The use of tacit knowledge within innovative companies: knowledge management in innovative enterprises

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Abstract

Purpose – The purpose of this paper is to examine the use of tacit knowledge within innovative organizations. It addresses what organizations can do to promote knowledge sharing in order to improve successful innovation. Compared to available research material on explicit knowledge, the use of tacit knowledge within companies is relatively unexplored. The use of tacit knowledge is assessed with special emphasis on its significance and implications in the innovation process.

Design/methodology/approach – Existing research is structured with the objective of examining how companies make use of tacit knowledge. Key levers for tacit knowledge management are identified and the positive impact of tacit knowledge on innovation success disclosed.

Findings – The role of tacit knowledge in innovation management is analysed. Creation, availability and transfer of tacit knowledge within an organization are highlighted. Competitive advantage will be gained when companies value their tacit knowledge because explicit knowledge is knowledge we are already aware of and is public by its nature. Tacit knowledge can be the source of a huge range of opportunities and potentials that constitute discovery and creativity.

Practical implications – As this paper focuses on the transfer of tacit knowledge, barriers to successful knowledge transfer are described and success factors are explored which help to secure and improve the transfer of tacit knowledge.

Originality/value – It is proven that tacit knowledge has a crucial influence on the success of innovation processes in companies and plays a vital role as a company resource and success factor.

Keywords Tacit knowledge, Knowledge management

Paper type General review

1. Introduction

More than ever companies are forced to renew their product portfolio. Only with new products can they sustain their competitive position by increasing revenues and profit, leading to an improved company value. But do firms have the right conditions and environment to enable them to maximize innovation success? Many researchers admit that tacit knowledge forms the foundation for building sustainable competitive advantage. The objective of this paper is to examine how tacit knowledge transfer affects the company's innovation capability. The authors stress the role of tacit knowledge as one key lever for achieving innovation success. They analyzed the existing published material on innovation management and tacit knowledge, focusing on the transfer of tacit knowledge, by reflecting barriers and relevant success factors to tacit knowledge transfer. To achieve innovation success a smooth interplay between tacit knowledge and innovation management is required.

The paper is organized as follows: First, it provides an overview of the literature on tacit knowledge management with special focus on the evolution and vitalization of tacit knowledge. Then the authors outline the innovation waves in different industries and the complexity and importance of the appropriate organizational structure to enable innovative
success. Based on a detailed analysis of the barriers to successful tacit knowledge transfer the authors discuss key success factors to ensure sustainable transfer of knowledge within innovative companies. The paper closes with an outlook on further research opportunities and some managerial implications.

2. Knowledge management in organizations

Managers and academics have recognized knowledge as a key source of competitive advantage (Grant, 1997). Knowledge is a potentially significant resource to the firm as it may possess valuable, rare, inimitable and non-substitutable characteristics particularly if it has a tacit dimension (Polanyi, 1966; Hall and Sapsed, 2005). The ever increasing importance of knowledge in contemporary society calls for a shift in our thinking concerning innovation in business organizations – be it technical innovation, product or process innovation, strategic or organizational innovation. It raises questions about how organizations create new knowledge and, more importantly, how they transfer new knowledge. Innovation, which is a key form of organizational knowledge creation, cannot be explained sufficiently in terms of information processing or problem solving. Innovation can be better understood as a process in which the organization creates and defines problems and then actively develops new knowledge to solve them (Nonaka, 1994, p. 14).

Davenport and Marchand suggest that: “whilst knowledge management does involve information management, beyond that it has two distinctive tasks: to facilitate the creation of new knowledge and to manage the way people share and apply it” (Davenport and Marchand, 1999, p. 2).

In Nonaka et al.’s (2000) unified model of dynamic knowledge creation, knowledge is described as dynamic, since it is created in social interactions amongst individuals and organizations. Knowledge is context specific, as it depends on a particular time and space. Without being put into context, it is just information, not knowledge. Information becomes knowledge when it is interpreted by individuals and given a context and anchored in the beliefs and commitments of individuals (Nonaka et al., 2000). Also Davenport et al., (1998, p. 43) come up with similar definitions of knowledge. Knowledge which is new to an organization has to either be invented internally, or acquired from external sources.

There are two types of knowledge: explicit knowledge and tacit knowledge. Nonaka et al. (2000) and other authors such as Kikoski and Kikoski (2004) describe explicit knowledge as what can be embodied in a code or a language and as a consequence it can be verbalized and communicated, processed, transmitted and stored relatively easily. It is public and most widely known and the conventional form of knowledge which can be found in books, journals and mass media such as newspapers, television internet etc. It is the sort of knowledge we are aware of using and it can be shared in the form of data, scientific formulae, manuals and such like. Patents are an ideal example of explicit knowledge in a business context.

In contrast, tacit knowledge is personal and hard to formalise – it is rooted in action, procedures, commitment, values and emotions etc. Tacit knowledge is the less familiar, unconventional form of knowledge. It is the knowledge of which we are not conscious. Tacit knowledge is not codified, it is not communicated in a “language”, it is acquired by sharing experiences, by observation and imitation (Kikoski and Kikoski, 2004; Hall and Andriani, 2002). Tacit and explicit knowledge are complementary, which means both types of knowledge are essential to knowledge creation. Explicit knowledge without tacit insight quickly loses its meaning. Knowledge is created through interactions between tacit and explicit knowledge and not from either tacit or explicit knowledge alone (Nonaka et al. 2000). Competitive advantage will only be gained if companies value their tacit knowledge, as explicit knowledge can be known by others as well. Tacit knowledge creates the learning curve for others to follow and provides competitive advantage for future successful companies (Kikoski and Kikoski, 2004).
3. Tacit knowledge management

Many definitions of tacit knowledge exist but Polanyi (1969) is widely accepted as the founding father who identified the significance of the concept of tacit knowledge. Polanyi encapsulates the essence of tacit knowledge in the phrase “we know more than we can tell”, and provides further clarification in such commonplace examples as the ability to recognize faces, ride a bicycle or ski, without the slightest idea to explain how these things are done (Polanyi, 1966, p. 4).

Kikoski and Kikoski cite two philosophers (H.-G. Gadamer; H. Lipps) who refer to tacit knowledge as personal knowledge that each individual possesses that is unique and once unlocked can be a creative contribution in an organization. “What is unsaid and unexpressed could be the reservoirs of tacit knowledge” (Kikoski and Kikoski, 2004, p. 66). The whole discussion on tacit knowledge management including definitions was brought forward by several authors such as Rosenberg (1982, p. 143) who describes tacit knowledge as “the knowledge of techniques, methods and designs that work in certain ways and with certain consequences, even when one cannot explain exactly why”. Nonaka (1991, p. 98) explores the term further: “tacit knowledge is highly personal and hard to formalize and, therefore, difficult to communicate to others”, and details his description that there are two dimensions of tacit knowledge: the first is the technical dimension which encompasses the “know-how”, the second is the cognitive dimension which consists of beliefs, ideas and values which we often take for granted” (Nonaka and Konno, 1998, p. 42). Howells (1996, p. 92) defines it as follows: “tacit knowledge is non-codified, disembodied know-how that is acquired via the informal take-up of learned behavior and procedures”. According to Kikoski and Kikoski (2004, p. 67) tacit knowledge embodies an individual’s education, natural talent, experience and judgment, e.g. an experienced venture capitalist’s tacit knowledge tells which of two business plans is superior for investment. Rüdiger and Vanini (1998, p. 469) say that tacit knowledge is represented through non-articulated knowledge. The different attributes focus on particular parts of tacit knowledge management and, therefore, highlight somewhat different aspects of tacit knowledge.

Still, for many tacit knowledge is a new domain about which little is known. Many managers rely frequently on their intuitive ability to make the right decisions, but are not comfortable with this. There is, however the beginning of a realization that tacit knowledge is critical to the key organizational tasks of creating new knowledge, generating new products and improving new business procedures leading to innovation. Every organization that seeks to be successful has to create the conditions enabling everyone in an organization to verbalize their tacit knowledge. Each employee should maximize his contribution to the pool of ideas that provide a competitive edge for the firm (Kikoski and Kikoski, 2004). The authors’ focus is based on the definitions of Nonaka et al. (2000) and Hall and Andriani (2002) and Kikoski and Kikoski (2004) mentioned above and in Chapter 2. The authors of this paper want to concentrate on how tacit knowledge is used within companies and focus on the transfer of tacit knowledge within them, this being fundamental to the innovation process, and the related achievement of innovation success in organizations. In their opinion this can be anticipated through the transfer of tacit knowledge as the key process for success, in turn supported by the knowledge exchange model of Szulanski (2003), which strongly relates to the aspect of tacit knowledge. Further, many barriers in organizations still exist regarding the transfer of tacit knowledge which will be discussed in detail.
3.1 Evolution of tacit knowledge

Basic conditions should exist for the evolution of tacit knowledge and tacit knowledge creation. Nonaka et al. (2000) developed the spiral model of knowledge: new knowledge always begins with the individual, e.g. a brilliant researcher has an insight that leads to a new patent, or a shop-floor worker draws on years of experience to come up with a process innovation. In each case, an individual's personal knowledge is transformed into organizational knowledge, which expands through the organization and is valuable to the company as a whole. Making personal knowledge available to others should be the central activity of the knowledge and innovation creating company. It takes place continuously and at all levels of the organization. Through these interactions an organization creates a knowledge process, called knowledge conversion. According to Nonaka et al. (2000) there are four modes of knowledge conversion:

1. Socialisation (from tacit knowledge to tacit knowledge);
2. Externalisation (from tacit knowledge to explicit knowledge);
3. Combination (from explicit knowledge to explicit knowledge); and
4. Internalisation (from explicit knowledge to tacit knowledge).

These four modes of knowledge conversion form a spiral, the SECI process (see Figure 1). Knowledge created through this spiral process can trigger a new spiral of knowledge creation, expanding horizontally and vertically across organizations. This interactive spiral process takes place both intra- and inter-organizationally. One example is the articulation of tacit knowledge possessed by customers that they themselves have not been able to articulate. A product works as the trigger to elicit tacit knowledge when customers give meaning to the product by purchasing, adapting, using, or even not purchasing it. Their actions are then reflected in the innovation process of the organization and a new spiral of organizational knowledge creation begins again (Nonaka, 1991, Nonaka et al., 2000).

Senker (1993) notes that substantial codification of knowledge in the twentieth century has not diminished the contribution of tacit knowledge to innovation, and argues that the tacit component of innovation can only evolve through practical experience (learning by doing), or personal interaction with experts who possess the relevant experience or knowledge, in or outside the organization and social networks, meaning the “know-who”. These thoughts on the evolution of tacit knowledge are further explored by Kikoski and Kikoski (2004) who support the statement that all knowledge either is tacit knowledge or is rooted in tacit knowledge.

Figure 1 The SECI Process

Source: Nonaka et al. (2000, p. 12)
knowledge meaning that explicit knowledge depends on or is encompassed by tacit knowledge, whereas tacit knowledge “possesses” itself. The authors developed the S-curve of tacit knowledge which shows the dependence between increasing development and increasing performance of tacit knowledge (see Figure 2).

A prerequisite for the evolution of tacit knowledge is an open culture in an organization which supports innovation, by, e.g. installing pilot plants or design and testing prototypes (Madeuf, 1984, p. 127). Interaction with others, as opposed to isolation is important if knowledge conversion is to take place (Stover, 2004, p. 167). Rüdiger and Vanini (1998, p. 473) maintain that the only way to recognize the subject of tacit knowledge is via personal contacts with external organizations or inside organizations, and it is therefore the duty of the management to support and afford these contacts. Baumard found common characteristics among successful tacit knowledge conversion companies: “resolution of ambiguity through communities of practice; tacit complicity among employees; informal matrices of relationships among employees and reliance on collective knowledge” (Stover, 2004, p. 167). We follow these arguments and conclude that, a climate of openness and trust amongst organization members is the basic condition that allows tacit knowledge to be created, shared and used in the innovation process. Sharing tacit knowledge will be more successful in informal settings than in formal ones. Therefore, it is important for the management of organizations to cultivate a commitment to motivate the creation of tacit knowledge, and to create an atmosphere in which organization members in an organization feel safe in sharing their knowledge.

3.2 Vitalisation of tacit knowledge

A precondition to activate tacit knowledge in the innovation process is to make sure that one is able to identify the relevant tacit knowledge in the organization. Rüdiger and Vanini (1998) note that tacit knowledge enables an increased perception of ideas. Therefore, it stimulates creativity and has a positive effect on business activities. The identification of tacit knowledge is often heavily hindered, but is made possible through the scope of personal contacts (Rüdiger and Vanini 1998, p. 475), where ideas are sharply critiqued but individuals are respected. A group of diverse individuals addresses a common problem, each skilled person frames both the problem and its solution by applying mental schemata and patterns. In a well-managed process, these varying perspectives foster creativity (which includes tacit knowledge), and this intellectual conflict between diverse viewpoints produces energy that is channeled into new ideas and products (Leonhard and Sensiper, 1998). A popular technique for capitalizing on the respective insights and intuitions (tacit knowledge) of a group of individuals is to conduct brainstorming sessions. Brainstorming sessions should

![Figure 2: The S-curve of tacit knowledge](source: Kano-Kikoski and Kikoski (2004, p. 78))

<table>
<thead>
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<th>Physical</th>
<th>Intellectual</th>
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<td>Examples:</td>
<td>- riding a bicycle</td>
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<td>- writing in a foreign language</td>
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<td>Examples:</td>
<td>- surfacing a new thought</td>
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<td></td>
<td>- having a new idea</td>
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Source: Kano-Kikoski and Kikoski (2004, p. 78)
occur at crucial stages in the innovation process and have been shown to lead to important consequences for the organization as a whole (Sutton and Hargadon, 1996).

Tacit knowledge exists randomly in society and relates to the context of a specific problem. Access is mainly through social networks, or know-how (Imai, 1991). The tacit dimensions of individual knowledge are not publicly available except as embodied in people to be hired, and the tacit dimensions of collective knowledge are woven into the very fabric of an organization and cannot therefore be easily imitated. Tacit knowledge is made visible through its application and can then be utilized in the innovation process (Leonhard and Sensiper, 1998).

Howells (1996) emphasizes that learning is particularly crucial in relation to difficult-to-acquire tacit knowledge, which may explain why tacit knowledge is often identified as being derived primarily from in-house capability and efforts. Tacit knowledge can be activated by generating new scientific knowledge, (learning-to-learn), by incorporating new knowledge in the design of a new product. It can further be activated in the process of learning new production methods and improving existing technology through minor improvements based on learning-by-doing, and based on learning-by-using once the new product or process is being employed internally in the organization or by external consumers (Senker, 1993).

Tacit knowledge is gained throughout the innovation and production chain of a company, and Howells (1996) adds further, that the stage at which tacit knowledge is gained and utilized in the innovation and production process is an important strategy and policy issue. The authors conclude that tacit knowledge is a source of competitive advantage. The creativity necessary for innovation derives not only from obvious and visible expertise, but from invisible reservoirs of experience which need to be vitalized first, before using these in the innovation process. Tacit knowledge can be gained both in and outside the organization. Inside the organization, by deciding what existing tacit knowledge capabilities the members in the organization carry themselves and what improvement could be made to build up the accumulated learning of the individuals and, therefore, enhance the tacit know-how competence. Outside the organization, by trying to gain tacit knowledge and skills from other firms, through recruiting the right individuals with the requisite education or work experience, by acquiring parts of or whole new companies, by engaging appropriate consultants or by building networks with other companies. It is made clear that tacit knowledge is gained and vitalized throughout all functions and stages of a company’s operations.

4. Innovation management

In the context of intense global competition and the continuously increasing pace of technological development, innovation is considered as mandatory for surviving in such a dynamic market environment (Nonaka and Kenney, 1991, Forrester, 2000, Cardinal, 2001). The growing interest in innovation and its relationship to economic growth has resulted in a body of specialized literature on various facets of the innovation process. Starting in the 1960s with simple linear “technology push” (e.g. Carter and Williams, 1957), and “need pull” models in the 1970s (e.g. Myers and Marquis, 1969), through the “coupling model” of the late 1970s (Rothwell, 1974; Mowery and Rosenberg, 1978) to early 1980s to the integrated model of Rothwell (1992). The complex nature of the innovation process has been analysed by several authors. Tornatsky et al. (1983) described the process of innovation as a “process of many discrete decisions and behaviours that unfold slowly over time”.

In the literature different methods exist to define innovation. One research direction underlines the novelty of an idea (e.g. Barnett, 1953, Becker and Whisler, 1967, Aregger, 1976). “An innovation is . . . any thought, behavior or thing that is new because it is qualitatively different from existing forms” (Barnett, 1953, p. 7). Others stress the subjective recognition of novelty (Rogers, 1983, Zaltman et al., 1984). A third direction emphasized the first introduction of the novelty (e.g. Schmookler, 1966; Knight, 1967; Kieser, 1969; Vedin, 1980). Another research direction focused on the new combination of needs and solutions (Pfeiffer and Staudt, 1975; Moore and Tushman, 1982; Rickards, 1985). Some academics
analyze innovation as a combination of invention and exploitation (e.g. Roberts, 1987; Brockhoff, 1992). Another research direction is focused on the process aspect (e.g. Uhlmann, 1978; Goldhar, 1980) defined as “a sequence of organizational and individual behavior patterns” (Goldhar, 1980, p. 284). In the postmodern or information era, where CEOs are experiencing a sense of loss of control as they try to guide their organizations, the importance of innovations has increased dramatically. Innovation management is becoming more abstract by focusing on the management of processes in the search for novel assignments through the combination and integration of different knowledge components. In recent literature innovation is viewed in terms of the transfer of knowledge (e.g. Scarbrough, 2003). As Kikoski and Kikoski (2004) point out, the compass points to a new direction with dramatic new challenges in an entire new environment and territory. They conclude that it may not be sufficient for managers to merely adapt old maps in their attempts to manage differently in this new environment. This concurs with Stacey (1992), who said: “The key to success lies in the creative activity of making new maps, not in the imitative following and refining of existing ones.” In this turbulent and unknowable world learning of the already known is necessary but not sufficient. Explicit knowledge does not provide a competitive advantage, but tacit knowledge does. Alfred Korzybski’s (1958) famous dictum, “A map is not the territory it represents”, is relevant today. Managers need to constantly update and even create a new map that guides them (Kikoski and Kikoski, 2004).

4.1 Innovations in different industries

In the history of innovations, there have been innovation waves every 50 years. Different industries have experienced major basic innovations, which have pushed the development of a whole set of new product generations on a differentiated level (see Figure 3).

First a series of smaller product innovations took place in the same industry as the basic innovation. In a next step the innovations were transferred to other industries. Referring to Bohinc and Erichson (2002) innovation has different effects on an industry. If the innovation achieves improvement, either a single organization/company can be changed step by step or the entire market of a traditional industry. If it is a “radical innovation” (Hauschildt, 1993,
p. 9), a new generation can be developed either as a paradigm change within one organization or by replacing an entire industry. The different industry effects of innovations are triggered by the economic environment. The interplay of adaptations to the economic environment and the industry itself leads to changes and adaptations in the environment. This interplay generates new impulses for developing innovations with different effects on the various industries. For further analysis of the effect of tacit knowledge on innovation in high-technology companies (e.g. biotechnology industry) and in traditional industries, such as the ceramics industry, Senker (1995) has executed an empirical study. It seems to be that firms have different ways in which they receive specific know-how. In the ceramics industry, firms maintain supplier relationships to ensure a continuous inflow of knowledge via the expertise of the suppliers. However, the high tech industry focuses on intra-company knowledge only, without incorporating the suppliers and outside expertise (Blüm, 2002, p. 68). Depending on the industry the type of innovation differs. In traditional industries we have process improvements or product improvements, whereas in new industries radical innovations are the trendsetter. Therefore, the technology base of a company plays a dominant role (see Figure 4). Depending on the assets the necessity of tacit knowledge increases (Howells, 1996, p. 92).

Especially in the case of existing intangible informal assets, the necessity of implicit know-how increases. Significant differences in knowledge sharing and hoarding in various industries can also be supported by Hall and Sapsed (2005), who analyzed these influences in project-based firms in the aerospace industry, oil and gas industry and the consulting industry, represented by consulting engineers and a management consulting firm. Whereas they have observed a truly ingrained culture of retaining knowledge within the company in the case of the consultant engineers, in the management consultancy firm, knowledge development is an explicit and critical part of the personnel review process, with a close link between knowledge development and individual expertise and reputation. Along with Hall and Sapsed (2005), the authors conclude that knowledge management which includes tacit knowledge is likely to underperform or fail, as long as the underlying incentive and motivational characteristics are not understood.

4.2 Complexity of organizational structure in innovative firms

Nowadays, multinational organizations with their worldwide networks, cannot rely solely on knowledge sharing within work groups. According to Cummings (2004), both intra-group and external knowledge sharing are important for performance in work groups. With the dramatic increase in labor costs, global expansion to access markets such as China and India, and corporate mergers, organizations are forced to connect people who are

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**Figure 4** The technology profile of a firm

![Technology Profile Diagram]

Source: Howells (1996, p. 92)
dispersed across different geographic locations, who represent different functions, report to different managers or who work in different business units. We have found detailed literature which examines the impact of diversity in work groups due to demographic diversity (e.g. sex, age, tenure) on processes such as communication, conflict or social integration (Jehn et al. 1999, Pelled et al. 1999). Only relatively little attention has been given to member differences in organizational affiliations, roles or positions. An empirical investigation of Cummings (2004) shows that external knowledge sharing is more valuable when groups are more structurally diverse. In another empirical study the extent to which perceived utilization of knowledge, skills and abilities among personnel is associated with innovative performance (Länsisalmi et al., 2004) has been analyzed. An association between underutilization of knowledge, skills and abilities of the personnel and poor innovative performance was proven.

Different barriers to innovation need to be overcome. Potter and Balthazards’ case studies (2004) showed that a constructive interaction style improves both team performance and contextual outcome measures, whereas passive and aggressive styles reduce task performance and contextual measures of performance. Similar results are presented in the article by Cook and Cook (2004), who examined what organizations can do to promote knowledge sharing in order to gain a competitive edge. The company’s environment directly influences the openness and ease with which employees communicate. Physical structures are often excellent representations of the company’s beliefs and values. Management should promote and support the creation, sharing and use of knowledge among employees. Dupuy (2004) points out that it is necessary for companies to develop a “company culture” by investing in human capabilities through an individual and organization learning process. Considering that innovation may be a key to survival in today’s highly competitive and abruptly changing business environment, companies should ensure that their organization encourages product development and administrative innovation. But only few firms are reshaping their organization in order to optimize the utilization of their capabilities in managing knowledge creation and transfer within and across the company.

5. Transfer of tacit knowledge towards innovation

An important dimension is the degree of transfer of any particular knowledge to a person, a group or to all members of an organization. The management of an organization should keep reflecting this process and try to keep it transparent and take action when necessary. Howells (1996) notes that intuition based on tacit qualities plays an important role in the innovation process, which shows that a great deal of the knowledge that is important to the operation or improvement of a given process or product technology is tacit. Tacit knowledge, which “cannot be wholly formalized, nor transmitted solely through written documents” (Madeduf, 1984, p. 127), is a kind of knowledge which is difficult to codify and embody in a blueprint or operating manual.

Tacit knowledge is usually part of a long-term, accumulated learning process that is often the beginning of a more systematic scientific understanding of a technology or process (Senker, 1993, p. 211). The strength and importance of tacit knowledge is that it is often very difficult for competitors to imitate it and, therefore, to be transferred. Tacit knowledge is also often an important element in industrial collaboration, both as a factor initiating collaboration and in its success. In empirical tests Cavusgil, Calantone and Zhao showed that tacit knowledge was transferred within partner firms through their close and frequent interactions, so that it can be concluded that companies with greater collaborative experience benefit more from tacit knowledge transfer (Cavusgil et al., 2003, p. 7-8). Hall and Andriani (2002) argue that the major challenge of an organization should be the achievement of balance between the tacit knowledge developed by individuals and the explicit knowledge needed for effective communication and integration, which means to make the bulk of an organization’s knowledge explicit and to render the company safe from employees walking away with their personal knowledge.

Leonhard and Sensiper (1998) and others such as Lehner and Lehmann (2004) argue that although it is much easier to stimulate, combine and communicate explicit dimensions of
knowledge than the tacit, there are many situations in which tacit knowledge cannot or will not be wholly converted into the explicit. Furthermore, a certain level of personal intimacy is necessary to establish comfortable communication of tacit knowledge. This involves recognizing networks of relationships, highlighted by Scarbrough (2003) as a critical resource for the combination and exchange of knowledge required to promote innovation and create intellectual capital (Nahapiet and Ghoshal, 1998).

Transfer of tacit knowledge strongly depends on the distinction between face-to-face and arm’s length relationships (Spring, 2003). The closeness of two partners is key to the degree of tacit knowledge transfer (Cavusgil et al., 2003). Much tacit knowledge is generated and transferred through body language or physical demonstrations of skills and, therefore, the use of information and communication technology is only partly possible (Leonhard and Sensiper, 1998). Nonaka et al. (2000) claim that as tacit knowledge cannot fully be transferred into formal language, electronic storage of tacit knowledge can hardly take place, and if so, will lead to loss of knowledge.

The authors of this paper conclude that tacit knowledge transfer requires personal and informal interaction. To support and encourage the application and transfer of tacit knowledge in organizations, and to underline the impact in the innovation process, the authors wish to highlight the success factors and the barriers which exist to successful tacit knowledge transfer within organizations.

### 5.1 Barriers to Successful Tacit Knowledge Transfer

Tacit knowledge resides in individual skills, previous experiences of collaborations and their social context. Many of these skills and social arrangements are related to work activities. For van Baalen et al. (2005) any form of explicit knowledge assumes the existence of tacit knowledge, the latter which cannot be articulated that easily. As a consequence the transfer of innovative knowledge (which often is tacit knowledge) from a person or group within an organization to another will become problematic (van Baalen et al., 2005).

Szulanski (2003) talks about the “stickiness of knowledge” when transferring knowledge from one practice to another. The aspect of “stickiness” involves the knowledge source, the knowledge recipient and the context. When the knowledge source and the knowledge recipient share the same context and are engaged in the same practice, the “stickiness” will be relatively low, whereas the transfer will be more difficult and will increase in cost when the knowledge source and the knowledge recipient operate in different contexts and are engaged in different practices. According to Szulanski, people on the source side may be reluctant to share their knowledge with others for fear of losing ownership, a position of privilege, superiority, for the lack of insufficient rewards or even sometimes due to being unaware of the fact that their knowledge might be of interest to others (van Baalen et al., 2005). Szulanski’s discussion of the “internal stickiness of knowledge transfer” focuses on the possible barriers encountered in the transfer process. In his empirical analysis he came up with three barriers with significant potential to disrupt the transfer of tacit knowledge. Firstly, the ambiguity of the mostly tacit knowledge which needs to be transferred. This seems to have a huge influence, where neither sender nor receiver can find enough congruence. This is closely connected to the second barrier the lack of absorptive capacity, which happens if the receiver is not able to deal with the ambiguity and therefore the probability of failure increases. The third interconnected obstacle to smooth transfers according to Szulanski is difficult relationships between sender and receiver (Lehner and Lehmann, 2004).

Other barriers, but with less influence are the lack of motivation by sender and receiver which might be overcome with executive fiat, and the unreliability of the sender which might slow down the transfer, but does not seem to affect its effectiveness. Organization structure and systems seem to have influence on the number of projects, but less influence on the outcome (Lehner and Lehmann, 2004). There is a widespread consensus in the literature that the failure to share information and to implement knowledge transfer processes, is often the neglect of human factors and an overemphasis on information and communication
technology solutions. Emotional factors such as power, trust, likes/dislikes seem to play an important role within the transfer of tacit knowledge (Cook and Cook, 2004).

The following problem areas can therefore be categorized into individual and collective factors, the organization structure and the culture of companies and the physical layout of companies. Individual factors are the readiness of every individual to share, e.g. if knowledge is a source of power and prestige. The sharing capability is also dependent on the social culture of the company. Collective factors relate to the fact that individual experiences should be transferred and acknowledged to a broader base within the firm. The culture of the enterprise strongly influences the transfer activities. A precondition to making this happen is to ensure a climate of openness and trust. During the transfer of tacit knowledge, communication problems at the interface can arise because many companies focus on the specialization of work. The higher the degree of specialization, the higher the isolation and narrower the perspective within a firm. The organization structure often hinders tacit knowledge sharing by establishing wrong authorities. Further, unclear goals and unclear incentives can inhibit tacit knowledge transfer. Finally, the physical layout of offices can act as a barrier, since they can hinder and disturb communication among employees (Hall and Sapsed, 2005; Lehner and Lehmann, 2004; von Krogh and Köhne, 1998).

5.2. Success factors to tacit knowledge transfer

So what are the success factors to tacit knowledge transfer?

An easy answer at first is to remove most barriers as mentioned in the chapter above. This means in detail that organizations have to focus on the so-called human-related factors like motivation, commitment, hopes and rewards, which is a combination of an intrinsic and extrinsic value system. Employees must be given the time, space and opportunity to transfer and therefore share tacit knowledge which is transmitted verbally. This is supported by the culture and organization structure of a company, e.g. through the decision-making process, HR policies, performance measurements etc. (Cook and Cook, 2004). These success factors are also mentioned by Hall and Sapsed (2005), who strongly underline a fit between the reward systems and the organizational roles and structure, along with sociocultural factors such as culture, power relations etc. as well as industry dynamics (Hall and Sapsed, 2005). Von Krogh and Köhne argue for good relationships between sender and recipient which is the precondition for planned, formal, informal and coincidental communication. The use and transfer of tacit knowledge will depend on the behavior of the management leaders as role models and to offer reward for imitation. Trust and openness between sender and receiver will often result in automatic absorption which must be backed up by the whole organization structure of the firm (Lehner and Lehmann, 2004). Also Cavusgil et al. vote for mutual trust and frequent and close interactions within and between organizations. Companies with great collaborative experience will benefit more than others (Cavusgil et al., 2003). Organization structures have to be modified in different industries so that the organizational structure of a company or a department supports the transfer and transmission of tacit knowledge in the best way. Li and Gao (2003) recommend identifying knowledge hierarchies in order to efficiently and effectively explore the transfer of tacit knowledge within an organization.

6. Managerial impact and further research

The authors conclude that tacit knowledge plays an important role in all stages of the innovation process. It is obvious that in the early phases of the innovation process, (idea discovery and generation), the degree of intangibility is high. It can therefore be assumed that tacit knowledge and its transfer in the early phases of the innovation process plays a more important role. Blümmer (2002), however, has disclosed in his case studies that in later phases, too, of the innovation process tacit knowledge contributes a great deal to the speeding-up of the innovation process and thus results in innovation success. At the four companies Blümmer examined, the transformation and implementation phase of ideas in the innovation process was shortened substantially through the transfer and application of appropriate tacit knowledge (Blümmer, 2002, p. 184). Also, the intuitive containment of the different alternatives before the real test phase starts, leads to a process-acceleration effect...
in the innovation process. It shows that with appropriate tacit knowledge management, upcoming problems are solved in a flexible manner and that in all phases of the innovation process, (from idea discovery up to market entry and ongoing utilization), proper transfer of tacit knowledge is of great significance for the success of innovation.

Nowadays in our fast-changing environment innovations are key for business survival. It is important to be aware of factors contributing to or preventing creation of new strategies, new products and new ways of manufacturing, distributing and selling. In the literature, several authors found different clusters of barriers to innovation (West and Altink, 1996; West and Anderson, 1996; Molinsky, 1999; Niosi, 1999; Kivimäki et al., 2000). In a recent empirical study Länssialmi et al. (2004) focused on six types of barriers of innovation: underutilization of knowledge, skills and abilities, lack of resources, lack of communication and cooperation, non-supportive managerial behavior, non-supportive reward systems and innovative activities considered as unimportant. The authors could clearly show an association between the barriers to tacit knowledge transfer, these barrier clusters and the company’s innovative performance, and underline with their study the importance of efficient identification, utilization and allocation of expertise in innovative activities.

The ideas reflected are somewhat idealized, as generally in the innovation process tacit and explicit knowledge components merge into each other and are quite difficult to separate from each other. This one-sided emphasis however, serves to underline the need for straight analysis, in order to achieve the right consequences for tacit knowledge management in the innovation process. Researchers and managers in the field of interaction and networks should show a high interest in this subject, as tacit knowledge seems to be an outflow of personal interaction processes. The transfer of intuitions, or what you “feel in your guts” seems to work best in an informal atmosphere and face-to-face, resulting in a successful generation of new ideas, products or processes or to solve problems in a flexible manner. So far there has been little empirical research on the question of the use of tacit knowledge in the innovation process, which as such could be generalized. Faulkner and Senker (1995) interviewed research & development employees in the biotechnology and ceramics industry, looking at the knowledge components in their new product development innovation process, and focusing on the tacit knowledge component. Blümm (2002) has written four detailed explorative based case studies based on the biotechnology and medical engineering industries. Cavusgil et al. (2003) should also be mentioned. They surveyed a broad spectrum of manufacturer and service firms to examine the effect of tacit knowledge transfer on firm innovation capability, focusing on the USA. Further research is planned towards a case study with an international consulting company relating to their mechanisms in supporting the transfer of tacit knowledge within their organization, and to the relevant locations and individuals within their organization and the transfer of tacit knowledge to only appropriate locations and individuals outside the organization to support and gain further success in the innovation process.

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Further reading


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