2007) have found that the expenditure on inter-units and inter-organizational training contributes to employees' and organization's performance

most. Inter-company training was even slightly more beneficial than the development of knowledge transfer and communicating, as well as collaborative R&D.

5.4. Organization flexibility and expert autonomy

To enhance knowledge sharing, organizations also need to work on building up their structural, operational and cultural flexibility. Flexibility plays a very important role at individual, group and organization levels in knowledge-intensive communities. The same process of creativity enhancement, learning and new knowledge creation that takes place at individual level, occurs at other levels as well. It is crucial to develop flexible systems, which would generate these processes at all levels in organizations. Bhattacharya et al. (2005) refer to Lengnick-Hall's (1988) ideas and argue that "skill flexibility can be generated in two different ways. First, firms may have employees who possess a set of broad-based skills and are capable of using them under different demand conditions. (...) Skills possessed by employees but not currently used may open up new opportunities of business for the firm, and indeed, may influence strategic choices. Second, firms may employ a wide variety of 'specialist' employees who provide flexibility by allowing the firm to reconfigure skill profiles to meet changing needs" This flexibility provides tools for quick reorganization and profile change whenever needed.

At the organizational level, companies develop their own ways of dealing with flexibility growth through schemes like job rotation, project-based work structures, or matrix structures. Due to such arrangements, different skills and competencies get evenly distributed within an organization; and, on the other hand, the company's work culture becomes more consistent. Bhattacharya et al. (2005) prove that employee skill and behavior flexibility, as well as the human resource's practice flexibility have positive effect on the firm's revenue. All in all, they state: "the higher the level of firm's skill flexibility, the more likely employees are to exhibit higher performance" (Bhattacharya et al. 2005). They imply that investments in human resources should not be based on trying to foresee employee skills they might need in the future, but on providing sufficient variety of skills and behaviors that would make adapting to any changes possible. In practice, it

may mean the change to skill- and competency-based pay, hiring very well educated employees, using recruitment methods detecting more flexible and adaptable individuals, and introducing more elastic human resource practices.

Du et al. (2007) name three contingent factors significantly enhancing knowledge sharing: company *organicness*, *the integration of activities* and *the characteristic of top management*. Their claim is that the more organic is the organization, the more integrated operational activities and the more open-minded management, the better company performance enhancement. In other words: the more flexibility in structures and comprehension the better market competitiveness.

All discussed preconditions for knowledge sharing and their relationships are presented in Figure 5.1.

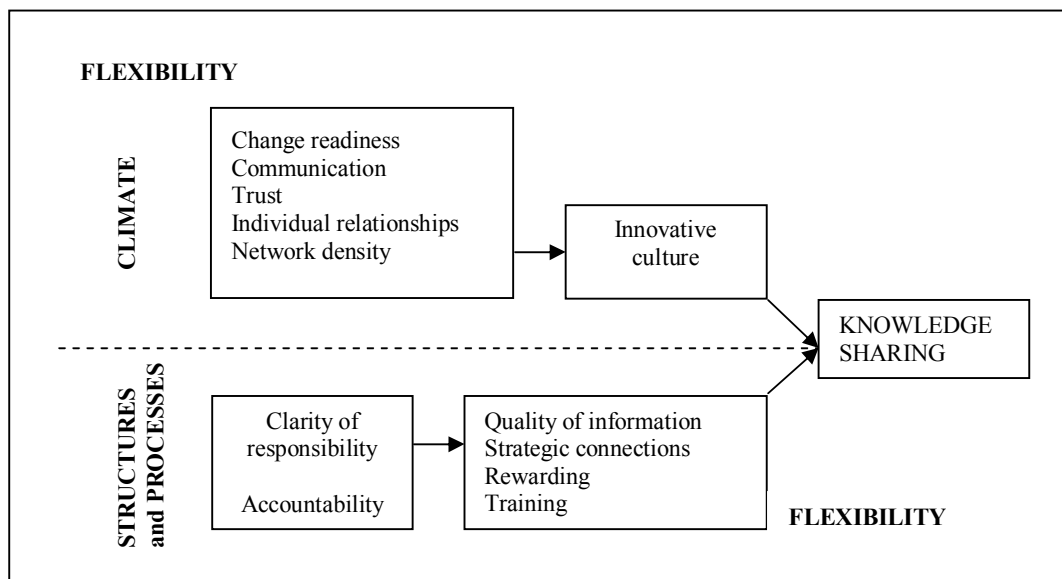


Figure 5.1: The predictors of knowledge sharing (Based on Wright and Taylor 2003)

5.5. Knowledge management processes

The SECI model helps to understand the cognitive processes taking place in the field of learning, development and knowledge gathering. Birkinshaw and Sheehan (2002), on the other hand, have approached KM matters from the perspective of the knowledge life cycle. They distinguish four stages of the knowledge life cycle: *creation*, *mobilization*, *diffusion*, and *commoditization* [Figure 5.2].

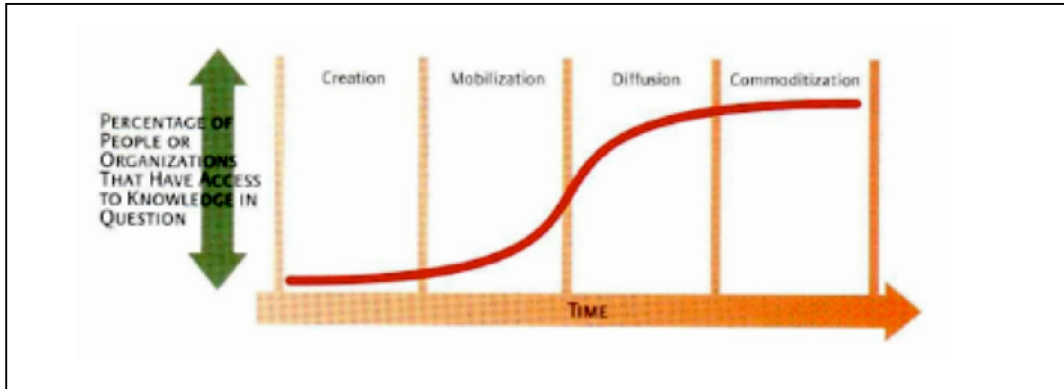


Figure 5.2: Knowledge progress through four stages as it develops over time (developed by Birkinshaw and Sheehan 2002)

Birkinshaw and Sheehan's stress the characteristics and ownership relations of knowledge changes throughout its lifecycle. Every stage has its expertise and means requirements, which means that no company can master all four stages equally well. It is most important, then, to decide which stages are the most relevant ones and focus the development of their KM systems on these stages.

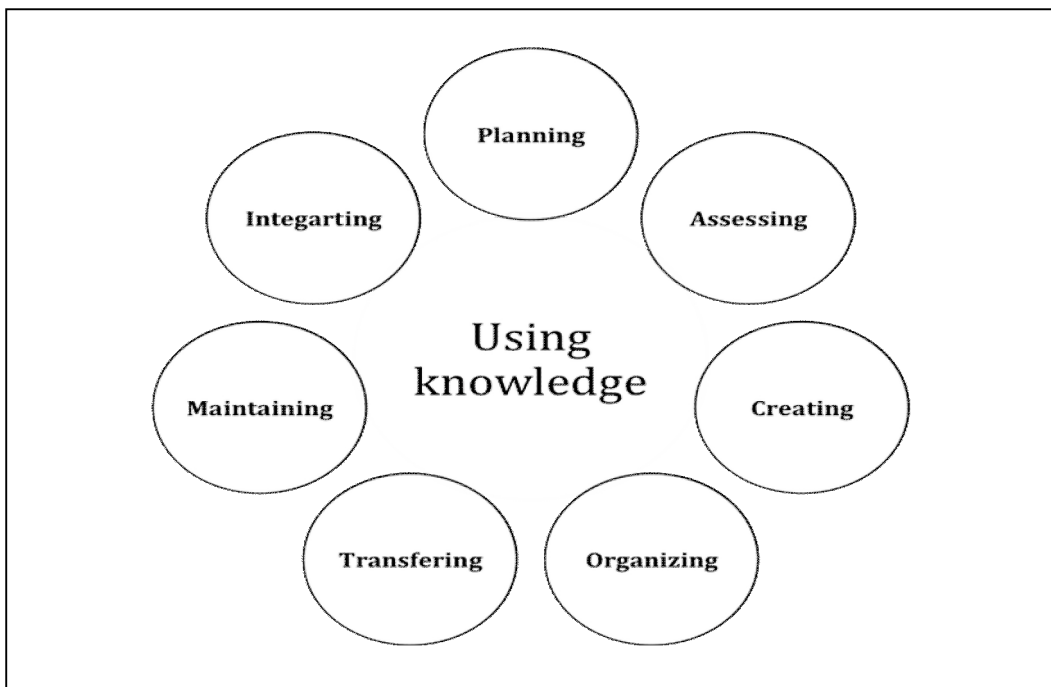


Figure 5.3: The process view of KM (Adapted from Rollett 2003, 10)

However, to create a comprehensive and working KMS, an organization has to provide for the whole knowledge lifecycle to some extent. Therefore, it is useful

to have a closer look at Rollett's (2003) more hands-on approach to knowledge evolution within KM. The scholar has developed a process approach to the subject with the ultimate stress and goal on the optimization of knowledge use. He distinguishes several processes within the KM: *planning, creating, integrating, organizing, transferring, maintaining* and *assessing*. The processes coexist and act simultaneously within the KM system contributing to the KM effectiveness and efficiency [Figure 5.3].

Knowledge planning

Knowledge is planned to match the context that knowledge is used in (Baets 2005; Raghu and Vinze 2007). It is an essential process that lays the basis for the KMS by:

- setting knowledge normative, strategic and operational goals;
- identifying the core business processes and establish the role that information and knowledge play in them;
- generating a clear understanding of the company's knowledge requirements;
- evaluating the nature, focus and scope of the required knowledge, together with the priorities for planning and running the knowledge flows that are important;
- gathering, analyzing and assessing intellectual capital already available;
- formulating the basis for the KM strategy;
- setting up process priorities and objectives;
- drawing plans from changing the status quo;
- deciding upon common strategies formulating the nature of KM
- designing explicit links between daily operations and knowledge planning, creating, integrating, organizing, transferring, maintaining and assessing.

(Lesser and Prusak 1999; Rollett 2003)

Knowledge creation

Knowledge creation aims at enlarging already existing knowledge through acquiring already created, or developing new knowledge. The knowledge creation enhancers described by Rollett (2003) go almost hand-in-hand with the predictors of knowledge sharing described in chapter 4.8. There are numerous methods and

technologies enabling capturing new ideas, their exchange and analyses that can be used on individual, group and organizational level (Rollet 2003).

Knowledge integration

The knowledge integration process aims at gaining access to already existing knowledge efficiently and effectively within and outside the organization. According to Rollet (2003), the integration of *external knowledge* is much easier than capturing, analyzing and storing *internal knowledge*. In each company, there is a lot of hidden (tacit) knowledge, which will never become accessible, unless integration processes are put into practice. Therefore, it is first most essential to establish priorities concerning knowledge nature, collection time, manner, and scope, as well as employee motivation tools (Rollet 2003; Tseng 2008; Raghu and Vinze 2007; Pan and Leidner 2003).

Organizing knowledge

The process of organizing knowledge aims at providing clear and efficient ways of retrieving knowledge, extending it, or acquiring an overview on a certain matter, helping in intelligent and meaningful processing of information, as well as enabling better communication between various parties. Different structures can be used to serve mentioned purposes: term lists, thesauri, semantic networks, categorization schemes, subject headings, ontologies, knowledge maps and various dynamic structures. In modern companies, employees have different means at their disposal to help them organize their knowledge environment, such as personal email, websites, discussion list archives, mental (knowledge) maps and special software. (Rollett 2003; Raghu and Vinze 2007; Pan and Leidner 2003; Wang et al. 2007)

Knowledge transfer

Stored and organized knowledge is of no use unless it can be easily transferred to employees who can turn it into value. Knowledge transfer (KT), sometimes called knowledge transformation, can be brought about by knowledge seekers (knowledge pull), or it can be deliberately provided by some other person or system (knowledge push). Both forms of KT are practiced during face-to-face discussions, training sessions, seminars, and knowledge fairs enabling communication

across units and departments, across formal and informal networks, as well as email communication. Knowledge-pull from electronic means results in better outcome if database knowledge is well organized and interlinked. Electronic-device-based knowledge-push, on the other hand, brings better results if users' behavior and need profiles are well defined within the system. (Rollett 2003)

The main rule for developing knowledge transfer system is to provide users with multiple shift channels, however it is useful to analyze which forms are optimal for certain kind and amount of knowledge, tasks, purposes and environments (Rollett 2003; Pan and Leidner 2003; Wang et al. 2007). For instance, methods used for transferring tacit and explicit knowledge would differ entirely. The nature of sources and receivers need to be taken into consideration as well, together with their communication skills. Also the effectiveness and efficiency of various methods need to be considered. Dixon (2000) presents a systematic division of KT types: serial transfer, near and far transfer, strategic and expert transfer, aiming at simplifying the process of planning and implementing knowledge transfer.

KT is one of the main prerogatives of efficient and effective KM. However, research into knowledge transfer shows that the process is very complicated, which causes numerous difficulties. Parent et al. suggest that "difficulties associated with knowledge transfer are not only possible but commonplace, so much that they should be considered the norm rather than the exception. [...] That is because, so far, efforts to transfer knowledge have had a distinctly modest record of success" (Parent et al., 2008, 98). Because of the sticky nature of knowledge its transfer, in practice, is found more difficult than expected (Galbraith, 1990).

Knowledge maintenance

Knowledge can be benefited from and can serve its purpose only if it is accessible, correct and updated. It sounds obvious, however, in everyday working life it is a challenging process. Dynamically modifying business environment, increasing mobility of workforce, and growing amount of available knowledge bring about knowledge disorder, security problems, as well as changes in KM context and content.

Thus, it is most essential to concentrate on preserving both content (employees' competence and networks) and knowledge organizing structure in good condition. Quality of knowledge preserved and updated should keep the upper hand over its quantity. The importance of preserving unified controlled company vocabularies, as well as coherency both in the structure of knowledge network, and in document formats. However, the most attention needs to be paid to keeping employees' knowledge updated through training and other information-centered schemes. (Rollett, 2003; Wright and Taylor, 2003)

Knowledge assessment

Measuring of intellectual capital serves several purposes. First of all, it helps the management to effectively coordinate strategy with operational practices and get a better control over knowledge sources. KM reports serve also as reference and the source of information and knowledge for all stakeholders useful in solving different problems. The assessment system might be used for benchmarking purposes as well. All in all, with a correct choice of indicators, KM assessment can provide a lot of useful information concerning individual, group and organizational KM, resource allocation, and serve as a means to communicate with stakeholders and propagate values of a learning organization. (Raghu and Vinze, 2005; Rollett, 2003; Du et al., 2007)

On the basis of discussions in KM literature and former discourse in this thesis, we can assume that knowledge assessment is effective only if

- intellectual capital strategy stays aligned with the company business strategy;
- key indicators for the assessment purposes derive from the company KM success factors;
- monitoring and the measurement of the intellectual capital happens on regular basis;
- the results of monitoring are analyzed, interpreted and summed up and shared with parties involved.

To create a holistic KMS, all describes KM processes need to be planned and implemented in alignment with company business strategy, processes and opera-

tions. In order to assure the efficiency and effectiveness of knowledge sharing processes, employees ought to work in environment encouraging knowledge sharing; and they need to learn to search relevant knowledge, analyze it, wrap in easily accessible and understandable chunks, and share with others. Moreover, the use of repositories, standardized forms and methods, objects, models and maps, as well as regular learning practices need to become a norm. Various ICT media, computer-based KM systems strengthen and enable the use of the listed methods and forms and their integration into one KMS. The functional roles of different ICT means in the holistic vision of KM will be elaborated on in the next chapter.

6. ICT role in knowledge management

Different available collaborative technologies make it possible to design and develop practices and systems thanks to which knowledge and experience of individual experts, teams and units can be created, organized, and stored ready for re-use. Numerous scholars give technology a major role in KM development schemes. Hakkarainen et al. (2004) stress that collaborative technology provides new resources for managing knowledge and innovations within intelligent organizations. Cabrera and Cabrera (2002) name technology “the major driving force in the diffusion of knowledge-management ideas”. 93% of the companies surveyed by KPMG (2000) found information and communication technologies (ICT) a main knowledge sharing facilitator. Others stress technological traits allowing for crossing national and intra-organizational borders (Tomlin, 1979; Tushman and Katz, 1980), providing tools for executing different tasks (Stock et al. 1996), and creating unified managerial system promoting knowledge sharing (Katz and Martin, 1997; Yang, 2008). Especially within a knowledge-intensive work environment, an extensive use of ICT would be a standard nowadays. It is clear that ICT can certainly make knowledge diffusion easier and more efficient.

Baets (2005) distinguishes two main areas of technology implementation for KM purposes: managing corporate knowledge and providing ground and tools for individual learning. He suggests that artificial neural networks and communication platforms, together with other available techniques, act as the base for storing individual and shared mental models and both tacit and explicit knowledge. Experience, on the other hand, is analyzed with the use of Case-Based Reasoning Systems (CBRS) and contextual knowledge extended through data bases, learning environment creation, use of simulation techniques, expert systems, computer-based learning, video conferencing tools etc. ICT tools help to share ideas, knowledge, expertise and material, structure them, create KM rules, as well as advise on emerging problems. With the help of technology it is possible to develop efficient and flexible environment allowing for both corporate and individual learning and development. The structural model of the scheme allowing for integrating indi-

vidual and organizational knowledge through the use of technologies is presented in Figure 6.1. (Baets 2005)

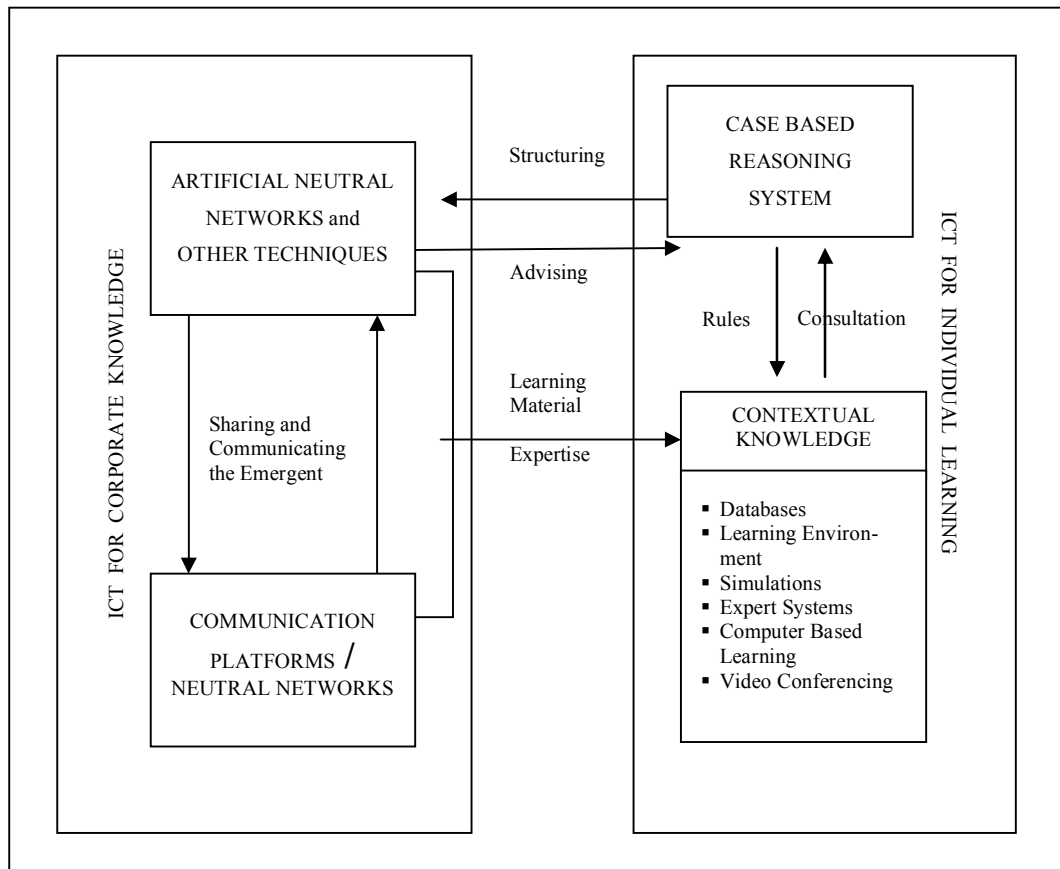


Figure 6.1: The use of knowledge technologies in integrating individual and corporate knowledge (Adapted from Baets, 2005, 86)

6.1. Technology acceptance requirements

However, choosing among different technological solutions and designing KMS is not an easy task (Hahn and Wang, 2007). Developing a KM environment requires combining cognitive, social, organizational and technological aspects of the system. In fact, no technological package is able to cover all needs of a KMS. Moreover, companies differ in their business and KM strategies, operations, processes, principles etc. Therefore, the choice of KM ICT solutions needs to be given a substantial deal of consideration.

Jarvenpaa and Staples (2000) have found that people working in ICT environment are by default more eager to use electronic means for knowledge sharing. However, they underline that an ICT system needs to be well designed and user-friendly to simplify knowledge diffusion tasks and actions and remove disruptive

additional elements. According to Ericsson and Avdic (2003), technology can be accepted for KM use if it is “a function of *perceived relevance, system accessibility, and management support*” [Figure 6.3].

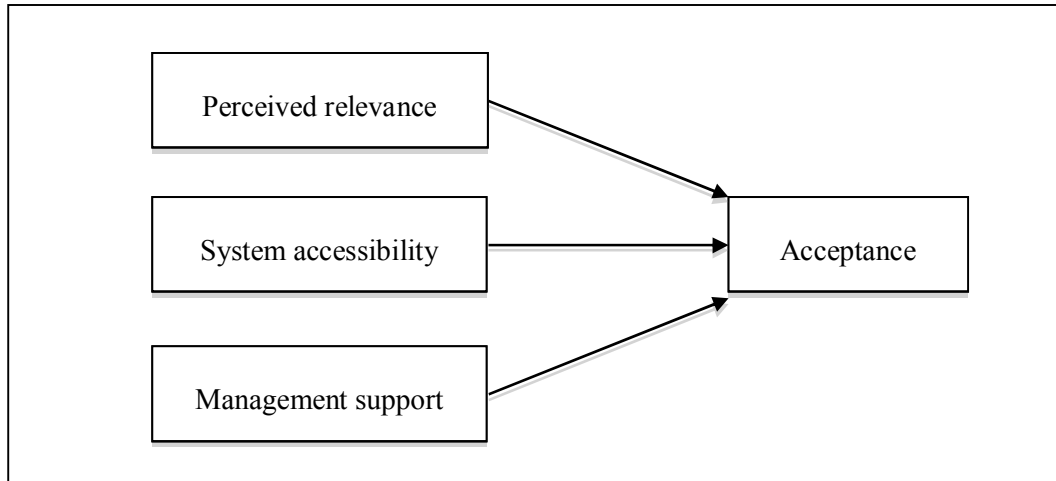


Figure 6.3: The Requirements of Acceptance Model (Ericsson and Avdic, 2003, 43)

The perceived relevance refers to KM ICT qualities, which “add value to the work results” and are “well integrated in running work” (Ericsson and Avdic, 2003, 42). It means that technological architecture corresponds with human social behavior at all organizational levels, work processes, and knowledge structures of system users (McGraw, 1994; Maier and Remus, 2003; van Greenen, 2005; Wang et al., 2007). The system accessibility cover the formulation of who the user(s) is (are), and finding out the scheme’s physical setup. It also requires describing and classifying actions performed by the future system users, as well as guaranteeing the system’s smooth operation once put into action. Finally, system accessibility accounts for the system’s design meeting its goals and employees’ needs. (Ericsson and Avdic, 2003)

The system’s success or failure is dependent on workers’ acceptance of the new scheme, as well as their motivation to implement it. Bridging the gap between technology and human behavior is maybe the most difficult task of KM schemes (Wang et al., 2007). Hence, it is the management’s role to underline the importance of the system and participate all the way through its planning and its implementation processes. In addition, it is a management’s job to have the goals, time scheme and cost of the undertaking estimated beforehand to be able to monitor the

system implementation and utilization. Finally, employees' expectations and demands need to be taken into consideration and structural changes to the system implemented. (Ericsson and Avdic, 2003; Du et al., 2007)

It has been also pointed up (Jarvenpaa and Staples, 2000) that employees do not take ICT tools into use unless they are informed about their existence, purpose, and provided opportunities for training in tools' use. These actions do not only motivate people to participate in knowledge sharing, but also reduce the cost and time of taking tools into use.

6.2. ICT as an enabler

Knowledge-workers are more efficient in information sharing if KM processes match operational task characteristics and procedures required for the task (Hahn and Wang, 2007). Moreover, ICT solutions have to be able to provide for proper process performance execution, knowledge stickiness reduction, context and culture adjustment, learning enhancement, knowledge diffusion as well as increase in innovation. Technology can have many functions serving the KMS, such as *communication, collaboration, content creation and management, knowledge adaptation, eLearning, networking, knowledge measurement, knowledge community creating* etc. (e.g. Baets, 2005; Havens and Haas, 1998; Rollet, 2003; Tseng, 2008)

Thanks to ICT, knowledge stakeholders from inside and outside the company are able to *communicate*: stay in touch, exchange thoughts, ideas and comments, as well as stimulate each other. ICT solutions allow for *collaboration*, which is essential to learning and development. Networked technological tools create media for real-time collaboration, or virtual shared spaces for groups working in the same context. ICT enables also structured cooperation over extended time through file sharing functions, organizational information management, wiki webs, as well as workflow management means (Rollett, 2003; Tseng, 2008; Wang et al., 2008).

Tools *facilitating content creation* allow for extended annotations use, stimulate creativity, help in managing structures, content and context, as well as allow for document enrichment through metadata interlinking and more efficient allocation and use of intellectual capital (Rollett, 2003; Tseng, 2008). Thus, knowledge creation technologies in KM facilitate the explication of tacit knowledge in practice,

in accordance with Nonaka's et al. (2000) ideas. Due to the use of knowledge creation technologies, it is possible to keep information well controlled, transparently structured, properly integrated, easily accessible and transferable, updated and ready to use.

Content and document management systems support the governance of pieces of information during their lifecycle enabling the merging of already existing content, creating metadata for more effective navigating in the system, as well as information storing, versioning and classification for its easier handling and retrieval. *Adaptation technologies*, on the other hand, allow for knowledge customization and personalization, knowledge filtering resulting in providing users with most relevant material recommendations through data warehousing schemes, portals, knowledge maps, and various visualization tools. (Rollett, 2003; Tseng, 2008)

Technology provides also enormous possibilities for individual knowledge management. *eLearning* virtual environment can be effectively and efficiently used for content creation, reusing existing schemes, environment administration, course delivery, on-the-job learning schemes execution, learners' progress tracking and testing, participants' communication, and sending feedback both on students' progress and the functioning of the system. *Personal KM tools* can solve the ever-present dichotomy between individual styles to work, learn, and use time and tools, and organizational common approaches, processes and media. Thus, personal knowledge tools are able to provide personalized working space by creating and organizing personal knowledge (Rollett, 2003; Baets, 2005).

It is often stressed that computer *networks* are not as important to KM as human networks (e.g. Rollett, 2003; Baets, 2005; Tseng, 2008), however they are important enablers of knowledge physical transfer. Widely used email, Internet and intranets, directory services, Web servers and browsers considerably enhance effectiveness of KM systems as a whole. *Information exchanging standards* play a similar role. The better different software solutions work together the more effective KM is. Thus, the compatibility of standards for exchanging information does matter.

Technological solutions also facilitate the utilization of *knowledge measurement systems* and knowledge needs analyses, which aid employees in developing their knowledge sharing procedures, and managers in decision-making. Finally, technology is a non-replaceable helper in *creating knowledge communities* across units, functions, country borders, and even across organizational borders. (Tseng, 2008)

ICT solutions are not a goal in itself, since technology does not solve KM problems single-handedly. However, due to ICT, all knowledge processes become more profound, accurate, efficient and faster. Technology provides also many forms of knowledge exchange: one-to-one, one-to-many, or many-to-many, as well as various modes taking into consideration time or context differences (e.g. cultural or geographical). It also aids internal benchmarking systems allowing for sharing internal best practices, and formulating organizational communities of practice by enabling knowledge sharing among group members, as well as shared problem solving (Hahn and Wang, 2007).

The qualities of technological tools influence the level and amount of communication, collaboration, learning, networking, and knowledge adaptation by and between stakeholders. There are several issues that should to be remembered when planning the use of technological tools. First of all, KM environment provided by ICT tools needs to be structured to some extent to allow for better knowledge command and clearer communication. Second, the environment serves its purpose effectively only if technologies at use are integrated and allow for some flexibility, so they need to be based on open standards. In addition, organizational culture should foster trust and willingness to share experience and cooperate to be able to benefit from the technological tools in question. And finally, special attention has to be paid to the system of access rights and group membership issues controlling the content, context, amount and relevancy of information flow between users.

Nevertheless, it is not enough to take into use new technical infrastructures in order to use these tools efficiently. It needs to be kept in mind that technology serves communication, collaboration, networking, learning etc. and does not replace them. It is vital to build social infrastructures that would support participa-

tion in networked activity, involve practices for documenting and help managing collaborative activities, along with relevant norms and values. Face-to-face meetings, contacts, forums, personal networks, classroom learning etc. are still needed. Personal and technology-based knowledge exchange is meant to complement each other. Moreover, organizations should pay attention to relevant tailoring of the technical solutions to the specific conditions, needs and circumstances of the organization in question. In other words, technological infrastructure has to be compatible with company business, operational, cognitive, social, and learning infrastructures. (Baets, 2005; Hakkarainen et al., 2004; Rollett, 2003)

6.3. Technology as active value-adder

In the majority of companies, technology is still considered more an enabler than a value-adder. However, ICT systems keep developing enhancing organizational operational efficiency. Regardless of how sophisticated technology used in a company is, it seems that companies do not exploit advantages and potential provided by technology as effectively as they could. Mitchel (2003) puts it down to the lack of skills and knowledge and stresses the significance of staff ICT education and training. For KM schemes, this observation has a dualistic meaning. On the one hand, the system has to provide for employees' training, learning and expertise development, and on the other hand, it needs to feed people's imagination and creativity to enhance interest and motivation to look for new ways of technology implementation that may benefit the business.

Orlikowski's (2006) research led her to the conclusion that technology helps to "scaffold knowing in practice". It means that technological materiality in the form of infrastructures, spaces, and artifacts shape organizational knowledge and influence methods, routines, and ideas applied by KMS users. Brivot (2007), in her research carried out in a big professional service (PS) company, applied Orlikowski (1992) and Rabarel's (1995) structural model of technology [Figure 6.2].

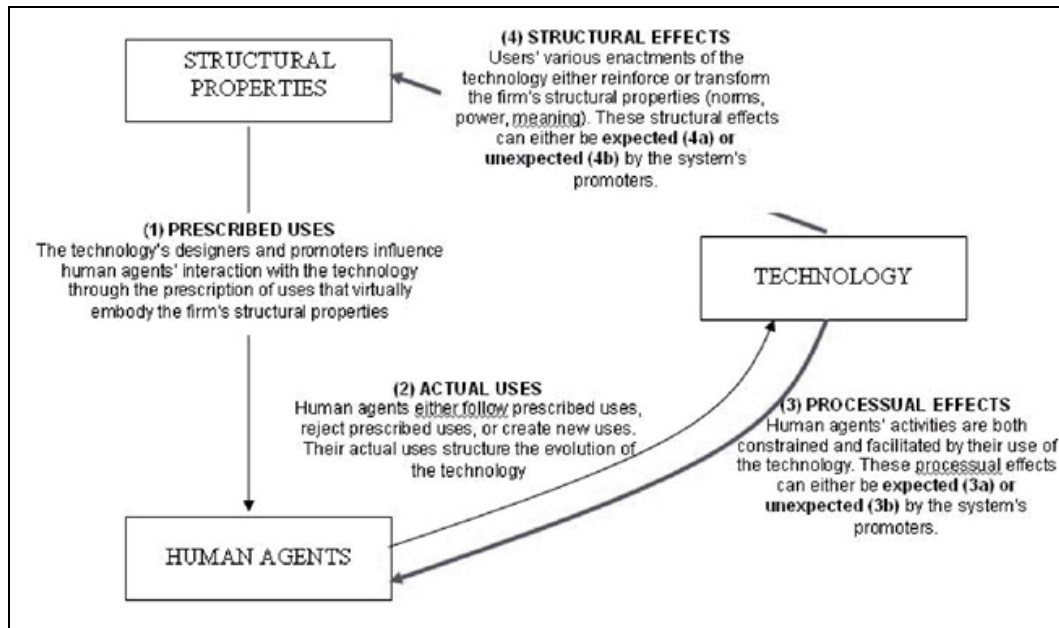


Figure 6.2: Structural model of technology (Orlikowski, 1992 and Rabarel, 1995)

The main point that Orlikowski (1992) and Rabarel (1995) make is that technology does not only serve as medium for KM processes, but it also actively influences these processes. According to Orlikowski and Rabarel, technology is planned, created, developed, and maintained by people, so it comes to existence as a result of human action (arrow 2). However, its role is far from being a pure passive tool. Technology has also a strong impact on people's working methods, means, and processes (arrow 3). In addition, ICT has an effect on structural properties, which can be promoted and foreseen only to a certain extent (arrow 4). At the same time, the form and nature of organizational structure influence employees' actions (arrow 1), which in turn, has its effect on technology (arrow 2).

Brivot (2007) applies Rabardel's (1995) concept of "prescribed uses" and "actual uses" and distinguishes two dimensions describing the effects triggered by ICT use: procedural versus structural effects, and expected versus unexpected effects. Brivot's research study led her to the conclusion "that professional service firms' attempts to rationalize their operations may cause professionals to either hybridize their identity, adopting a personal blend of bureaucratic and professional values, or reinforce their traditional identity (Brivot, 2007, 42). In fact, this is the main trait of highly professional consultancy work researched in the case company.

It was made clear in previous chapters that KM technology provides excellent media for knowledge sharing and diffusion, which add up to the growth of creativity and innovation. The emergence of new ideas leads to improvements in work processes, activities and methods, the improvement of old products and services, as well as the development of new ones. Hence, ICT is not only an enabler of KM, but if effectively used, it can be a strong process and environment conveyor, as well as a value-adder.

7. Comprehensive approach to knowledge management

There is comprehensive evidence showing that knowledge systems repeatedly fall short in providing the expected benefits (e.g. Hickins, 1999; KPMG, 2000; van Greenen, 2005). Therefore, the aim of this thesis was to develop a comprehensive approach to building and implementing a KM system within a knowledge-intensive organization, such as a PS company. Since business variables can vary enormously, there is no universal KM system that could suit knowledge needs of all companies. Moreover, “companies gain competitive advantage not from the amount of knowledge they manage to gather, but from the quality of its use” (Wah, 1999, 316). Therefore, the quality of a KMS implemented in a company, is of a great significance. Thus, each KM system has to be tailor-made to match the specificity of each organization.

7.1. Comprehensive knowledge management model

In previous chapters, we have tried to analyze the context and elements influencing goals, structures, operations, processes and media of KM systems. Knowledge generation and diffusion have been described from economic, cognitive, organizational, behavioral, technological and social perspectives. KM processes have also been discussed. Moreover, it has become clear that organizations can benefit enormously from ICT media while planning and implementing their KM systems. The developed model presented in Figure 7.1 aims at combining all discussed variables to help to generate a holistic methodology for developing a KM system. Ultimately, the created KM system should be able to face the complexity of company’s business environment through incorporating all KM processes into the organization’s strategy, operations and activities. Simultaneously, special attention ought to be paid to the utilization of the facilitating and value-adding ICT means. Thus, a KM system comes to existence as a flexible network of interdependencies between elements generating business environment, knowledge sharing and KM processes, and ICT media, which contribute to the enhancement of the company performance.

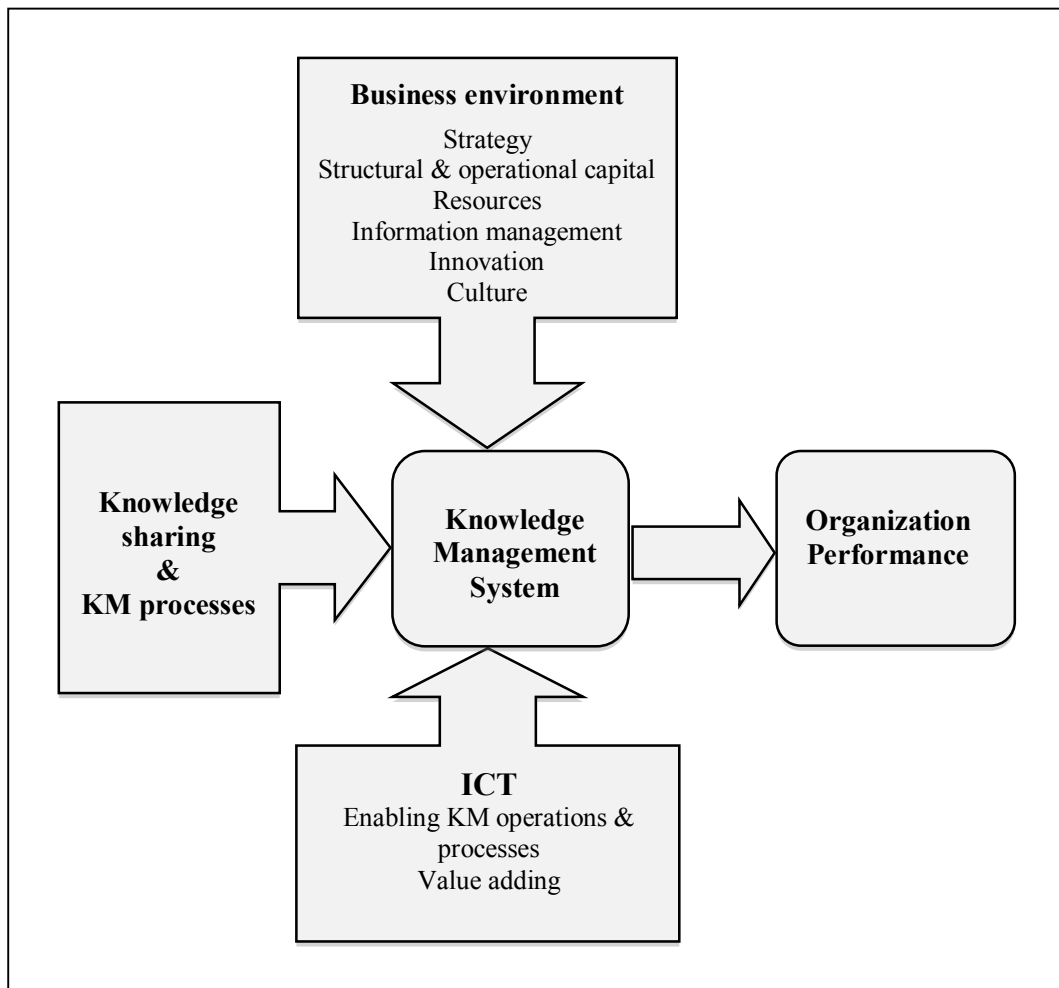


Figure 7.1: Comprehensive knowledge management model

However, in order to conduct empirical diagnostic and analytic research, we need to establish the key characteristic dimensions of the model elements fostering the success of a created KM system. The variables for this model have been developed on the basis of the research carried out by DeLone and McLean (2003), Jen-nex et al. (2008), as well as Taylor and Schellenberg (2008).

7.2. KM Success Model

DeLone and McLean (2003) have managed to single out several interrelated dimensions crucial for an IS (information system) success. Their extended DeLone and McLean's IS success model (D&M IS model), presented in Figure 7.2, which consists of three main dimensions: *system quality*, *knowledge quality* and *service*

quality, along with two other traits: *employees' intentions to use the system* and its perceived benefits, along with *user satisfaction* and *company net benefits*.

Before going into details with the dimension final formulation, it is important to stress that, in this thesis, DeLone and McLean's along with Jennex and Olfman's (2006) approaches are followed, according to which KMS *success* and *effectiveness* are synonymous terms.

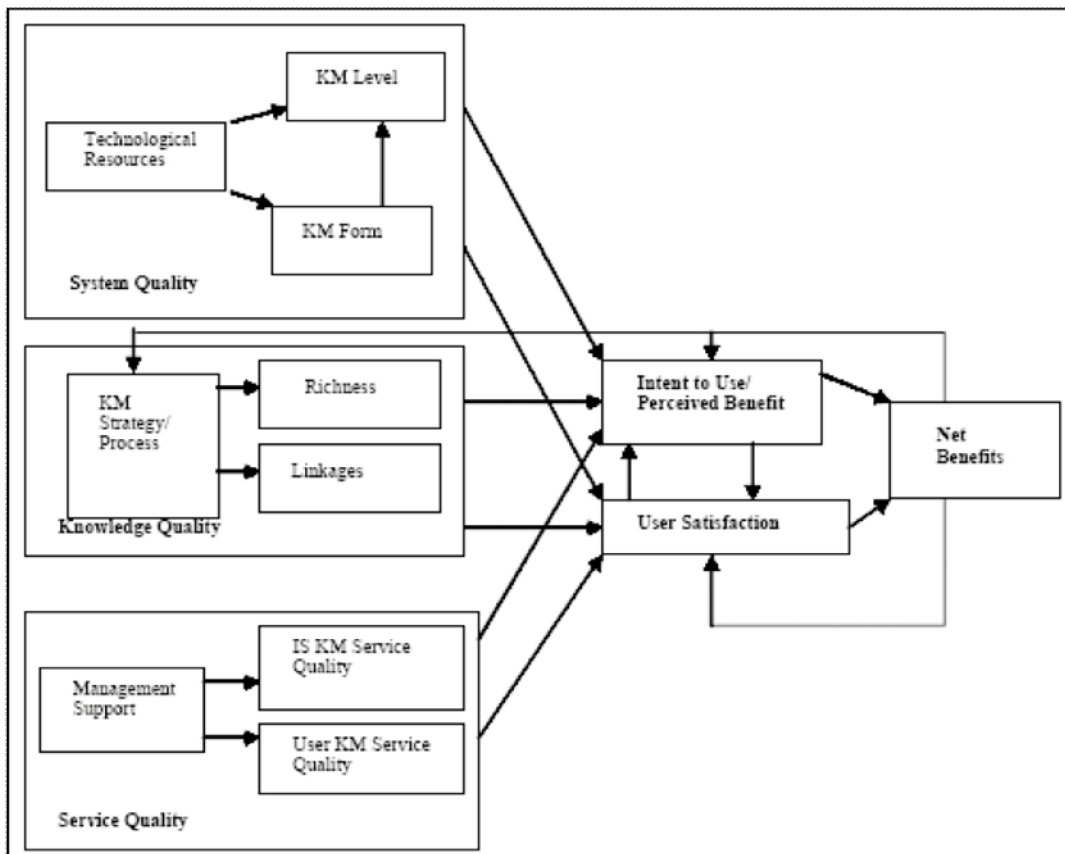


Figure 7.2: DeLone and McLean's extended success model (2003, 56)

The system quality, knowledge quality and service quality dimensions correspond with the three main areas of the comprehensive KMS model presented in Figure 7.1 and described in detail in chapters 4-6. **System quality** correlates with **ICT for KM** area discussed in chapter 6 of this work. In the D&M IS model, it represents company's technological resources correlated with KM level and KM form. According to Jennex and Olfman (2003), who further developed DeLone and McLean's (2003) ideas, technological resources formulate organization's potential

to develop, manage, and uphold KM. They consist of company's ICT KM infrastructure, along with the competence of its users and service personnel. Moreover, technological resources facilitate the two other dimensions: KM form and KM level. KM form corresponds with the extent of knowledge digitalization, as well as its standardization and integration with organizational routines and processes. KM level, on the other hand, refers to the capability to affect KM processes and functions (e.g. search, retrieval, usage etc.) and the quality of their implementation. All in all, the system quality provides means to effective facilitation of knowledge and, according to Wu and Wang (2006), has significant influence on user satisfaction and overall KM benefits.

The **knowledge quality** dimension correlates with the **knowledge sharing and KM processes area** of the comprehensive KMS model (elaborated on in chapter 5), and it "ensures that the right knowledge together with sufficient context is captured and available for the right users" (Jennex and Olfman, 2003, 57). It includes KM strategy and processes, knowledge richness, and knowledge linkages. In Jennex and Olfman's (2003) writings, KM strategy and processes aspect refers to the characterization of knowledge context, identification of knowledge user groups and their needs, recognizing critical knowledge for storage and reuse, and the planning of KM processes. The other element, knowledge richness, deals with knowledge accuracy and the lifecycle of the stored knowledge, along with its usefulness in relation with knowledge context and company's cultural context. The knowledge quality dimension is completed by linkages between knowledge components, such as topic maps and listings of know-how available and the sources of appropriate knowledge.

The results of Wu and Wang's (2006) research show, that the quality of the contents and outputs of the KMS play a central role in the success of a KMS. According to the scholars, the high quality of knowledge improves user's attitude towards the KMS and its expected benefits, which, in turn, motivates knowledge users to utilize and develop available expertise. At the same time, users' increased motivation, as well as their activity and participation in knowledge processes enhance the quality of the KMS at use.

The role that **KM environment** plays in the KMS model corresponds with the **service quality** dimension in the D&M IS model. KM environment characteristics were discussed in chapter 4 of this thesis. As stated by Jennex and Olfman (2003, 58), “the service quality dimension ensures that KM has adequate support in order for users to utilize KM effectively”. It is constituted of three sections: management support, user KM service quality, and IS KM service quality. Management support covers the guidelines for KM facilitation in an organization, and allegiance for providing sufficient and suitable resources to meet company’s knowledge needs. It is stressed that it is the job of the management to facilitate organizational culture enhancing learning processes, innovation, expertise development, and knowledge sharing (debated earlier in the thesis). User KM service quality relates to the support that the organization provides their employees to employ and profit from KM; such as training to use tools and utilize structures, networks, and KM processes. IS KM service quality, on the other hand, deals with backing delivered by IS organization to KMS users and to uphold KM. It stretches over building and nurturing KM infrastructure, tools and maps, sustaining updated, relevant and reliable knowledge base, as well as ensuring the security and accessibility of knowledge. (Jennex and Olfman, 2003)

Jennex and Olfman (2003) point up that users’ satisfaction with KM is a more relevant measure for KM success than the amount of KM use. The **level of user satisfaction** plays crucial role in the level of KM development and its correct performance. Satisfied users, who clearly recognize the advantage of active contribution to the KMS, proactively participate in its development and maintenance, look for solutions, communicate without getting involved in political games in the company, and get satisfaction from their work. All these processes generate financial profit for the company through better project outcomes, less delays and rework, customer satisfaction, and better prospects for future contracts. Wu and Wang (2006) also describe the interdependence between users’ satisfaction and a used KMS and employees’ motivation and willingness to utilize it.

Next dimension, the **intent to use/perceived benefit**, also measures users’ understanding of long- and short-term benefits that KM use provides, and employees’ willingness and activity in participating in the knowledge system. Also in this di-

mension, knowledge sharing and diffusion rise to the rank of the crucial condition. In addition, KM usage influences individual work performance, along with employee's decision-making productivity. Individuals' joint impact affects the performance of company sections, and the organization as a whole, which sums up into the net benefit of the KMS (Jennex and Olfman, 2003). Knowledge sharing dilemmas and preconditions related to users' satisfaction and the expectation of the perceived benefit were also discussed in more detail in chapter 5 of this work.

7.3. Research focus areas

In their research on measuring organizational readiness for KM, Taylor and Schellenberg (2008) applied very similar dimensions to the ones defined by DeLone and McLean (2003). Taylor and Schellenberg carried out a successful study in one of the largest global telecommunications companies. They managed to further define and contextualize DeLone and McLean's key success areas. Therefore, for the purpose of the empirical research at Company A, both approaches were combined and the following areas were focused at:

- extent of knowledge-friendly culture (service quality)
- knowledge/information quality, contextuality and infrastructure (system quality)
- relevancy of current sources of information and knowledge (knowledge quality)
- usefulness of knowledge-sharing methods at local and global levels (system and knowledge quality)
- users' satisfaction and perceived benefits from knowledge sharing
- most suitable methods to stimulate knowledge sharing (service quality, and intent to use)

The listed dimensions are interrelated and can be of varying nature. The study aims at analyzing and diagnosing the present state of KMS in the case company, as well as pointing out towards the development directions. The sociological, psychological, cognitive, and behavioral areas of organizational existence will need to be investigated. Therefore, the role of qualitative study allowing for more elaborate and extensive diagnostic analysis of the complex structures and processes

within a KMS will be in significant role in the empirical research. However, the qualitative study will be accompanied by a survey of quantitative nature, which will provide more in-depth information helping to single out the most problematic matters within the listed dimensions and aiding in prioritizing action points in accordance with their urgency.

8. Case study

The developed theoretical scheme of comprehensive KMS was put into practice and tested in empirical research at an IT-based PS company, Company A. This chapter will include:

- firm's presentation,
- introduction of the Global Services Unit, which was the focus of the research,
- explanation of the research methodology,
- description of the project stages and their outcomes, and finally
- results analysis and the KM development plan.

8.1. Company and business environment description

Company A was founded in 1980s and is headquartered in Espoo, Finland. The company provides highly functional ready-made software solutions for two key financial processes: Enterprise Purchase to Pay and Financial Management. In addition, Company A provides the customers with associated consultant and support services. Specifically, the company offers solutions for automating the customer's financial processes from the beginning till the end, from purchase management to electronic invoicing service, invoice automation and electronic archiving. Company A's Enterprise Purchase to Pay products focus on procurement and automated processing of purchase invoices, while their Financial Management products provide solutions for planning and reporting. (Company A 2008).

Today, with over 650 employees, the company holds a significant international position in the market of purchase-to-pay solutions, providing leading-edge software to automate financial processes for organizations around the world. The company's goal is to develop solutions that meet customers' needs and contribute to their business success. The company's very strong domestic market position (80%) serves as a solid foundation for their international operations. Over 1,200 organizations in the private and public sectors have chosen Company A to automate their financial processes, which stands for 650,000 users in over 50 countries around the world. The company uses an extensive network of Company A offices

and business partners to distribute and implement their solutions in Europe, the US, and Asia-Pacific. (Company A 2008)

According to 2008 Forrester Research, Company A has also strengthened its place among five largest ePurchasing vendors. The company's core competence is in easy-to-use financial process automation software, quick implementation and efficient support. Company A has been listed on Helsinki Stock Exchange since 2000 and more than 10 years in a row, the company was growing at average yearly rate around 40%. The growth slowed down in 2007 (22.2%) and 2008 (17.5%). The net sales development, operating profit and personnel figures are shown in Figure 8.1.

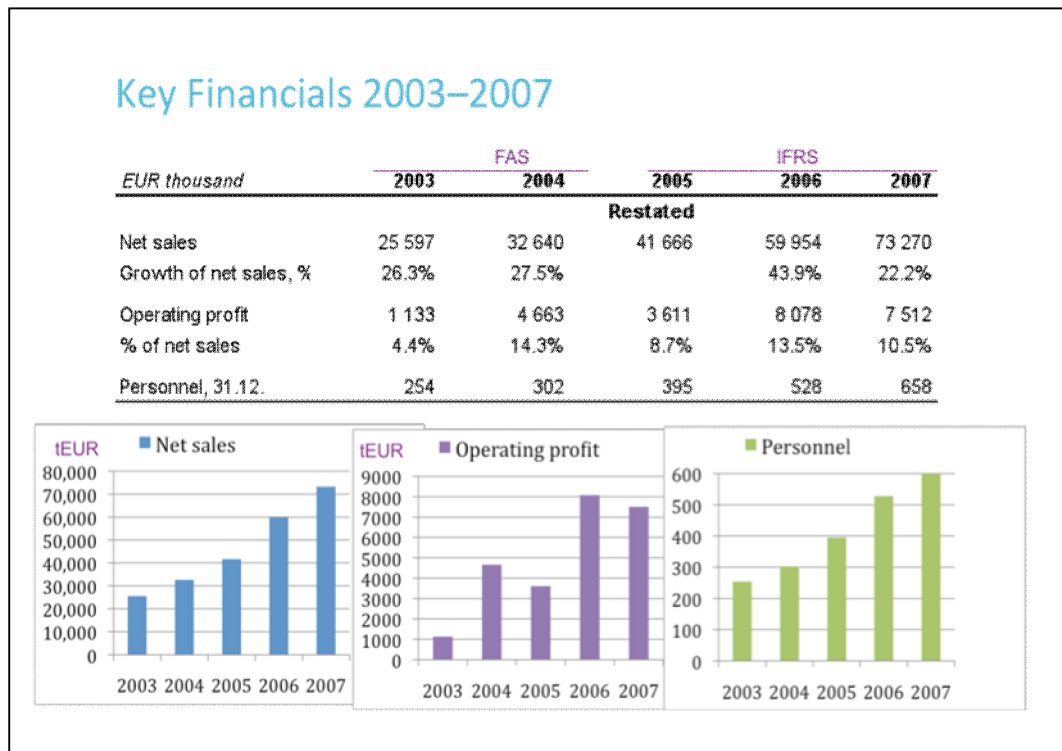


Figure 8.1: Company A key financial indicators 2003-2007

In 2008, Company A net sales were EUR 86 million [Figure 8.2], which was a growth of 17.5% in relation to 2007. 57.5% of the sales were generated in Finland and 42.5% through company's overseas operations. Company A's revenue shown in Figure 8.2 is generated mainly from consulting and services (39% in 2008), product sales (28%), as well as maintenance and support (27%). It is considerable

that consulting and services experienced the biggest growth of all in 2008 of 42.9%

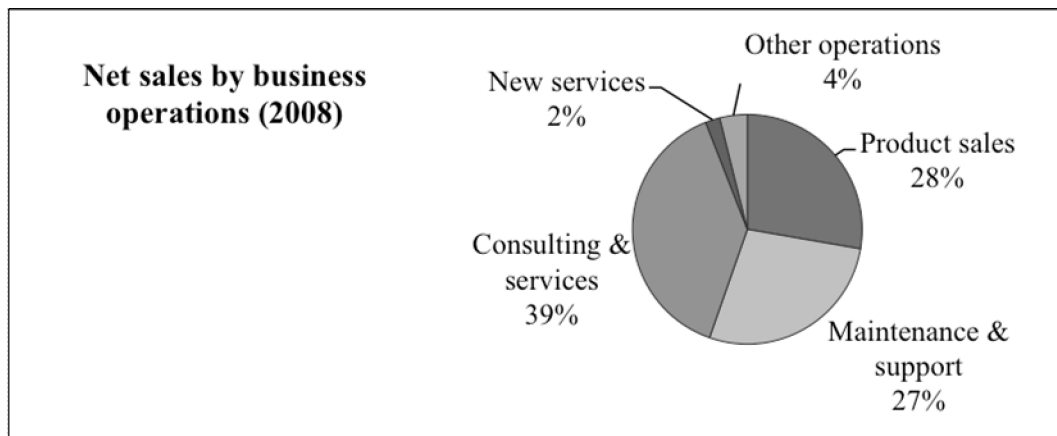


Figure 8.2: Company A sales by operation in 2008 (Company A website)

Company A's business environment and its future trends

Invoice automation and financial management software is still being very much in the development stage. Thus, even the definition of the market is under change. AP (accounts payable) Electronic Invoice Presentment and Processing (EIPP) market is growing very fast - 33% CAGR from 2003 to 2008 (Forrester Research 2008). As the market segment is very narrow and the companies providing services are highly specialized in their fields, the market leaders are rather small companies, such as Company A. Without a big player to set standards and to follow, the market leaders are left with the challenging task of determining the direction to take the industry in. There is, however, no certainty of the direction the industry might evolve into in the future. Certain trends, though, that are likely to materialize are already emerging.

Due to the industry's fast growth and fragmentation, strong consolidation processes are occurring, e.g. Company A has been acquiring its competitors to strengthen its position in the market. Moreover, cross-company co-operation and network marketing have become very important strategic elements in the industry, especially in the narrow market segment of the invoice automation. In order to be competitive and successful, companies, such as Company A, must design their software to be compatible with software platforms and to acquire certificates for

their software proving compatibility. This requires the development of co-operation with other, sometimes even competing companies. Small and medium size companies, including Company A, operating in a very niche market must also acquire certificates from their competitors like SAP, since the end customers usually require the software to operate in integration with their current ERP systems.

Apart from the processes of consolidation and cross-company co-operation within the software industry, customers evolve in their software deployment models towards new service models, such as BPO (Business Process Outsourcing) and other software delivery schemes hosted on premises, or perpetual license models. Similar development can be noticed in the invoice automation and financial management software industry, and within Company A.

Considering the industry's future development directions, the lack of standards is also one of the main factors increasing the software developers' uncertainty. For instance, there is a lack of technical standards for the format and transfer of the invoices in eInvoicing.

In addition to the mentioned trends, the ICT role is changing, as well. It is becoming more business-focused and it plays an important role of business support. Therefore, Company A products have to increasingly follow business rules, instead of being purely process-focused. Thus, the requirements of strengthening the corporate governance requirements, the implementation of the SEPA (Single Euro Payment Area), the IFRS and US GAAP consolidation have to find their reflection in the company products and their innovation.

All trends and developments mentioned above create a dynamic and complex business environment for the company and its employees. In these conditions, it is vital to stay alert and knowledgeable to be able to face the facing challenges. The fast organic growth of the company over the years has had an impact on Company A's operational and procedural systems, which have not evolved parallel to the business growth. Therefore, the corporation is experiencing growth problems. The company's activity is expertise-based and knowledge-centered; its main assets are in skills and the competency of employees. In addition, consolidation, cooperation

and networking processes within the industry, the increasing demand for service-based products, as well as the growing amount and complexity of knowledge required to succeed set progressively growing demands for employees and the organization at all levels.

Moreover, according to the results of the Forrester Research (2008) presenting the situation within the industry right now, Company A has managed to outperform its competitors in some areas during the last years. Thus, the pressure to keep the firm's current market position will grow. But it could require a reconstruction of the KMS within the company to help it facilitate future growth and keep the leading position. The described research aims at analyzing and diagnosing the present KM state at the company's international operations, and drawing up a KM enhancement plan, if necessary. However, before we start describing the research, we shall have a look at the company operational processes and the existing KM solutions and tools.

Operational processes

Following the basic principle of the comprehensive KM approach presented in the previous chapter, KM processes ought to be synchronized with organization's business and operational processes. Therefore, first, it is necessary to describe Company A's ways of working. There are three main operational processes the company works according to: *customer acquisition*, *customer life cycle*, and *product life cycle*. Customer acquisition process handles sales and marketing activities and involves mainly sales and marketing personnel. Customer life cycle process engages account managers, business and technical consultants, and customer service personnel, such as service managers. They take care of relationships with customers from the moment the agreement is about to be signed and make sure that a contract gets delivered as agreed. They also provide customers with other value-added services and tools. The product life cycle process follows the product making and development schema, and thus involves mainly technical personnel and consultants.

Personnel all over the world are involved in the described operational processes, accompanied by business partners in some countries. Finnish organization, along

with other Nordic countries' organizations is self-sufficient to a large extent. Units in many other countries, such as Germany, Spain, France, or Australia rely on their partner companies, especially Finnish organization. Nevertheless, the main KM principle is that all parties should be familiar with the way Company A works and have access to knowledge tools and bases.

Existing knowledge management solutions and tools

Company A is a typical software company with strongly computer-based KM solutions. It is natural, since digitized environment is a well familiar setup to the great majority of employees. Moreover, digitized tools enable smooth information flow across units, borders, and companies. There are numerous KM media at use at Company A at the moment:

Company A Academy is a new agent implemented in 2007 to familiarize new employees with the company and its operations quickly and profoundly. It is run four times a year and is meant for Company A and partners' new employees. Curricula for technical and business oriented candidates differ. Each program is a combination of self-study, online-study, face-to-face sessions, and on-the-job learning with mentoring. Participants are tested several times and mentors get also evaluated at the end of the training period by their protégées. The programs are well planned, but they require some harmonization of the recruitment processes within the global organization, which may be problematic at times.

Career development discussions between employees and their superiors take place twice a year. Their goal is to motivate personnel to master and extend their skills and competencies for company and employees' benefit. During these meetings, personal development plans and schedules are drawn and courses of action agreed on.

Other training (than Company A Academy), such as ICT application and system courses or business training, can be organized or paid for (partially or fully) by the organization. Line managers and the HR department are responsible for drawing up individual training plans and agreements with employees, which may stretch over longer periods of time.

Intranet is a widely used tool by all employees and partners' personnel. It consists of current news, information about company strategy, profile and organization, along with the knowledge concerning the company products and services. Company A's intranet is wide in range and multileveled, which requires some practice in learning to search for required information. It seems to be the best platform for the ICT KM system's tools.

Project management schemes differ between country organizations, which hinders smooth knowledge diffusion, especially knowledge transfer from country units to headquarters in Finland. As a result, there is no structured exchange of ideas and information between Finnish and other geographical locations, neither across local organizations. This means, that country-based subsidiaries and partners do not benefit the corporation as a whole with their know-how, such as cultural knowledge of different markets crucial in company expansion processes.

However, the customer life cycle process is unified for the whole corporation, which means that all subsidiaries and partners follow the same scheme and produce similar documents. As a result, cooperation in this area has been developing.

BMC Remedy² is a support application introduced four years ago to enhance communication between different offshore units (Tier 1) and technical support services (Tier 2) in Finland. The application consists of all incoming product support requests followed by detailed reports of conversations and solutions to problems. It is a useful source of knowledge helping to deal with emergent dilemmas either through involving the support personnel, or by searching through already solved questions in the database. In addition, the application can be used as a forum to suggest areas and subjects worth researching by employees working in different locations. Around 3000 cases are dealt with monthly through BMC Remedy.

Although the application is a very good tool enabling solving emergent problems efficiently, finding solutions to already solved dilemmas is complicated and time consuming. It requires surfing through the whole report, and both experience and

² BMC Remedy – commercial software developed by BMC Software providing IT with the Business Service Management (BSM) solutions

the knowledge of the system are needed. Therefore, to make better use of the knowledge stored in the databases of the application, a new knowledge base has been created.

Knowledge base has been taken to use recently in order to provide knowledge users with an extensive and easy to use bank of emerged problems with their solutions. If used more, the application would become an efficient tool for knowledge diffusion within the whole corporation. Therefore, during the research, possibilities of wider use of the Knowledge base were investigated.

8.2. Research scope: knowledge management in Global Services Unit

The scope of the research at Company A was a KM system at the Global Services Unit. The Global Services Unit is a part of company's Finnish operations, but it is strongly outward oriented. It is the bridge between production, sales and customer service functions. The company production operations are situated in Finland, while sales and customer service procedures are taken care of by different geographical units: Scandinavia, Finland, Europe, USA, and APAC countries, which consist of Company A subsidiaries and partners.

The Global Services unit is responsible for providing product support globally (e.g. using BMC Remedy), as well as knowledge generation, diffusion, and maintaining, both within Finland and overseas. It means that Global Services cooperate with production functions creating material on new products, product innovations and improvements, as well as in-company services for technical and business consultants, other customer service personnel, and the rest of the staff. Unit's personnel also organize and carry out training, along with testing product quality.

As the result of the gathering pace of the company growth process, carrying out of the unit's daily activities and operations has been becoming more and more complex and challenging. There is a feeling of resource and knowledge waste caused by the inefficiency in integration and coordination cross-unit operations. Knowledge flows from the Finnish organization through Global Services outwards to country units, but there is very little knowledge transfer from overseas and across different area organizations.

Continuously expanding product portfolio requires effective creation of new knowledge and information packages, and their efficient sharing. The specific nature of generated and shared knowledge makes it impossible to use services of other companies specializing in knowledge creation and training. Thus, knowledge generation and sharing has to be delivered mainly in-house, including employee training, training planning and development, along with training material creation. At present, these processes are not manageable if a major organizational change, such as a company acquisition, takes place. Thus, it calls for sufficient continuous investing into human resources and knowledge generation, which is a hard task for an organization with culture focused on production and sales efficiency, such as Company A.

The never stopping need for new knowledge requires also activity on the employees' side in constant learning, competence building, and knowledge diffusion on individual and group levels. Employees are expected to expand and deepen their knowledge and take care of their other work responsibilities at the same time. Consulting work especially requires the continuous use of updated high-quality interdisciplinary knowledge. The more complex are the tasks that an employee needs to perform, the bigger demand for information and cooperation with knowledge sources, as it is presented in Figure 8.3. Thus, personnel need to be motivated to participate in the KM processes for their own and company benefit.

There is one technical and one sales trainer at Global Services, whose main responsibilities are the development and implementation of training material and employee training schemes within the whole organization. Other employees, such as business managers, or product owners and developers also participate in the KM processes. Some of them are able to conduct training sessions if required. However, no special KM organization or network has been set up. Therefore, the secondary scope of the research were human and ICT resources in search of the hidden reserves that could be used for enhancing company knowledge sharing and increasing the efficiency of operations within Global Services and the offshore units.

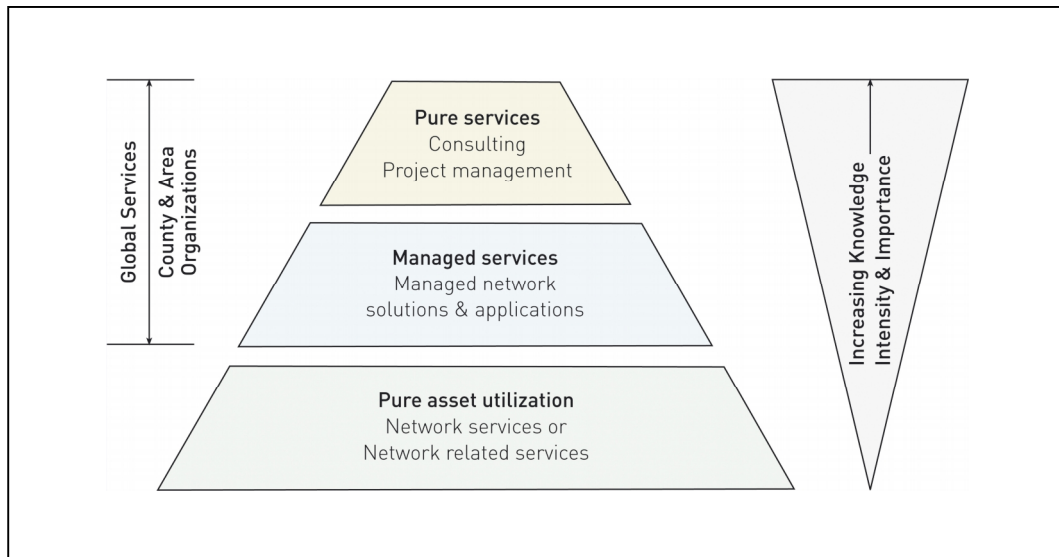


Figure 8.3: The role of knowledge in asset utilization and service-based models (Adapted from Taylor and Schellenberg, 2008, 342)

8.3. Case study methodology

There was one important condition put forward before the research started: the stress of the research was to be put on enhancing the efficiency, relevancy, and effectiveness of the *existing structures and tools*. It did not cause any constraints to the research methodology, since one of the main principles of the approach developed in this thesis earlier is the agility of the KMS with the organization's existing strategic and operational structures. So, the aim is at building the KMS within the existing business context by default. Therefore, the key KM success dimensions singled out in chapter 7:

- extent of knowledge-friendly culture
- knowledge/information quality, contextuality and infrastructure
- relevancy of current sources of information and knowledge
- usefulness of knowledge-sharing methods at local and global levels
- users' satisfaction and perceived benefits from knowledge sharing
- most suitable methods to stimulate knowledge sharing

were used to analyze and diagnose the current KM environment, processes and tools at the company, and to develop a plan for their enhancement.

The listed dimensions were investigated in a series of workshops and interviews with managers, along with surveys sent to 84 knowledge workers employed at the Global Services unit and area units operating in Finland and overseas. Employees

were asked to express their attitude towards the effectiveness of the current environment and practices, which measured the level of users' satisfaction with the current KMS. They were also inquired about their needs and expectations concerning knowledge sharing schemes. The data collected during discussions, workshops and interviews was mainly of qualitative nature, while the survey results were both of quantitative and qualitative nature. The data was analyzed and the KMS development plan was generated.

The case study methodology is introduced below in Figure 8.4.

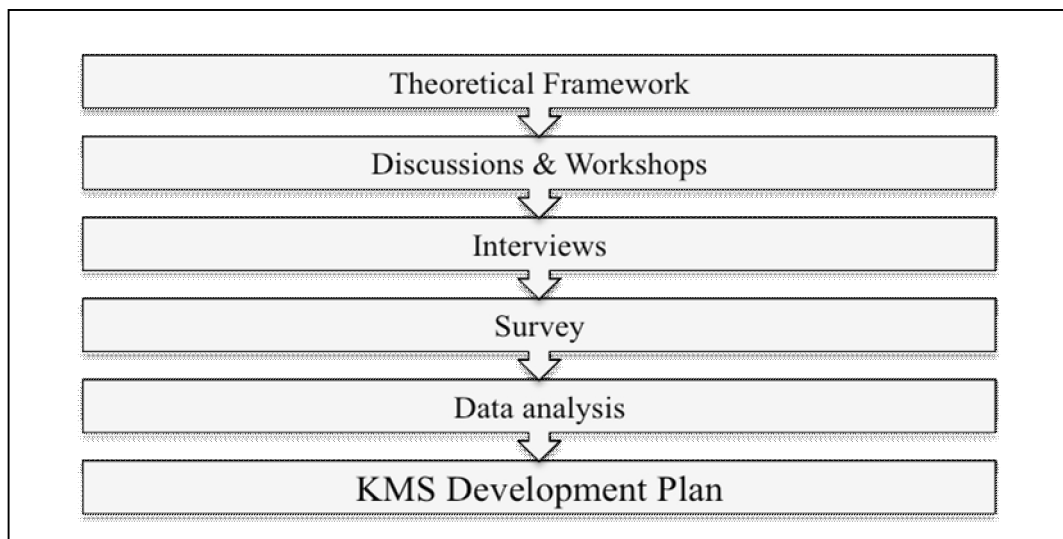


Figure 8.4: Case study methodology

8.4. Research stages

8.4.1. Knowledge management workshops

The empirical research started with a discussion with the Global Services unit manager and it concerned several matters: the Company A business and strategic characteristics, firm's operations (especially in the Global Services unit), and the company subsidiaries. It was followed by two workshops attended by eight key persons from the Global Services and the Finnish business units. The main goals of the discussions during the workshops were to:

- establish links between Company A's business strategy and KM strategy
- identify the main groups of knowledge users within the Global Services unit and the country/area organizations
- identify the critical knowledge needed by users
- analyze the required form and extent of KM processes within units

- probe the general feeling about the efficiency of present KM (IT, HR, and management support).

A list of the most urgent business challenges facing the company was created and a corresponding list of KM challenges, which are shown below:

Business challenges

- Consolidation processes
- Networking and cooperation
- Standardization processes (developed in-company)
- International sales processes
- International delivery processes
- Internal communication and channel management
- Increasing customer expectations and needs (project scale)

Knowledge challenges

- Business culture consolidation throughout whole corporation
- Knowledge adequacy, relevancy and timeliness
- Living with national cultural differences
- Reuse of project related data and information (non-centralized, no proper documentation library)
- Utilization of existing tacit knowledge
- Coordinating KM and operational ICT infrastructure
- Knowledge sharing responsibilities
- Operational inadequacies and bottlenecks

The main groups of knowledge users within the Global Services unit were also identified. They consist of consultants, customer service personnel (help desk), project and program managers, customers, sales personnel, local product managers, team leaders, and unit leaders; accompanied by product development experts working outside the unit together with employees from country and area units. The listed knowledge-workers have different responsibilities, perform varying activities, and work in different business environments. Thus, their knowledge needs vary significantly.

The company strategic goals, knowledge required for their successful completion, the knowledge sources, and finally KM tactics needed for the successful execution of the company business strategy were also identified and listed down. The outcome of discussion has been summed up in Table 8.1.

Information collected during the discussions was used to plan and execute the interviews and the survey in more detailed manner, relevant to Company A business and operational context.

Table 8.1: Workshop summary: Company A KM Strategic tactics based on the strategic Vision 2010: Breakthrough to Global Leader

Strategic goal	Type of knowledge required	Source of knowledge	KM Strategic tactics
1. Must-Win Battles for 2007 - 2010 2. Highly Competitive Products 3. Committed International Professionals 4. Operational Excellence	<ul style="list-style-type: none"> • Business intelligence • Competition intelligence • Forecasts of future trends • Company vision and strategy • Best practices • Lessons learned (from mistakes) • Program and project management formula • Project/program size and budget scaling • Product limits and performance characteristics • Processes and methods used in product development • Brand awareness within and outside company • Career and professional development possibilities at Company A • Cultural awareness (for international projects) 	<ul style="list-style-type: none"> • Business field analysis • Analyses of competitors' strategies, products and operational processes • Case examples • Customers • Consultants and other field workers • Employees from different units performing varying functions • Project planning, budgeting, implementation and outcome data analyses • Performance assessment sessions • In-company training • Training outside company • Human resources • Line and project managers • Customer feedback 	<ul style="list-style-type: none"> • Defining KM ownership and responsibilities throughout the company → crucial to take KM projects to the end • Gaining top and middle management support for developing and maintaining competence development and knowledge sharing practices to enable the development of the incentive system, working tools and clear KM principles and procedures • Increasing communication and cooperation <u>across</u> units throughout corporation (e.g. brainstorming/"round-table discussions", product development sessions, international project cooperation) • Recruiting knowledgeable, eager to learn and develop, and cooperative individuals • Practicing long-term KM planning • Enhancing transparency in communication • Facilitating existing tools and applications to create and maintain extensive and flexible knowledge database (projects, reports, solutions etc.) • Incorporating KM tools into application management → automatic data collection tools inbuilt in Company A products • Standardizing program/project management processes and tools throughout company (program/project template + documentation templates) • Incorporating KM processes into company operational processes and practices → knowledge channels (mapping) • Propagating the role and benefits of competence development and knowledge sharing among employees • Developing follow-up practices to learn from mistakes (lessons learnt) and successes (best practices) • Modifying present performance evaluation practices and providing transparent multi-dimensional assessment methods (quantitative and qualitative) • Learning from other players in the industry

8.4.2. Interviews

The aim of the interviews was to contribute to a deeper understanding of the current relations between the organization (the Global Service unit and country organizations) KM and its business environment. Therefore, the discussed subjects correlated with the three main areas influencing the generation and success of the KMS: KM environment, knowledge sharing, and ICT KM infrastructure. The asked questions dealt with the employees' understanding of the company business model, KM role and knowledge sharing within Company A's business context, the management's role, the functionality of ICT tools, employees' readiness to contribute to KM, as well as the knowledge-sharing situation within and between different units.

All interviewees were asked to elaborate on ten questions. Their comments are summarized in this section.

Question 1: *What is the level of Company A business model clarity within your country/area organization?*

Company A's business strategy and model have been communicated well lately, and it has become relatively clear throughout the organization. However, understanding and knowledge concerning other functions', as well as area and country organizations' operations and roles are rather poor throughout the whole organization.

Thus, the clear understanding of the business strategy and business model is restricted mainly to local and area operations.

Question 2: *What is the role of KM at Company A?*

The general feeling is that knowledge plays crucial role both in global and local operations. It has even been pointed up that it is the firm's main asset and the key to succeed and preserve company's market position. Everyone underlines that company's operations are entirely dependent on the knowledge about firm's IT solutions, their implementation and use, as well as customers' expectations and requirements. It is also recognized that knowledge quality and quantity correlate with easier work and better performance. Everyone stresses the importance of best prac-

tices, knowledge building, upgrading and sharing both within and across country and area units.

However, it is also acknowledged that the role of KM is not what it should be. The important role of KM is not reflected in the company strategy, or in everyday operational activities. It is not communicated throughout the company. It has been often stressed that there's no real knowledge *ownership*, which hinders conscious knowledge use and its embodiment into company's business environment. As a result, knowledge and good initiatives are continuously wasted, because of the inequality in the development and innovation network.

As a result, the level of knowledge utilization varies a lot. It depends on individual interests, personal features, interest and employee activity. Its main form is the face-to-face exchange of comments and information within a unit and with customers. But all in all, employees' understanding of KM is very basic and there is not enough proactive behavior aiming at knowledge creation and utilization.

Question 3: *What is top management's role in KM creation and implementation?*

According to the interlocutors, the top management plays a crucial role in KM as:

- creator of a KM strategy and a framework for efficient KM
- enabler and creator of possibilities for innovation and development initiatives
- supporter and facilitator of local ideas
- KM resource provider
- coordinator of KM processes
- KM ownership facilitator within the company.

Moreover, the management is responsible for:

- setting KM as the top strategic and operational priority within the company
- communicating the importance of KM throughout the company
- staying committed to KMS embodiment within the organization
- setting up a motivation and incentive system encouraging knowledge creation, implementation and sharing

- showing good example by sharing basic knowledge concerning company strategy, events, changes etc.
- creating the spirit of knowledge-centered culture helping to incorporate KM principles into everyday behavior throughout units.

Question 4: *Do you have a KM strategy in your country/area organization? What is it?*

In the majority of country and area units, there is no conscious KM strategy and no real KM structures. However, in all units, there have been initiatives aiming at increasing their local knowledge level and efficiency by:

- standardizing operations and processes (e.g. starting with process analysis and separate preliminary scoping)
- integrating knowledge into and within local knowledge bases to be used locally by the whole organization (e.g. standard templates)
- increasing cooperation with sales employees to make estimations and product implementations more efficient and useful for customers
- enhancing knowledge utilization through appointing employees to the roles and tasks they do best (skill management, resource leveling)
- coordinating knowledge activities
- initiating cooperation with other country units
- cooperating with customers to maximize their benefits from the use of the company products (e.g. starting with analyzing customers' needs before signing a contract, customer care)
- exchanging knowledge within BASE-M expert groups

All in all though, KM has no common strategy and plan. Actions are taken ad hoc and reactively, when the necessity to act occurs. Therefore, all interviewees expressed their concern with the lack of clear KM strategy consolidating knowledge and information utilization within the company.

Question 5: *What is the influence of the knowledge-intensive character of the services that you provide to your clients on your business and knowledge strategies?*

The knowledge-intensiveness of company products and services has the biggest influence on organization's everyday operations. The portfolio growth and bigger customers make it necessary to build better knowledge base and knowledge system, which could be used by employees and customers. Experience has shown that numerous learning and knowledge-centered actions have to be included in daily actions and responsibilities, such as:

- cooperation with customers starting already at the scoping phase (stress on customer education aiming at maximal utilization of products and good customer satisfaction)
- product testing within different environments
- staff formal regular education and information sharing (e.g. Company A Academy, solution upgrading training, formal group and unit meetings)
- employee informal education and knowledge sharing (e.g. meetings, discussions, participation in interest and function groups)
- employee self-learning
- on-the-job training (e.g. products, implementation, procedures, application limitations, mentoring)

However, due to the lack of clear and unified KM policy, there is not enough focus put on competence and knowledge building in developing company operational efficiency when building and delivering new solutions to customers. It has also been expressed that information and knowledge delivered both to customers and employees is insufficient. Almost everyone guessed that this situation is caused by the cost-centre and delivery focused incentive system.

Moreover, a strong need for single shared tools, forums and channels has been expressed, which would facilitate better communication, as well as information generation, maintaining and exchange within the corporation.

There have also been very critical voices saying that the knowledge-intensive character of Company A products and services has no influence on employees' daily operations. Thus, experience and knowledge gained is not accumulated and re-used. Likewise, information concerning customers, their needs and requirements,

is not used to develop and optimize company products, operations and services at all.

Question 6: *What is the state of knowledge sharing within your area/country organization? And what would be your expectations?*

Although there is no shared culture of regular knowledge sharing, no common network of channels (only workspace), no integrated knowledge base, and no shared knowledge concept and its role, there is clearly interest and eagerness among employees to exchange information and knowledge. It is imposed by work demands and problems that arise in everyday work situations. Consultants recognize the necessity of using expert knowledge in different fields and areas, which forces them to cooperate with employees working in marketing, support, sales, R&D etc.

If a unit is small enough, communication is based on personal contacts and is smooth. Then meetings with experts, workshops, informal conversations etc. take place on daily basis on ad hoc principle. The more people you know, the better is your chance to receive information and assistance you need. However, when a unit size increases, effective and efficient communication across functions becomes more and more difficult, and according to several interlocutors, almost impossible.

All interviewees stressed that getting the best of the organizational knowledge is not happening. KM activity is very much dependent on employees' cultural background and personal traits (interests, activity, and motivation). Information and knowledge exchange is not streamlined, consciously planned, and optimized.

Question 7: *What is the state of knowledge sharing between different area and country organizations? And what would be your expectations?*

During the interviews, it became obvious that the employees' comfort zone is within their country business units. There is very little cooperation and exchange of experiences between country organizations. If it is practiced, it is always reactive and based on personal connections. Best practice sharing, the analyses of les-

sons learned, the exchange of ideas and information about customers' and products and markets are very rare.

Formal training provided by the Company A Academy is considered very good and useful in all country and area units. Also training anticipating releases of new products is found relevant and very useful. However, according to the interviewees, formal training is not able to provide for occurring knowledge needs in field-work, since it only covers products' technical features and possibilities, and formal structures and operations. Company A products can be implemented and used to solve varying customers' problems in different environments, which requires a lot of interdisciplinary knowledge from consultants. However, according to interviewees' opinion, this aspect of consultants' work is not taken into consideration and supported enough.

According to the interlocutors, even the information available on the intranet cannot always be trusted, since it repeatedly happens to be outdated. Even company trainers cannot always get manuals, which are up-to-date (one comment: "How can we train our customers, if we are unable to educate ourselves?"). Moreover, looking for information is time consuming and it is not well looked upon due to the incentive principles within the organization. In addition, stored knowledge is very fragmented, which does not allow for thorough studies and understanding increasingly resulting in mediocre solution delivery.

Cooperation with the headquarters is not considered easy either. Time and resource shortage within the headquarters causes unwillingness to spend time answering questions and solving remote problems. Therefore "better not ask and try to solve everything yourself"-mentality has been developing in many subsidiaries. Unfortunately, this atmosphere also discourages subsidiary employees to share their innovative ideas with the headquarters.

Improved knowledge sharing across units would help to solve knowledge inefficiency problems to a great extent.

Question 8: *Is your staff ready and willing to participate in information generation and sharing within the whole organization? If not, what might be the reasons for such attitude?*

Consultants are, in general, eager to cooperate with other organizational units and share their experiences if given opportunity. According to the interviewees, for many experienced consultants, mentoring is a privilege.

However, employees expect it to work on a give-and-take principle. A trigger and motivation to act, and a shared knowledge-oriented spirit are needed. The typical comment was: “The willingness is there, assuming that tools and systems are easy to use. In addition, there should be value in the effort of doing it”.

Question 9: *Can existing tools and processes at your use facilitate effective and easy knowledge/information generation and exchange? If not, what suggestions would you have for their improvements?*

All interlocutors agreed that there are some tools at Company A that are designed to provide information (e.g. Sharepoint, intranet, BaseM), however they are not always considered very useful. Although company operational processes have been defined, KM processes and tools have not been integrated with them. They also do not provide a framework for defined and efficient KM. Many interviewees find tool inefficiency and inaccuracy a major managerial problem.

The interlocutors pointed to several matters necessary to be taken into consideration in a tool development plan:

- Tools should allow for operational integration and interoperability between functions and across borders
- Standardized tools, processes and procedures are required globally to make knowledge use and knowledge sharing more efficient (e.g. shared project management tools, standardized methodology for studying and developing product usage, limitations, recommendations etc., standard documentation procedures and templates, a diagnostic tool/system helping to analyze customers’ financial environment and finding the best implementation solutions for Company A application etc.)

- Tools should allow for dynamic communication and knowledge exchange (e.g. forums) on daily basis.
- Tools should not only be improved and consolidated, but their use and KM procedures need to be taught properly.

Question 10: *Do you anticipate cultural change within the company towards more knowledge-oriented approach? If so, what changes would you suggest?*

The interlocutors presented many ideas, which are summarized below:

- More attention should be paid to KM at the company as such.
- Top management's commitment to KM should be increased and more attention ought to be paid to the importance of knowledge sharing and developing a knowledge-based system and tools. KM should not be considered a cost, but investment and a vital asset.
- Employees' awareness of interrelations between different functions and knowledge they collect and the company operations should be increased to understand KM short- and long-term benefits. It would facilitate the desired change in attitude among employees and activate their contribution to KM.
- Resource utilization throughout the company needs to be leveraged.
- A global and harmonized knowledge base needs to be created. Local knowledge should be synchronized globally and utilized throughout the corporation.
- It is essential to include all functions, fieldworkers and customers into product development through project follow-up and feedback procedures.
- It is important to analyze and map information-flow processes.
- Setting up use and competence groups within the company and facilitating them with knowledge sharing tools, procedures and practices is crucial.
- There has to be room for reflection on completed projects in processes allowing for learning from lessons learnt and best practices.
- More stress on knowledge-based skills is needed. More employees facilitating and developing KMS are necessary, which should involve employing people with different knowledge backgrounds (knowledge professionals, customer service professionals etc.)

- More knowledge-centered assessment and remuneration principles ought to be developed and implemented.

Several interesting additional comments are cited below:

“We need to get our act together, define and develop clear and unified streamlined processes for KM - how it should be supported by tools and systems. Content does exist, but people need to contribute more to knowledge creation.”

“If we want to continue to grow and be more competitive, proper KM attitude is needed. One continuously ongoing program is needed.”

“What we sell is expertise and experience. If KM isn't a part of our culture, we'll be just an application provider. KM should be taken more seriously. Clients look for best practices, value and recommendations – they expect expertise (not technical instructions). Market leaders should be able to solve customers' problems and provide expertise. Change should stress knowledge functionality. There's enough of technical knowledge around.”

“Business culture at Company A is OK, but not good enough. The strategy and KM should take into consideration customer satisfaction more. KM needs to be integrated into the strategy much more. What customers expect is:

- a bug-free tool
- consultants knowing what to do and how to facilitate Company A products (at both technical and business level)
- consultants speaking customers' language
- service-minded Company A staff
- professional approach
- responses in due time and fluent cooperation.

There are times when we're unable to deliver this because of time pressure, too much work, and knowledge overload. Thus, there's the problem of time restrictions, pressure to deliver, there're not enough KM tools (except from BaseM). We'd need better tools and environment to exchange knowledge within the organization.”

8.4.3. Survey

The survey was sent to 84 knowledge workers employed at Global Services and company's overseas units. There were 58 respondents (69%), of which the biggest group stated people working for the Central Europe and UK (35 respondents), Finland (12), Scandinavia (10), and the USA (1) units. The respondents work in consulting, or consulting-related functions: product/global support, enterprise sales, local consulting, and local customer support.

The survey focused on the research main dimensions: the extent of knowledge-friendly culture within the company, knowledge/information quality, contextuality and infrastructure, the relevancy of current sources of information and knowledge, usefulness of knowledge-sharing methods at local and global levels, users' satisfaction and perceived benefits from knowledge sharing, as well as the most suitable methods to stimulate knowledge sharing.

Extent of knowledge-friendly culture

According to the received answers, employees have relatively good access to crucial information. However, for a consulting company with knowledge-effectiveness being the key to operational success, the average ought to be at least 4. Employee readiness to advice colleagues on various matters and their responsiveness are at relatively good starting levels, too. These aspects of employee behavior should automatically get enhanced with the advances in the KMS. Employee positive attitude to knowledge generation and sharing promises good results for the making of open knowledge communication.

However, special attention ought to be paid to the bolded statements in the table. They clearly show that there are several underdeveloped areas clearly hindering knowledge and information generating and sharing, such as:

- best practice utilization
- time allocation for creative thinking
- habitual knowledge recording and sharing
- learning from failures and errors, as well as
- the existence of informal networks.

Statements describing the characteristics of the knowledge-friendly culture and the received replies are presented in the Table 8.2. Please note that the scale used was the following: 1= strongly disagree, 5 = strongly agree.

KNOWLEDGE-FRIENDLY CULTURE

	1	2	3	4	5	Average
We have unrestricted access to crucial information	1.7 % 1	24.1 % 14	25.9 % 15	44.8 % 26	3.4 % 2	3.2
All employees are ready and willing to give advice or help on request to anyone else in the organization	1.7 % 1	13.8 % 8	20.7 % 12	53. % 31	10.3 % 6	3.6
Looking for best practices or work that can be re-used is a natural standard practice	5.2 % 3	27.6 % 16	29.3 % 17	31 % 18	6.9 % 4	3.1
Time is allowed for creative thinking (as opposed to firefighting)	6.9 % 4	39.7 % 23	25.9 % 15	20.7 % 12	6.9 % 4	2.8
People are responsive (e.g. emails and voice mail get answered in a timely manner)	1.7 % 1	8.6 % 5	50 % 29	34.5 % 20	5.2 % 3	3.3
Recording and sharing knowledge is routine and second nature	10.3 % 6	36.2 % 21	36.2 % 21	15.5 % 9	1.7 % 1	2.6
A climate of openness and trust dominates in the organization	1.7 % 1	12.1 % 7	31 % 18	43.1 % 25	12.1 % 7	3.5
Time and attention is spent on learning from failures and errors	8.6 % 5	29.3 % 17	39.7 % 23	20.7 % 12	1.7 % 1	2.8
Informal networks across different parts of the organization are encouraged	8.6 % 5	19 % 11	37.9 % 22	25.9 % 15	8.6 % 5	3.1
Employees take responsibility for their own learning	0 % 0	6.9 % 4	25.9 % 15	56.9 % 33	10.3 % 6	3.7
Average	4.7 % 27	21.7 % 126	32.2 % 187	34.7 % 201	6.7 % 39	3.2

Table 8.2: Survey results: knowledge-friendly culture (bolded rows require special attention)

Information/knowledge contextuality and infrastructure

The respondents recognize ICT infrastructure as the main source of information and knowledge used in everyday operations, as well as the key to information and knowledge sharing. However, as can be seen from the results below (bolded rows), the quality and transparency of the system stays behind the required level. The results show that

- knowledge and information sources are not well integrated
- available tools and systems do not sufficiently facilitate document creation
- knowledge storing and reuse do not reach a sufficient level, and in addition
- available information is not updated on regular basis.

It is alarming that the average value for both rapid access to necessary information, as well as the clarity and unambiguity of the knowledge classification and indexing is only 2.6/5, which is much under value required from a knowledge- and expertise-based company.

The detailed information on the responses concerning information and knowledge quality, contextuality and infrastructure are presented in Table 8.3. Please note that the scale used was the following: 1= strongly disagree, 5 = strongly agree.

INFORMATION/KNOWLEDGE QUALITY, CONTEXTUALITY and INFRASTRUCTURE (intranet, extranet, and AR system)

	1	2	3	4	5	Average
Our IT infrastructure (intranet, extranet, and AR system) is an excellent source of information and knowledge	5.3 % 3	7 % 4	54.4 % 31	28.1 % 16	5.3 % 3	3.2
IT systems are the key enabler of efficient knowledge/information sharing	3.5 % 2	5.3 % 3	28.1 % 16	36.8 % 21	26.3 % 15	3.8
Our IT systems provide ease of access to information	3.5 % 2	19.3 % 11	49.1 % 28	26.3 % 15	1.8 % 1	3.0
Our IT knowledge/information sources and tools are well integrated	7 % 4	26.3 % 15	45.6 % 26	17.5 % 10	3.5 % 2	2.8
We get updated information from our IT systems	7 % 4	17.5 % 10	49.1 % 28	24.6 % 14	1.8 % 1	3.0
We can rapidly find necessary information on our IT systems	12.3 % 7	31.6 % 18	38.6 % 22	15.8 % 9	1.8 % 1	2.6
We can trust the information in our IT systems	5.3 % 3	12.3 % 7	36.8 % 21	38.6 % 22	7 % 4	3.3
IT tools and systems make it easy for us to create documents, which can be reused in the organization	10.5 % 6	22.8 % 13	36.8 % 21	24.6 % 14	5.3 % 3	2.9
Our IT systems provide knowledge and information helpful to my work	1.8 % 1	8.8 % 5	56.1 % 32	28.1 % 16	5.3 % 3	3.3
Knowledge/information classification and indexing is clear and unambiguous	14 % 8	29.8 % 17	38.6 % 22	17.5 % 10	0 % 0	2.6
Average	7 % 40	18.1 % 103	43.3 % 247	25.8 % 147	5.8 % 33	3.1

Table 8.3: Survey results: information/knowledge quality, contextuality and infrastructure

Usefulness and efficiency of knowledge-sharing methods at global and local levels

The assessment of local and global knowledge sharing level within the company [Table 8.4] escalates around average 3.0/5. A distinct difference between the level of local and global knowledge sharing can be noticed. It shows clearly that knowledge distribution is based on cooperation within units. This is an apparent indicator that knowledge and information sharing is encouraged and being improved lo-

cally (app. 3.6/5). However, the global state of knowledge distribution needs enhancement.

The area that requires immediate attention is the remuneration and appraisal principles and system for employee participation in knowledge generation and sharing. Motivational tools are undoubtedly insufficient both at the global (2.6/5) and local (3.0/5) levels.

Please note that the scale used was the following: 1= strongly disagree, 5 = strongly agree.

SHARING GLOBAL and LOCAL KNOWLEDGE

	1	2	3	4	5	Average
Global sharing of knowledge/information within the company is improving	1.7 % 1	15.5 % 9	43.1 % 25	36.2 % 21	3.4 % 2	3.2
Global sharing of knowledge and information is proactively encouraged	3.4 % 2	24.1 % 14	37.9 % 22	32.8 % 19	1.7 % 1	3.1
Individuals are appraised on how they share knowledge and information globally	15.8 % 9	31.6 % 18	35.1 % 20	15.8 % 9	1.8 % 1	2.6
Individuals are appraised on how they share knowledge and information locally	8.8 % 5	22.8 % 13	31.6 % 18	28.1 % 16	8.8 % 5	3.1
Local sharing of knowledge/information is improving	1.8 % 1	7 % 4	35.1 % 20	40.4 % 23	15.8 % 9	3.6
Local sharing of knowledge and information is proactively encouraged	1.8 % 1	14 % 8	26.3 % 15	40.4 % 23	17.5 % 10	3.6
We use the same tools and IT systems (e.g. project management documentation templates) locally and globally	7 % 4	12.3 % 7	36.8 % 21	38.6 % 22	5.3 % 3	3.2
Average	5.7 % 23	18.2 % 73	35.2 % 141	33.2 % 133	7.7 % 31	3.2

Table 8.4: Survey results: usefulness and efficiency of knowledge-sharing methods at global and local levels

Users' satisfaction and perceived benefits from knowledge sharing

The results of the survey in the area of users' satisfaction and perceived benefits [Table 8.5] are not very satisfying. The average total is below the average (2.9/5). The reasons of this limited user satisfaction can be found in the inefficiency of the available information to:

- meet employees' needs on daily basis
- help them to acquire new knowledge and develop innovative ideas
- store the acquired knowledge.

Employees are not rewarded for their contribution to innovation and information and knowledge diffusion. In addition, the existing KM tools and procedures do not have noticeable positive effect on employees' task completion competence and the quality of their work.

Please note that the scale used was the following: 1= strongly disagree, 5 = strongly agree.

USER SATISFACTION and PERCEIVED BENEFITS

	1	2	3	4	5	Average
Information available in our IT tools and systems meet my needs entirely	3.4 % 2	37.9 % 22	37.9 % 22	20.7 % 12	0 % 0	2.8
Knowledge IT tools and systems help me to acquire new knowledge and innovative ideas	5.2 % 3	34.5 % 20	37.9 % 22	22.4 % 13	0 % 0	2.8
Knowledge IT tools and systems help me to store knowledge that we need	3.4 % 2	29.3 % 17	39.7 % 23	25.9 % 15	1.7 % 1	2.9
Knowledge IT tools and systems enable me to accomplish tasks more effectively	3.4 % 2	22.4 % 13	43.1 % 25	29.3 % 17	1.7 % 1	3.3
Knowledge IT tools and systems improve the quality of my work life	3.4 % 2	20.7 % 12	48.3 % 28	25.9 % 15	1.7 % 1	3.0
Average	3.8 % 11	29 % 84	41.4 % 120	24.8 % 72	1 % 3	2.9

Table 8.5: Survey results: users' satisfaction and perceived benefits

Importance and relevancy of information and knowledge

In their answers concerning the importance and relevancy of sources of information and knowledge presented in detail in Table 8.6, respondents stressed the key role of learning-by-doing (4.3/5) and self-study (4.0/5). This outcome corresponds with the consultancy-based interdisciplinary work of the employees, who participated in the survey. Their work requires continuous competence development to cater for arising problems and needs. This trait of consultancy-based work is clearly recognized by the personnel.

It has also become apparent that employees' local sources within their own (4.0/5), or other departments (3.4/5) are most often turned to for information collection and knowledge generation. In addition, the usefulness of professional Service Practices (3.5/5), as well as knowledge generated by company organizations in other countries (3.0/5), has been recognized.

Therefore, two main conclusions can be drawn from this section of the survey:

1. It is crucial to develop a hands-on approach within the KMS allowing for extensive on-the-job learning and self-study practices.
2. The local environment ought to be well developed and equipped with tools, processes and practices serving KM enhancement.

Please note that the scale used was the following: 1= not at all, 5 = crucial.

HOW IMPORTANT AND RELEVANT TO YOUR WORK ARE THE FOLLOWING KNOWLEDGE/INFORMATION SOURCES

	1	2	3	4	5	Average
Local sources within other departments	5.2 % 3	24.1 % 14	15.5 % 9	31 % 18	24.1 % 14	3.4
Company organizations in other countries	10.3 % 6	24.1 % 14	20.7 % 12	37.9 % 22	6.9 % 4	3.1
Local sources within own departments	3.4 % 2	6.9 % 4	12.1 % 7	43.1 % 25	34.5 % 20	4.0
Professional Service Practices	3.6 % 2	9.1 % 5	36.4 % 20	34.5 % 19	16.4 % 9	3.5
Learning by doing	1.7 % 1	0 % 0	17.2 % 10	32.8 % 19	48.3 % 28	4.3
Self-study on own initiative	1.7 % 1	3.4 % 2	15.5 % 9	50 % 29	29.3 % 17	4.0
Average	4.3 % 15	11.3 % 39	19.4 % 67	38.3 % 132	26.7 % 92	3.7

Table 8.6: Survey results: importance and relevancy of current sources of information and knowledge

Sustainability of methods and tools for knowledge sharing practices

The average value given for the suitability of methods and tools for knowledge sharing practices was 3.5/5, which suggests that all listed methods are found valuable in knowledge diffusion [Table 8.7]. However, face-to-face communication is appreciated most (4.3/5). This outcome backs Eddy et al. (2005) hypothesis of the importance of interpersonal knowledge exchange. In consulting-based work environment, this fact carries special meaning. It seems that more team-based practices need to be developed to balance solitary and independent consulting work and provide room for discussion about emerging problems, challenges, and solutions.

Email is also highly appreciated, followed by manuals and printed information, in-company mentoring and learning-by-doing schemas, in-company formal training, phone and conference calls, as well as on-line-collaboration, AR system, intranet database, and extranet. In IT-intensive company, like Company A, there

is a natural need to incorporate the KMS into the ICT infrastructure. Thus, the most effective and efficient approach to KMS tool and method development should be an IT-based infrastructure combined with compatible face-to-face communication possibilities.

Please note that the scale used was the following: 1= not at all, 5 = crucial.

HOW USEFUL ARE THE FOLLOWING METHODS FOR KNOWLEDGE/INFORMATION SHARING

	1	2	3	4	5	Average
Extranet	8.8 % 5	15.8 % 9	35.1 % 20	26.3 % 15	14 % 8	3.2
Phone and conference calls	3.4 % 2	15.5 % 9	29.3 % 17	39.7 % 23	12.1 % 7	3.4
Intranet data base	5.2 % 3	25.9 % 15	27.6 % 16	29.3 % 17	12.1 % 7	3.7
Email	1.8 % 1	1.8 % 1	22.8 % 13	40.4 % 23	33.3 % 19	4.0
Face-to-face communication	0 % 0	3.4 % 2	15.5 % 9	31 % 18	50 % 29	4.3
Manuals and printed information	1.7 % 1	6.9 % 4	25.9 % 15	44.8 % 26	20.7 % 12	3.8
AR system	5.2 % 3	20.7 % 12	31 % 18	34.5 % 20	8.6 % 5	3.2
On-line collaboration within competence groups (e.g. consultant community)	3.5 % 2	21.1 % 12	22.8 % 13	40.4 % 23	12.3 % 7	3.4
Other forms of on-line collaboration	5.3 % 3	17.5 % 10	38.6 % 22	26.3 % 15	12.3 % 7	3.2
In-company formal training	1.7 % 1	12.1 % 7	31 % 18	37.9 % 22	17.2 % 10	3.6
In-company mentoring and learning-by-doing schemas	5.2 % 3	5.2 % 3	32.8 % 19	27.6 % 16	29.3 % 17	3.7
Average	3.8 % 24	13.2 % 84	28.4 % 180	34.4 % 218	20.2 % 128	3.5

Table 8.7: Survey results: Suitability of methods and tools to stimulate knowledge sharing

Open questions

The respondents were also asked a number of open questions corresponding with the main focus areas.

1. *How would you modify company culture to increase its knowledge-friendliness?*
2. *What work tasks and activities company ICT knowledge and information systems do not support, and should?*

3. *What are, in your opinion, the biggest obstacles to knowledge and information sharing between Company A headquarters and company local organizations?*
4. *What other information/knowledge sharing methods would you introduce into the organization?*

The majority of the voiced ideas went hand-in-hand with the comments of the interviewees and workshop participants. The answers contained numerous hints of knowledge sharing obstacles, underdeveloped areas, and suggestions of their enhancement. Respondents were eagerly anticipating in the research, which showed their genuine interest in the process of improving knowledge sharing, KMS development, and stressed the urgency of these matters. The detailed answers can be found in Appendix 2.

8.5. Research diagnosis: main knowledge management problems at Company A

Having analyzed the research results in the context of the theoretical discussion of this thesis, we can list down the main KM problems and challenges the case company is facing. Following the research theoretical framework, dimensions and methodology, several KM environmental/cultural, CIT and knowledge-sharing process challenges can be distinguished. It has to be taken into consideration, though, that these areas are interrelated and the presented challenges stretch beyond the mentioned areas and influence each other.

However, **the primary problem in the present Company A KM system is the lack of KM concept and strategy.**

Environmental challenges

A visible lack of unified company culture promoting learning and knowledge diffusion can be noticed. There seems to be insufficient conscious effort to try to coordinate individual and group mental models, interests, experiences and knowledge. This atmosphere does not encourage creativity and innovation, which are crucial for the company existence and growth.

Structural and procedural problems are visible as well. The network of strategic connections exists mainly on administrative and functional levels. However, it

does not expand over resources. There is *no real KM ownership*, accountability and clarity of responsibilities for developing and maintaining the system. As a result, resources are wasted, competitive tendencies occur; the risk of miscalculations and misunderstandings grows, which influences the quality of company products and services and affects relationships among employees and with customers.

Although employees see clearly the need for knowledge sharing, there is still ever present skepticism towards the management's commitment to build knowledge-culture within the organization. As a result, the *insufficient level of trust* between different organizational levels and functions has had negative influence on the state of informal communication, network density and change readiness. Finland-focused R&D and knowledge creation procedures do not help to enhance the atmosphere of trust and partnership. It seems that unified team-spirit corporation culture has never been encouraged within the company. Even the motivation and remuneration system is mainly based on individual performance. Therefore, employees do not consider themselves as community members, but rather task executors. It does not encourage active participation in developing company common activities and operations.

Another serious problem slowing down knowledge generation processes is the *powerful individualistic performance culture*, which is enforced by firm's incentive and remuneration system. The delivery-based bonus system aims at enhancing consultants' motivation and activity to grow their own and company's income, and it has apparently worked well so far. However, there is a serious downside to it. This culture works against knowledge sharing, since, within the existing frame, employees mainly expect to receive the knowledge they need, not to create or share it. The remuneration principles create social barriers (discussed in chapter 5.1) giving rise to the consumptive attitude towards knowledge and encouraging free-riding. As a result, information and knowledge valuable for R&D functions, peer consultants, other units etc. do not circulate within the organization. Unfortunately, it is obstructive and ineffective in a long run both for the employees and the organization. Succeeding in strongly interdisciplinary environment requires cooperation, team-work, active exchange of information and experiences in order

to have one's finger on the pulse to be able to respond quickly and accurately to the challenges in the business environment, and deal with ever-present uncertainty and ambiguity.

However, the main cultural problem seems to be *the lack of belief and commitment to KM among the top management*. Therefore, there is no integrated KM system, KM schemes and their benefits do not receive enough attention, they are not implemented to the end, the importance of the knowledge-friendly culture is not communicated, and cooperation on a big scale is not encouraged and enabled.

Problems with ICT infrastructure, tools and content

A considerable amount of complaints concerning *information quality* is disturbing. Inadequate and irrelevant information and knowledge lowers the quality of work environment considerably by hindering cooperation between groups and individuals, slowing down work and lowering its efficiency.

Fragmentary KM ICT infrastructure, not allowing for fluent coordination of tools and knowledge and their cross-operability, is also a big obstacle for knowledge sharing. In addition, existing KM ICT operations are not properly harmonized with business operational infrastructure. Therefore, open and fluent communication and cooperation within the company is obstructed, content creation, sharing and retrieving knowledge gets handicapped, and employees' commitment and interest in knowledge diffusion weakened.

There is *deficiency in proper database and search tools* restricting quick access to necessary information, and the clarity and unambiguity of the knowledge classification and indexing systems. Thus, consultants spend a lot of time inefficiently searching for adequate information, which should be automatically provided. They are also often forced to try to find solutions to problems, which have already been solved before. As a result, resources are wasted only on coping with emerging daily problems, and there is very little room for development and innovative work. In addition, employees do not see sense in creating knowledge, which will be wasted due to the inefficiency of the system.

Employees working in consulting services *lack immediate and open communication media* with co-employees, e.g. online forums, which would speedup problem

solving and facilitate working in dynamic environment. Moreover, this kind of communication mode has strong psychological role for consultants working mainly solitary at clients' premises. It offers a possibility of receiving second-opinions, hints, and comments, which does not only accelerate the process of decision making, but also enhances the quality of the service provided by Company A. The usage of open communication media also increases the amount of personal contacts between individuals, and boosts the team spirit, which also facilitate cooperation and knowledge exchange.

Another serious technology problem is the *insufficient standardization of knowledge sharing formats, processes, and procedures*. It obstructs the integration of knowledge and information sources across functions and area/country units, and handicaps all KM processes.

Process-generated problems

The outcome of the research shows that *no comprehensive KM system* has ever been developed in the company, although separate schemes of information and knowledge processing exist. Diagnostic actions aiming at analyzing different knowledge processes and their importance to the company business operations are rare. It has resulted in fragmented ad hoc attitude towards knowledge generation, as well as undeveloped and incompatible KM processes. Therefore, all former attempts and worked up schemes (such as Company A Academy or numerous ICT tools) have been left halfway and cannot be benefitted from properly.

In general, insufficient attention is paid to competence and knowledge leverage throughout the company hindering its operational efficiency and flexibility. As a result, *the company competency structure does not meet the requirements set up by the company strategy* of growth, development, and serving big customers in the future. There are knowledge areas "owned" by a few employees, which causes occurring operational stiffness, slowdowns and bottlenecks, increase costs and the risk of knowledge loss if a key expert moves on to another organization. Moreover, different skills and competencies are unevenly distributed through the organization and the company work culture is inconsistent, which lowers the outcome of company performance.

The lack of flexibility is, among others, caused by *inadequate coordination of different forms of learning and training* with the company needs. The Company A Academy meets the training needs on formal and basic level; however, it does not provide tools and means for developing expertise knowledge, which is essential in challenging consultancy work. Deeper familiarity with the company product portfolio, as well as its complex multi-dimensional implementation environment requires work-related learning schemes and tools, which are not provided for right now.

All in all, we cannot talk about a process-based knowledge system integrated into the business strategy and operations. There are numerous separate knowledge initiatives, which do not meet the needs of the demanding business environment the company operates in. Moreover, inadequate reuse of accumulated data, information and knowledge (project-, product-, customer- and process-related) is most probably going to slow down the further growth of the company.

8.6. Knowledge management system development plan at Company A

The main reason for the inconsistency and inefficiency in knowledge utilization at Company A is that the knowledge concept and the KMS concept have never been developed and communicated. The same goes for the KM strategy. Therefore, before moving on to discussing the KM development plan, it is essential to discuss these key concepts.

8.6.1. Company knowledge and knowledge management concepts

Knowledge as the key resource

As it became clear during the research, operational processes at Company A are based on intangible, mainly human, resources to a great extent. The Company A products are the outcome of multi-function contribution and a wide-range of interdisciplinary knowledge.

It can be seen from the Figure 8.5 that Company A production schemes require the command of financial business processes, knowledge of business, markets and competitors, engineering and programming competence, good knowledge of the company, its strategy and operational site, specific knowledge of the Company A

product portfolio, together with managerial, marketing, ICT and consulting skills. When all different knowledge areas are summed up, it can be seen that knowledge is the key resource, the raw material Company A products are made of.

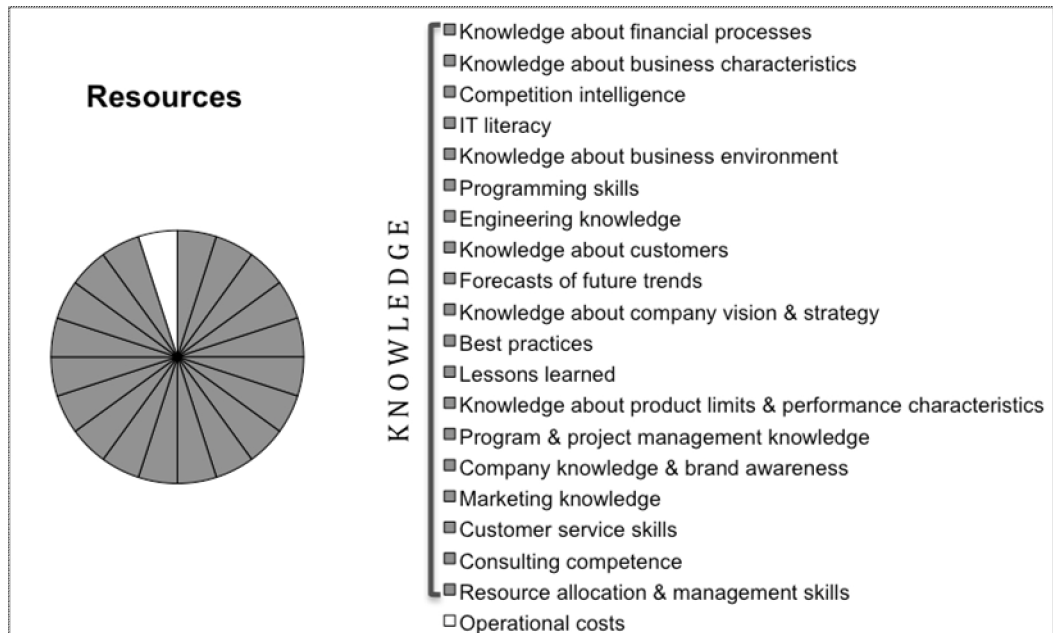


Figure 8.5: Resources required to develop Company A product portfolio

Knowledge management and value chain management

Thus, knowledge is material that is being shaped, developed, advertised, sold, shared and learned, maintained, and mastered in the company delivery and value chain operations. Therefore, like in any other production site, the misuse of raw material and resources causes delays, rework, customer dissatisfaction, misunderstandings, mistakes, inaccuracy, and the necessity to repeat standard operations.

Unnecessary problems and costs in the value chain can be effectively reduced by aligning material (knowledge) usage with functional and operational processes, which results in improved coherent functional interoperability and the optimization of knowledge utilization in the whole corporation. Thus, in fact, at Company A, a knowledge-intensive company, knowledge and information management equals the organization's value chain management as drawn in Figure 8.6.

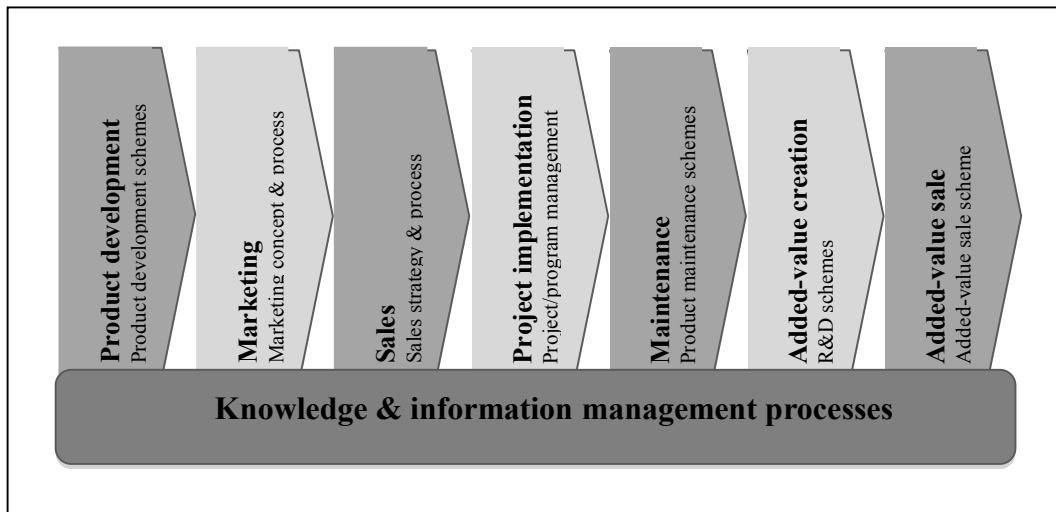


Figure 8.6: Knowledge Management equaling value chain management

Consulting competence and its sources

Knowledge plays the same crucial role in any consulting function. The consulting knowledge competence scope presented in Figure 8.7 is a combination of general skills and domain knowledge, combined with representational, decision-making, strategic and meta-conceptual skills (discussed earlier). They all constitute consulting expertise of Company A employees.

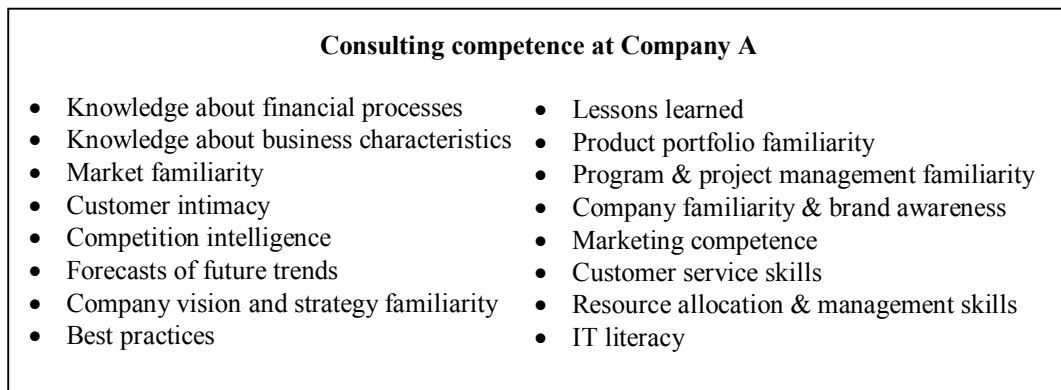


Figure 8.7: Company A consulting knowledge competence scope

The wide scope of knowledge and skills is required to perform consulting activities. Thus, it is a necessity for knowledge workers to update their competence on regular basis. The specificity of Company A products also sets additional challenges for the company knowledge generation and sharing. In addition, KM op-

erational field is demanding due to the numerous sources and modes of knowledge acquisition, presented in Figure 8.8 below.

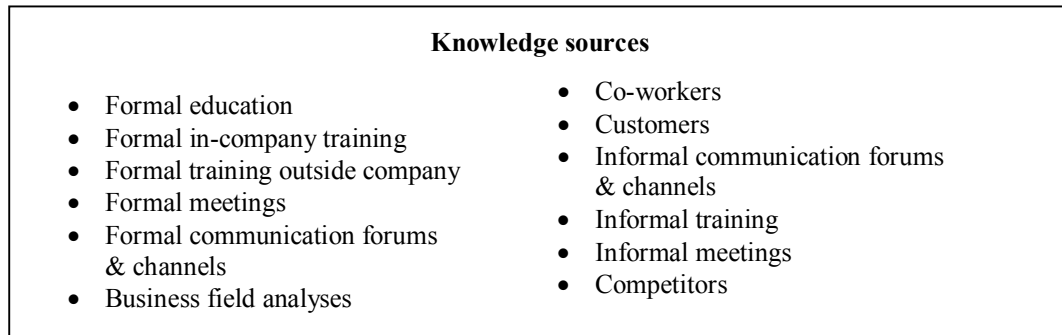


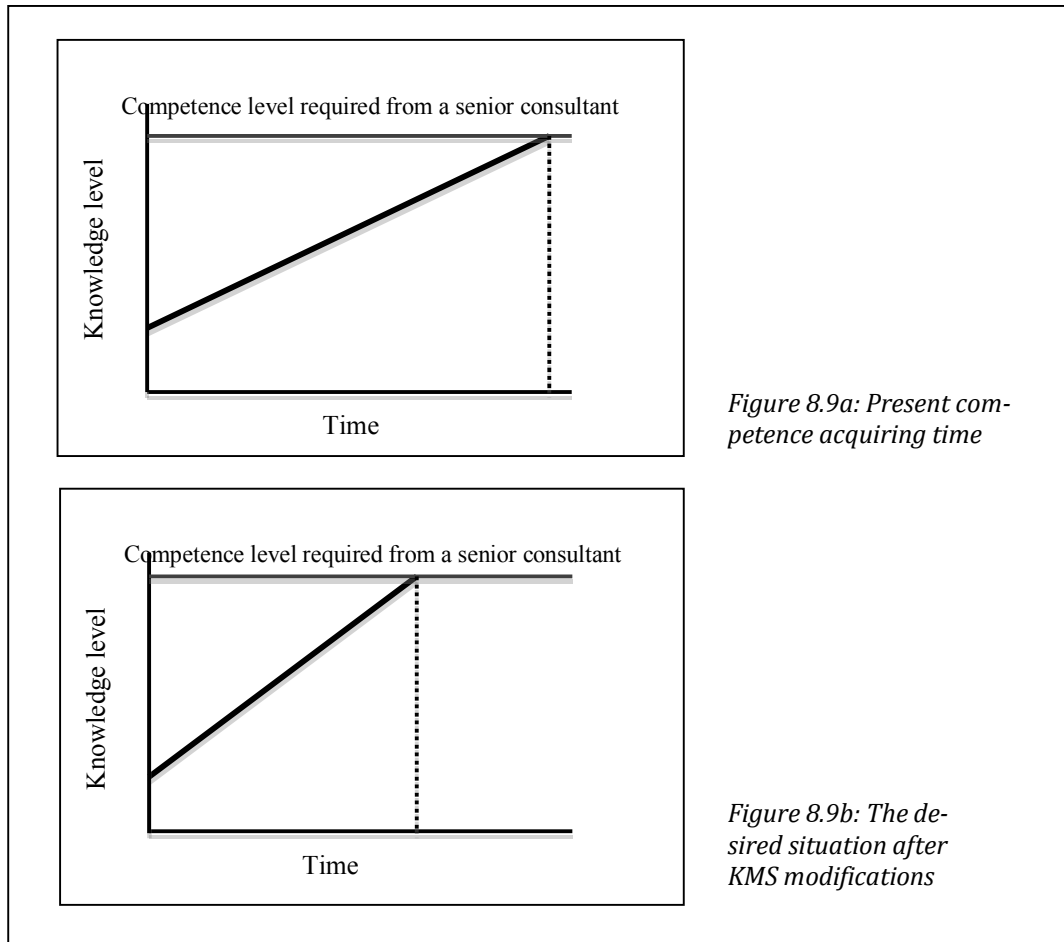
Figure 8.8: Knowledge sources of consulting competence

While planning and developing KM processes, all mentioned sources ought to be taken into consideration to create a versatile learning environment meeting managerial, employees' and customers' needs equally. Moreover, it has to be understood, that there is no possibility for knowledge workers' to acquire and utilize the required complex competence without dynamic networking and cooperation across functions, units, and well developed customer intimacy.

The insufficient level of networking and cooperation in the area of knowledge acquisition, creation and diffusion has a significant influence on the expertise structure between knowledge workers at Company A. The majority of employees are experts in their specific fields providing services in-house and to customers at request. This mode of knowledge distribution causes bottlenecks in organization's operations, which was a great concern of all workshop participants. In addition, it does not facilitate swift learning and expertise building [Figure 8.9a], which is needed to meet the requirements of the market.

Therefore, to meet future challenges and be able to serve bigger organizations, knowledge diffusion ought to be intensified, the expertise scope on individual level widened, and the competence acquisition time shortened [Figure 8.9b].

A bigger number of consultants with multidisciplinary knowledge at reasonable level and expertise scattered across units would make the major difference to the company operational flexibility and creativity.



8.6.2. Company A knowledge management strategy

Taking into consideration company business strategy, together with all matters, comments and ideas, which emerged during discussions, interviews and in the survey, we suggest the following goal for the Company A KM Strategy:

Create a corporate KMS enabling the company to succeed in the execution of the business strategy through incorporating knowledge diffusion processes and tools into company integrated operational processes and tools.

Since Company A is strongly IT-based, the codification suits very well as its main KM policy. Thus, the main media for the policy implementation would be ICT. However, the strong need for face-to-face communication and knowledge-sharing schemes (e.g. on-the-job learning, job-rotation) shows clearly that the personification strategy ought to play a strong supportive role.³

³ Codification and personification strategies (introduced earlier) are presented in Appendix 1.

8.6.3. Action points for knowledge management system development

To meet the goals of the suggested strategy, the following KM development plan is recommended:

1. Create and propagate the concepts of knowledge, KM, and their role to

- Communicate the understanding of their role for the company operations and future.
- Gain top and middle management support for developing and maintaining competence development and knowledge sharing practices to enable the enhancement of the incentive system, working tools and clear KM principles and procedures.
- Improve the understanding of the role and benefits of competence development and knowledge sharing among employees.

2. Set up KM organization

- Define KM ownership and responsibilities throughout the company to enable complete implementation and control over KM processes.
- Practice long-term KM planning.
- Set up use and competence groups and facilitate them with knowledge sharing tools and procedures.

3. Incorporate knowledge sharing processes into company operational processes, practices and tools

- Analyze and map information-flow processes within business operations and create knowledge channels for them.
- Standardize program/project management processes and tools throughout the company.
- Develop follow-up practices to learn from mistakes (lessons learnt) and successes (best practices).
- Incorporate KM tools into application management (e.g. an automatic data collection tools inbuilt in Company A products).
- Set up a diagnostic tool, or system, helping to analyze customers' financial environment in search for the best implementation of Company A products.

4. Increase open dynamic communication and cooperation throughout the whole corporation to keep employees informed.

- Create motivation, practices and tools for teamwork facilitation.
- Set up an online discussion forum, newsletter and other communication channels.
- Organize brainstorming and "round-table discussions", interdisciplinary product development sessions, and international project cooperation schemes.
- Include customers and fieldworkers into product development processes.

5. Improve functionality of the company ICT infrastructure:

- Facilitate and master the existing tools and applications: AR, BaseM, Sharepoint, and other intranet media.
- Create and maintain extensive and global knowledge database including:
 - project library
 - report library
 - solutions database
 - customer database
 - resource database.
- Introduce standard documentation procedures and templates.
- Create a possibility to access intranet through extranet.

6. Develop Human Resource processes.

- Develop and take into proper use the existing resource management tool.
- Implement and use dynamic communication tools and procedures.
- Put into practice on-the-job and self-learning schemes (better utilization of mentoring and tutoring systems).
- Develop and implement standardized methodology for studying and developing product use, limitations, recommendations, etc.
- Recruit knowledgeable, eager to learn and cooperative individuals as well as KM professionals.
- Organize training in tool use and facilitation.

7. Set up more knowledge-centered assessment and remuneration principles and procedures.

- Create a bonus/incentive system based on the level of voluntary contribution to knowledge creation and sharing.
- Set up a system for submitting development ideas and suggestions combined with incentives.

8.7. Why to invest in knowledge management system development right now

Company A has experienced strong physical growth for over twenty years, which has been partly organic and partly acquisition-based. Unfortunately, it has not gone hand-in-hand with the development of the company organizational maturity. Therefore, the company KM culture, processes, operations and tools are inconsistent and fragmented. It is the outcome of the aggressive disruptive business behavior of a market challenger that Company A has been until now. Thanks to this strategy, the company has managed to gain a considerable revenue growth form one year to another, physical expansion, and has extended its operations across boundaries and oceans.

However, *the company's market position has changed* greatly. It has gained the leader's place within one niche market. Since the intensive growth and gaining the upper hand over the niche market have been the strategic priorities for years, organizational consistency suffered causing its fragmentation, which is a natural result of such strategy. However, with the change of the market position and the boost of firm's reputation, the cost of possible mismanagement will be considerably higher than before. At the same time knowledge (the main resource) management processes have not been able to follow the company physical growth and has become a potential threat hindering the firm's further development and threatening its market position in the future.

Although there are many areas needing immediate attention and enhancement, numerous positive traits are visible in the company, which forecast the success of the development scheme. There is a visible *need for the optimization of opera-*

tional processes within the organization. Problems and operational bottlenecks caused by inaccurate information processing cause *frustration among knowledge-workers*, which gets reflected in their *interest in KM issues* and readiness to participate in KM development.

Though there are traits of knowledge consumerism and free-riding, in general, *employees are ready to both receive and share knowledge*. Eager cooperation can be clearly seen at the local level.

There is already *a vast, strong and unique competence base* at hand within the organization. However, it needs channels to facilitate its diffusion. This existing knowledge is accompanied by *numerous already created KM schemes*, such as Company A Academy, training schemes, local practices and standards, Base M, Sharepoint and other applications, intranet data storage places, etc. With mastering and proper coordination, they can be utilized appropriately.

It is worth noticing that developing a working KMS does *not* require *investing in tangible assets*. The existing ICT infrastructure and resources can be utilized in the KM development process to a great extent. What is most needed, is the participation of knowledge makers and users. The present global slow-down in economy will certainly affect Company A's customers and cause company operational deceleration. The temporarily freed resources can be effectively used in the KM development program.

Finally, it has to be pointed out that investing in KMS development at this point would considerably aid company's inner consolidation and equip the organization with strong basis for times after the recession.

8.8. Benefits of the knowledge management system development at Company A

As it was discussed in the thesis before, the exponential growth of knowledge assets has holistic influence on company culture and operations. Thus, the proposed actions aiming at developing, optimizing, and rationalizing KM at Company A will bring both short- and long-term benefits not only to the Global Services unit, but the whole corporation. The main profits are listed below:

- Rational, optimal and efficient use of company resources allowing for time and cost savings, along with increase in operational efficiency and accuracy.
- Leveraging knowledge utilization throughout the organization to free additional resources to have time for innovation and be able to improve Company A service level and scale.
- The improvement of Company A service quality reducing the amount and costs of knowledge misuse, increasing customer satisfaction, boosting company image and significantly improving the company after-sale perspectives.
- The enhancement of employees' competence and expertise strengthening their professionalism, intensifying work motivation and satisfaction, which translate into better performance quality and commitment to the company.
- The development of unified corporate culture and the enhancement of employee commitment reducing organizational frictions, and simultaneously smoothing and energizing cooperation across units and borders.
- Quicker and more effective reaction to changes in company business environment making adjustment to novelties a natural trait of working life and an interesting challenge.
- Keeping critical and unique knowledge in-house, allowing for strengthening the Company A leading position and growing the distance to the market challengers and competitors.
- Securing future resources by improving the quality of present knowledge-workers, quick and effective competence growth of future employees, and employee loyalty and commitment to the organization.

In addition, the developed KMS will set up a sound and flexible structured basis for the controlled growth of the company. It should also help to deal with uncertainty, ambiguity, and equivocally of the knowledge-based economy that Company A operates in. All in all, it would have a considerable effect on the enhancement of company competitiveness and profitability for a long time.

9. Conclusions

The purpose of the research was to find out how to develop a comprehensive and coherent knowledge management system (KMS) in an information technology-based professional services firm. The objective of the thesis was met, as a holistic approach to knowledge, knowledge management (KM), and its development was created and implemented in the empirical research conducted through a case study at a Finnish professional services firm.

In order to develop an all-inclusive approach to the subject, several theories and methods of approaching KM, organizational studies, as well as learning and knowledge diffusion were investigated and included in the research. Three main KM areas: KM environment, knowledge sharing and KM processes, as well as an information and communication technology (ICT) infrastructure were described and analyzed in detail. The study resulted in drawing up the comprehensive KM model aligned with the company business strategy and operations.

The research proved that it is possible to approach KM holistically, and it also provided tools for KM development. It showed that KM is as complex as organization and its environment, since it is aligned with all company's business areas, operations, processes, and resources. Therefore, it is necessary to examine the whole organization with its strategic and operational areas, in order to study and develop KM meaningfully and effectively. It is especially true for modern professional services firms, which produce, develop, and trade information and knowledge. The fact that KM cannot be treated fragmentarily is probably its biggest challenge.

It was also claimed and demonstrated that knowledge is the most crucial asset of professional services (PS) companies. It could be further claimed that knowledge is the key resource for any modern company; however it would require more research. Since efficient KM is the key to success for strongly knowledge-intensive PS companies, it is mandatory to approach knowledge as any other company resource, regardless of its intangible nature. This approach was put into practice and tested in the research project at Company A.

The case research exposed also the generic nature of KM strategy and backed up the claim that KM strategy has to evolve directly from company business strategy. It was also proved that KMS can not be successfully developed without clear concepts of knowledge and KM, as well as KM strategy deriving from the specific context the enterprise operates in. Furthermore, the development and success of the KM system are directly contingent upon the level of commitment to the program among the top management, since it involves a complex process of developing the knowledge-friendly culture and knowledge-sharing facilitating environment throughout the whole organization.

Moreover, the research showed that, for an IT-based PS organization, developing a working KMS does not necessarily require investing in tangible assets. Since the most important tangible enabler of knowledge diffusion is ICT infrastructure, a company can utilize its existing resources to a great extent. However, it requires the participation of knowledge makers and users in the process of developing the KMS, its implementation and maintenance. The company might also need to employ KM professionals to help to analyze processes across functions, units, roles, and countries to optimize them to the best benefit of the company and its customers.

It has also become apparent that it is not enough to develop KM processes and operations, and provide tools to create a KMS. The fact that employees are familiar with the ICT environment does not guarantee their mechanical acceptance and commitment to the new system. When new is introduced and learnt, old has to be modified and unlearnt. It happens both on operational and cognitive, as well as individual and group levels. Therefore, every KM undertaking has to be widely communicated, and actively taught to help the new common procedures get formulated and worked out.

Knowledge-intensive PS organizations have to deal with specific and sticky character of their domain knowledge. This knowledge attribute is taken into consideration in the developed comprehensive KMS model, but it also sets special requirements for training practices. Sharing of tacit context-based knowledge calls for on-the-job and self-study learning practices, incorporated in everyday work.

This means that apart from HR personnel responsible for developing KM schemes the involvement of managers at all levels, senior employees, mentors and peers of varying knowledge and work experience is asked for.

Diagnostic analysis of the empirical research revealed the characteristics of the knowledge asset, which distinguishes it from all other resources. It showed that knowledge is complex, sticky, multi-usable, reusable, accumulative and potentially exponentially diffusing. All these traits of knowledge make it hard to manage, but on the other hand, they can be very beneficiary to the whole organization both in short- and long-terms. Following the knowledge-asset approach in the context of the research results, a concept of KM equaling PS firms' value chain management was created. Since knowledge and information processing constitutes the essential part of all functions, operations, and business processes, value can be created within all knowledge-related areas, operations and actions. Similarly to the value chain management benefits, the profit that KMS brings do not only profit the function in question, but it is also diffused throughout the organization creating more value for other functions, the whole company, and customers.

The value-generation approach to KM may be the key to solving companies' problems with their knowledge-sharing practices. It can be claimed that the main reason for strong knowledge stickiness is its ever-presence in all components of the value-chain. Knowledge-material needs to be analyzed, coordinated with all operations and processes, anticipated by all stakeholders, and its usage optimized to the best benefit of the organization. It is a complex and challenging process, but essential for the existence and prosperity of knowledge-intensive companies.

To sum up, the implementation of the holistic KMS brings both short- and long-term benefits to a PS organization, such as:

- rational, optimal and efficient use of company resources,
- time and cost savings,
- better operational efficiency and accuracy,
- leveraging of knowledge utilization throughout the organization,
- improvement in service quality,
- reducing costs of knowledge misuse,

- increasing customer satisfaction,
- enhancing innovation,
- boosting company image and improving the firm's after-sale perspectives,
- creating unified corporate culture,
- enhancing employee commitment,
- reducing inner organizational frictions,
- smoothening and energizing cooperation across units and borders,
- increasing organizational readiness for change and dealing with uncertainty,
- keeping critical and unique knowledge in-house, and finally
- providing a sound basis for the company controlled growth.

It is interesting to notice that the listed benefits are the copy of gains that good supply chain management, or value chain management, brings upon in production- or logistics-focused companies.

Managerial implications

All knowledge-intensive companies face knowledge management problems and become engaged in knowledge management and knowledge sharing initiatives. The model developed in this work offers an extensive systemic approach and guidance to the process of KMS generation combining business environment requirements, ICT possibilities, and users' needs.

It has become apparent that the management's commitment and interest in the KMS development is principal to its success possibilities, as well as to the organization's cultural evolution of knowledge-friendliness. It is the management's role to communicate the importance of common knowledge generation and utilization for the organization, units, groups, and individual knowledge-workers. Only then knowledge sharing can become a natural trait of managerial work at all levels, as well as a uniform element of employees' work activities. In addition, KMS development requires thorough preparation, well-planned resource allocation, as well as proper follow-up and evaluation of the schemes. A KM organization and well-defined responsibilities should help to solve the problem of ownership, accountability and compatibility of all KMS development initiatives.

However, the research stresses, that before allocating any resources into the knowledge sharing schemes, managers have to establish a common KM strategy and language by developing a unified understanding of knowledge and knowledge management functions within the company business context. Moreover, managers need to investigate the organization and its characteristics to find out whether there are no generic limitations, such as motivation, work circumstances, process or tool incompatibility, or employees' expertise level. The existence of such limitations will certainly limit, if not hinder, the success of the developed KMS. Thus, the nature, sequence and timetabling of investments will vary depending on the character of the detected bottlenecks and problems.

In addition, the study provides the understanding of the types of dimensions and metrics that can be made use of in the implementation and evaluation of knowledge-sharing schemes. These measurements can be combined with strategic and operational functions and utilized to follow employee level of motivation, involvement, and competence to employ and disseminate knowledge within well-defined operational contexts. They can also aid in estimating the relevance of knowledge, its sharing environment, processes and tools.

All in all, the managerial role in KM system development and implementation can be summed-up by one word: *facilitation*, which can be defined as creating, implementing and propagating knowledge-friendly culture, accompanied by knowledge infrastructure and tools. Moreover, the selected managerial implications are of perpetual nature and ought to become a basic part of managerial work in every knowledge-intensive organization. Also the process of KMS development and generation requires on-going adjustments to the dynamic and complex business context.

Limitations and future research

Like all studies of this kind, this research has several limitations. First, the qualitative analysis provides a comprehensive description of KM state and problems and points towards the development directions within a company in question. The quantitative part deepens the understanding of the results, however some additional quantitative research, e.g. in-company financial-flow analyses, would help

to recognize KMS process bottlenecks at different operational levels. Second, although the survey was sent to different area units equally, its distribution level and response activity varied between units. Thus, the opinions of more active personnel gain more attention in planning and implementing the improvements to the KMS. However, we believe that this study will considerably contribute to the KMS development, implementation and maintenance in Company A and will further the understanding of knowledge functions among the personnel.

A main advantage of developing the value-generation approach to KM is that it can help to create direct links between KM and business processes, operations and actions, which profit the whole organization, its customers and partners. However, it is extremely demanding to calculate the KM system's benefits beforehand. It also asks for wide and mature organizational overview embodying expertise from different knowledge areas, such as business, engineering studies, organizational studies, psychology, sociology, and pedagogy. It should not be surprising, though, in business environment relying mainly on human resources. Therefore, the knowledge-based value-generation approach could be worth of being investigated further and not only in the context of PS firms.

Moreover, a systemic procedure for deeper quantitative studies of the dimension of KMS development model could take the research onto a deeper operational level. Thus, it is recommended to supplement this research with more detailed quantitative pieces of research within the listed measurements. For the case organization, in-company financial flow analyses are recommended next to enable relevant prioritization of initiatives listed in the KMS development action plan.

This kind of KM research is unique in Finland, although the number of successful middle-size ICT PS companies is considerable. It would be worthwhile to conduct a comparative study researching their KM practices. It would not be surprising if the results of such research did not differ from the outcome of Hickins (1999) studies described in chapter 5, and the KM situation in Company A were just a typical example in this area in Finland.

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Oct. 14, 2008 - Interview with the vice-president of Global Services

Oct. 29, 2008 and Nov. 25, 2008 - Knowledge Management workshops

Participants (7): managers from Global Services and Finnish business units representing consulting, program management, project management, and interface management

Nov. 25, 2008-Dec. 19, 2008 - Knowledge Management interviews

Interviewees (10): area/country leaders, consulting managers, project managers from Finland, Sweden, the Netherlands, Germany, UK, USA, and Norway

Dec. 8-23, 2008 - Online survey

Appendix 1

How Consulting Firms Manage Their Knowledge		
CODIFICATION		PERSONALIZATION
Provide high-quality, reliable, and fast information-systems implementation by reusing codified knowledge.	Competitive Strategies	Provide creative, analytically rigorous advice on high-level problems by channeling individual expertise.
REUSE ECONOMICS: <ul style="list-style-type: none"> • Invest once in a knowledge asset; reuse it many times. • Use large teams with a high ratio of associates to partners. • Focus on generating large overall revenues. 	Economic Model	EXPERT ECONOMICS: <ul style="list-style-type: none"> • Charge high fees for highly customized solutions to unique problems. • Use small teams with a low ratio of associates to partners. • Focus on maintaining high profit margins.
PEOPLE-TO-DOCUMENTS: <ul style="list-style-type: none"> • Develop an electronic document system that codifies, stores, disseminates, and allows reuse of knowledge. 	Knowledge Management Strategy	PERSON-TO-PERSON: <ul style="list-style-type: none"> • Develop networks for linking people so that tacit knowledge can be shared.
<ul style="list-style-type: none"> • Invest heavily in IT; the goal is to connect people with reusable codified knowledge. 	Information Technology	<ul style="list-style-type: none"> • Invest moderately in IT; the goal is to facilitate conversations and the exchange of tacit knowledge.
<ul style="list-style-type: none"> • Hire new college graduates who are well suited to the reuse of knowledge and the implementation of solutions. • Train people in groups and through computer-based distance learning. • Reward people for using and contributing to document databases. 	Human Resources	<ul style="list-style-type: none"> • Hire MBAs who like problem solving and can tolerate ambiguity. • Train people through one-on-one mentoring. • Reward people for directly sharing knowledge with others.
Andersen Consulting, Ernst & Young	Examples	McKinsey & Company, Bain & Company

(Hansen, Norhia and Tierney, 1999, 55)

Appendix 2

Survey – the summary of the open questions

The respondents were also asked a number of open questions corresponding with the main focus areas.

Question 1: *How would you modify company culture to increase its knowledge-friendliness?*

The voiced ideas went hand-in-hand with the expectations of the interviewees and workshop participants:

- improving cross-department and cross-function cooperation and communication
- enhancing cooperation within user and specialist groups
- more open and effective communication between the HQs and country/area units, as well as across units
- developing shared, effective and easy-to-use database
- developing common workspaces and discussion forums
- establishing KM processes and ownership
- improving the quality of documentation and making the use of English language standard throughout the corporation
- developing more work-related forms of training (e.g. better utilization of mentoring and tutoring system)
- modifying the structure of work assessment and incentives.

Question 2: *What work tasks and activities company IT knowledge and information systems **do not support**, and should?*

The answers contained numerous suggestions of underdeveloped areas listed below:

- clear communication and information sharing
- clear and easy installation and implementation of manuals
- extensive use of mailing list, bbs, wiki pages, faq, best practice, news letters
- employee training on standard use of tools and IT environment
- training and motivating newcomers to use company IT tools
- access to information through extranet
- straightforward procedure for creating new customers in the AR system
- easy and clear access to updated and correct regional/country wide implementations/best practices and lessons learned.
- finding solutions to common problems and access to relevant people able to advise in concrete matters (“reinventing the wheel”)
- reuse of standardized documentation
- easy project cooperation environment
- integration of project management follow up actions and reporting with time reporting (next hour) and invoicing
- easy use of technical documentation
- clear record of resource use, e.g. holiday allocations
- easy surfing throughout integrated AR, intranet and extranet

Question 3: *What are, in your opinion, the **biggest obstacles** to knowledge and information sharing between Company A headquarters and company local organizations?*

This and next questions generated numerous answers, which shows the urgency of the matter and employees' genuine interest in the process of improving knowledge sharing. The obstacles mentioned in the comments were:

- no KM ownership, processes and structures
 “Knowledge/information flow is based on individuals. It would be more effective if the Train the Trainer principle were used. Also if knowledge were shared, since what is shared is only fragmented pieces of information. There is no discussion about interconnections within processes. Training sessions are done quickly without extra time for deeper discussion.”
- unclear, messy and unsynchronized AR system with poor classification and categorization of material
- cultural differences and use of local languages in AR system (e.g. too much Finnish)
- communication gap and barriers
 “Distance - nothing beats face-to-face meetings. We need more open lines of communication, and the communication needs to be two-way. One simple idea would be to pre-release software to the local organizations and allocate some time for testing at a local level. This would be pointless without allocating the time but could add great value to the release process and open up communication possibilities.”
 “I have no clue how I can share my findings/discoveries, outside the local unit, except by writing to GS...”
- lack of structured deployment and hand-over caused by the lack of standardized processes, templates and tools across borders
- no proper search engine and information classification standards
- problems with updating material on the products
- lack of proper project workspace
- lack of proper customer database (contact persons internal/external, software orders, licenses, support contracts, links to open SRs in the AR system, ...)
- insufficiently informative and instruction-based technical documentation on products
 “It’s important to define basic standard implementation and functionality for each product (Feature Description) and make them known through training and available online to all employees (project mgrs, consultants, customer service personnel...”.
- no centralized place to store the project documents
 “Too much information buried deep in DOC/PDF/PPT files, making it time consuming to recover. Many things are only briefly explained, and details, caveats and good-to-know things are not mentioned in documentation.”
- inadequate attitude
 “Knowledge share is dependant on individual willing. Moreover, there is a lack of tools, or tools are not used, and in addition, the bonus model is oriented toward immediate benefits”
- need for country-specific solutions
- lack of projects follow-up processes
- lack of proper knowledge system focused on performance efficiency, as well as the retrieving of generated information
- insufficient on-the-job training
 “Very little training is offered to local business units when a new product is released. There is a huge dependency on certain key individuals when implementing certain products. Whilst a lot of work has gone into training Company A consultants, I don't think we are perfect at this yet. It remains very difficult to train consultants to a high level; we are still dependent on very proactive consultants who are prepared to put in the hours to learn themselves, which means we have to pay a higher rate for the best consultants.”

- lack of activity on the side of local organizations to train their staff and upgrade their knowledge
- insufficient use of Sharepoint – “not all employees can see all areas of the network”
- lack of time allotted for knowledge generation, sharing and acquiring from corporate and local perspectives

Question 4: *What other information/knowledge sharing methods would you introduce into the organization?*

The survey respondents wrote also a great number of suggestions:

- better tool to collect information acquired during work
 - working international wiki, or a forum, for informal knowledge exchange (e.g. to exchange some tricks and workaround on products)
 - bug tracing system for the project execution (e.g. MANTIS)
 - standard templates
 - follow-up tools and activities after project implementation (feedback on lessons learnt and best practices)
 - exchange of information and knowledge between consultancy and sales
 - newcomers’ participation in project implementation
 - coordination of all media discussed in the survey
 - cross-area training and knowledge exchange
- “I think knowledge sharing is divided into 2 sections:
1. direct work related
This knowledge is all about the products. This is mandatory to perform the basic tasks on customer site like installation and implementation.
 2. indirect work related
This knowledge is all about the extra employee knowledge. This knowledge is nice to have and within a organization the different people have different knowledge about a lot of thing. This knowledge is hard to get. And can be shared by "mandatory" training sessions.”
- involving people from all global units into the process of determining product changes and enhancements
 - more face-to-face training:
 - in-company specialist workshops
 - 6-month mentoring
 - more best practice training
 - better quality product training for consultants and managers
 - knowledge-exchange database
 - local knowledge intranet-site designed for the local department, market and customers needs
 - better follow-up on training
 - cooperation based on customer-related enhancement requests
 - proper management system for products which allows for tracking and tracing all aspects of a project from budgeting to delivery.
“Instead each project manager sets up their own methodology, which makes it difficult to involve technical consultants in project matters, because each of them has to learn to work with different methodologies across different project managers.”
 - World-wide test- and demo system with Company A standard products (reachable over the internet and with country specific requirements)
 - test system to try products and check/compare company’s own installations
 - demo system for customers to try Company A products autonomously

Open comments:

“Company A is full of great people all wanting to a good job and co-operate with one another. The will is there let's get the tools together to deliver. :-)”

“From a consulting point of view, Base-M has been an excellent tool to help capture and share the right information, from project management to consultant to customer. I don't think it is a coincidence that our most successful projects this year have been projects where Base-M has been embraced, and even enhanced, by the consulting team. However, having invested in the development of such a methodology, I don't think Company A has invested enough in rolling it out to individual consulting units. When I talk to individual consultants from across the Company A globe, it is amazing how many people still understand Base-M to basically be a set of document templates and that is all. As a result, I still see documents and methodologies in many different formats and to a hugely varying degree of quality.”

Having produced a project methodology, we should teach our consultants how to use it. Trust me, it works, and is scalable across smaller and larger projects.”

“Happy to see knowledge sharing is an hot topic at Company A”

“I don't like AR -We don't need to have implementation or install guides, or files on intranet: when working on the customer site, only extranet is accessible (the same case for partners)”

“Important approach;-)”

“Knowledge sharing is good from our office but not so good for home workers. There are e-mails sent to groups, which are not recorded and include useful info. We need some way of storing known issues, fixes and tips and tricks centrally. And people need to have the time to update these systems and be forced to do it. It needs to be part of their job, and assuming sufficient time is allocated they need to do it without question.

Paid, billable work is the priority and far too often this takes second place. It should not, as it is very useful later on and will actually save time. There needs to be a billable element for documentation to every project, even if it is not billed to the customer, to ensure people do this.”

“Local consulting and support. Talking about information sharing is rhetoric unless we take action against it. Share point is a great tool and our corporation and administrator of Sharepoint should be commended for this. Units and corporation must adopt a mindset to promote taking the time to reflect on, document, and deploy knowledge before we are truly successful with this. My gut instinct tells me that we are all doing local KM in some way shape or form, but it is getting lost on the interfaces between units unless you have that "informal" network up that was previously eluded to.”

“Of all the companies I have worked for over the past 20 years, Company A has the best knowledge sharing infrastructure and ethos. It's not perfect but has all the mechanisms required to share knowledge successfully.”