FOSTERING THE MOTIVATION TO SHARE KNOWLEDGE

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Abstract

Electronic knowledge bases sometimes are regarded as easy-to-achieve knowledge management tools. In practice, however, they are rarely used as extensively as anticipated.

We identify two potential reasons why electronic knowledge bases fail: For one, due to the nature of knowledge, it is difficult if not impossible to codify implicit knowledge with reasonable effort. And secondly, individuals are not willing to provide their knowledge in an anonymous database voluntarily for several reasons which are discussed in detail. We introduce neoinstitutional economics theory to analyze the reluctance of employees to share their knowledge.

We suggest to associate a price to knowledge that is to be shared in an electronic knowledge base and to reimburse the author/owner of a knowledge object for his expenses to generate and share his knowledge. Also, we identify several means to reduce transaction cost incurred by the process of finding and sharing knowledge in an electronic knowledge base.

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1. FAILURES OF ELECTRONIC KNOWLEDGE BASES

1.1 Introduction

An increasing number of organizations considers knowledge management to be a challenge with the prospect of being rewarded with a competitive advantage over the competition. In order to achieve this goal quickly, organizations are eager to develop tools for efficient dissemination of existing knowledge. Information technology is frequently considered to be an adequate means for those initiatives as it provides the possibility to make knowledge available to all employees quickly and at low cost. Within information technology there are two different basic mechanisms for the dissemination of knowledge – push or pull mechanisms. While push technology such as email or electronic newsletters tend to add to the employees` undesired information overload, organization often prefer to provide pull technology in their knowledge management initiatives. The result of this frequently is the attempt to distribute the existing and valuable knowledge of the employees by establishing Electronic Knowledge Bases (e-KB).

Electronic knowledge bases refer to databases that contain knowledge on a broad array of topics. At DaimlerChrysler, for example, such databases are referred to as "Books of Knowledge" – such as the "Engineering Book of Knowledge (EBoK)" or the "Finance Book of Knowledge (FBoK)". Although the access to certain electronic knowledge bases may be limited to special interest groups for security reasons, it is the underlying goal to enable employees to access the accumulated knowledge of the company conveniently, "just in time", on demand via their web browser in the intranet.

The concept is intriguing, however, from our experience with several organizations, electronic knowledge base initiatives are often stalled or abandoned. In this paper, we will identify some reasons for e-KB failures from a practical point of view in terms of database design. After that, we will introduce Neoinstitutional Economics Theory as a basis for a detailed analysis of motivational aspects of sharing knowledge in electronic knowledge bases.

1.2 Reasons for failures of e-KB initiatives

An electronic knowledge base can be considered to be a medium for employees to share and collect knowledge. In order to identify reasons for knowledge base failures, it is helpful to apply a framework for electronic media design developed by Schmid (Schmid, 2000). He suggests to incorporate four different layers in the design of electronic media: 1. I*nfrastructure* layer with basic IT elements such as network, transfer protocol, hardware and software, 2. S*ervices*, such as features that are provided to the user (in the case of a electronic knowledge medium for example video feeds, audio, chat, interactivity, etc.); 3. *Processes*, that are established within the organization to enable and support the functionality of a medium; 4. *Community,* the interaction between the users of an electronic medium[2].

[2] In his framework, Schmid also distinguishes four different phases, which are disregarded in this paper. For a more detailed description of the framework, please refer to (Schmid 2000).

In our experience, many efforts to develop an electronic knowledge base focus on the first two layers of this framework – infrastructure and services – while disregarding the remaining layers – processes and community – to the effect that employees are not willing to use the system. Particularly, common shortcomings in the design of e-KB include insufficient media richness (infrastructure and services layer), inadequate methodologies to handle implicit or tacit knowledge (processes layer), a lack of review cycles to identify and update obsolete knowledge (processes layer), and motivational aspects to share knowledge in an anonymous database (community layer).

In this paper, we will only briefly elaborate on the management of implicit and explicit knowledge transfer with e-KB. Instead, we will focus on the individual's motivation to share knowledge.

1.3 Management of implicit and explicit knowledge

Understanding the difference between explicit and implicit knowledge in terms of its transferability is imperative prior to designing a knowledge management strategy. As we can learn from Nonaka and Konno's seminal work on knowledge creation, the transfer of implicit knowledge requires externalization, combination, internalization, and socialization (SECI-model) (Nonaka and Konno, 1998). Implicit knowledge embraces rich contextual information as to where and in what situation to apply it. Also, according to Hansen et al, there are two different approaches to share knowledge, using either a personalization or codification strategy (Hansen et al., 1999). While personalization strategy pays tribute to the fact that tacit knowledge can best be transferred by personal meetings, codification strategy is usually limited to explicable knowledge. Hence the observation that an electronic knowledge base is likely to fall short of being an appropriate medium for implicit knowledge transfer. Upon planning a knowledge management initiative, it is essential to understand that the exchange of implicit knowledge is a time consuming activity. Unless sophisticated systems with video feeds, interactive learning capabilities, and synchronous communication are available, new media today cannot adequately support the process of informal transfer of implicit knowledge. As a consequence, we suggest that knowledge management initiatives aiming at the transfer of implicit knowledge provide for personal interaction rather than merely introducing an IT-solution.

1.4 Individual's motivation to share knowledge

Knowledge management initiatives on electronic knowledge bases often fall short from expectations due to the fact that after initial implementation of the database it is assumed that all users submit their knowledge voluntarily. However, in our experience, employees are not always willing to do just that due to various reasons such as time restrictions, insufficient feedback, lack of additional compensation, etc. Another reason why employees are reluctant to share their knowledge results from the discrepancy of the company's and the individual's perspective on the value of knowledge. Disregarding this important difference consequently jeopardizes knowledge management initiatives. Therefore, we will further explore this relationship.

From a company's point of view the value of knowledge increases with the number of people within the company that share it. For example, in a small software firm with ten employees in a web application unit, the knowledge of one developer on how to design a web application with Java is an important asset. If this knowledge was critical for the success of the company, it would be very desirable for the company that each member of the web development team shared the same knowledge. Thus for the firm the value of knowledge in this specific programming language naturally increases with the number of people sharing it. Hence the firm's intention to motivate its

employees to share their knowledge with their colleagues. The same is true for sales personnel of, say, an insurance company and their knowledge on the strengths and weaknesses of the products and about specific customers and their needs and expectations. The company's sales force grows in power with the number of staff sharing detailed knowledge on products and customers.

From an employees' point of view, however, sharing knowledge is not a matter of course. In today's competitive working environment, the competitive advantage of an employee is his or her knowledge. Sharing this knowledge with others results in a dilution of the competitive advantage over his colleagues. While knowledge on a special programming language such as Java or on products and customers is a main asset in the balance sheet of knowledge workers, a voluntary provision seems unlikely. In contrast to regular goods, knowledge remains with the person who shares it. However, its value is reduced likewise. Therefore, an individual will not be interested in sharing his knowledge and thus accepting the fact that his main assets are diluted. For the employee, the value of knowledge decreases with the number of people in a company sharing it. Obviously, there is a goal conflict between an employee's point of view and the company's perspective on the value of knowledge that is shared among the individuals. Figure 1 illustrates this relationship.

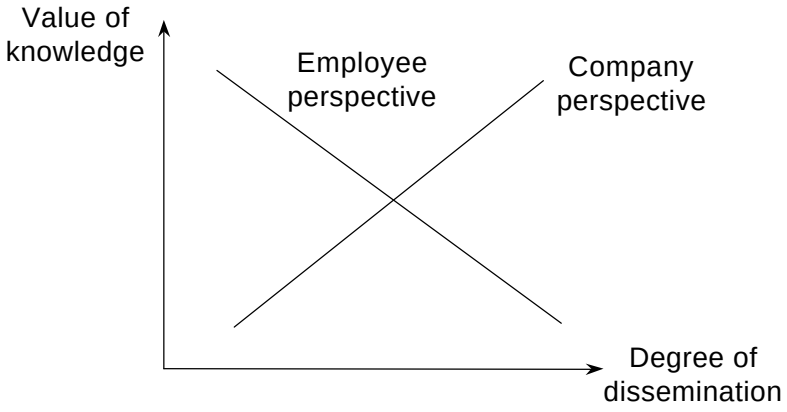

Figure 1: Goal Conflict Knowledge Sharing

Sometimes management tries to explain the failure of knowledge management initiatives with an inadequate knowledge sharing *culture* within a company. However, we believe that there is a more fundamental principle behind our reluctance to share knowledge voluntarily. In order to explore this principle in more detail, we will apply a widely accepted and mature economic theory – neoinstitutional economics theory – to the process of knowledge sharing. With a better understanding of the mechanisms of knowledge sharing we will be able to identify ways to overcome the problems illustrated above.

2. THEORETICAL BACKGROUND

2.1 Neoinstitutional economics

"Neoinstitutional economics theory" is a comprising notion for a number of methodologically similar approaches that share a common assumption about the nature of human behavior and assets.

While Neoclassic theory is based on the assumption that all actors are able to access all relevant information without restrictions due to time or money ("omniscience" or "complete information") (Picot et al., p.43, 1997 and Langlois 1997), neoinstitutional theory is based on the bounded character of all actors.

2.1.1 Assumption I: Bounded Rationality

Bounded rationality refers to cognitive limitations of information processing capabilities of human beings and communication restrictions (Picot and Dietl, p. 179, 1990). Even if individuals aim at rational decision making, in these theoretic approaches it is assumed that individuals succeed to do so only in a limited way (Simon 1976). "Contracting agents are thus assumed to be subject to bounded rationality", as Williamson points out. In addition to this important distinction from neoclassic approaches, neoinstitutional theories also build upon the agents' strive for individual maximization of profits, or, as Williamson continues, "where circumstances permit, [agents] are given to opportunism" (Williamson, p. 520, 1983).

2.1.2 Assumption II: Opportunistic Behavior

As a direct result of the bounded rationality assumption, additional assumptions have to be accepted in order to better align the theoretical construction with reality. Bounded rationality for example refers to a long term contract between buyer and seller, which cannot be completely specified due to myriad possible future developments. A contract that is not fully specified, in turn, opens the door for opportunistic behavior by each of the two parties. The gaps of incompletely specified contracts are considered to be the source for each party "to attempt to gain advantage over the other" (Dietrich, 1994, p.21).

Neoinstitutional theory comprises a large number of approaches; we will focus on two partly overlapping concepts - transaction cost and property rights theory:

2.2 Transaction Cost Theory

In order to better explain the economics of organizations, Coase introduced the concept of Transaction Cost in his seminal work in 1937 and 1960 (Coase 1937). In 1975 and 1985, Williamson and others further developed the theoretical research on the strategic decision whether to vertically integrate or to contract (Klein et al., p. 298, 1978), in short: "make or buy" decision.

The relevance of the transaction cost concept can be compared with the concept of friction in physical systems (Williamson, p. 19, 1985). While in some cases it is helpful to temporarily disregard friction in physical systems to gain a better understanding of cause-and-effect relations, monitoring and measurement of real world phenomena requires researcher to "expressly take into account" the effects of friction (Williamson, p. 19, 1985). The same holds true for economic systems. While neoclassic theory focuses on cost of production from a rather technical perspective, Coase initiated a perspective which focuses on transactions and the management of relationships (Milgrom and Roberts, p. 57, 1990). Transaction cost theory provides a language to describe all cost associated with drafting, negotiating, and safeguarding an agreement (ex ante). In addition, transaction cost include costs incurred by realignment of contracted features of goods and services and its real-world resemblance in case of discrepancies (ex post)[3]. Without using the term transaction cost, Coase referred to it in 1937 as the 'cost of using the price mechanism' of markets (Coase, p. 21, 1937). However, transaction cost are not limited to financial resources but also consist of non financial assets such as time and effort, as Picot et al. point out (Picot et al., p. 66, 1997).

This theoretical approach used to describe the "costs of running the economic system" (Arrow, p. 48, 1969) can also be applied to explain the knowledge exchange process between individuals in organizations[4]. We will elaborate on the components of transaction cost with respect to knowledge being the trade object. For that, we will use the compilation of components provided by Picot et al. because it is aligned with the corresponding steps of the knowledge exchange process initiation, negotiation, transaction, control, and ex-post adaptation. The dominant purpose is the identification of dissimilarities to other trade assets due to the unique features of knowledge.

2.2.1 Initiation cost

Initiation cost refers to the cost incurred when seeking information where a specific knowledge can be found. In an organization this refers to identifying the person or the location within a database

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[3] Milgrom and Roberts list similar components of transaction costs: "Transaction costs encompass the costs of deciding, planning, arranging, and negotiating the actions to be taken and the terms of exchange when two or more parties do business; the costs of changing plans, renegotiating terms, and resolving disputes as changing circumstances may require; and the costs of ensuring that parties perform as agreed." Milgrom and Roberts argue that transaction costs also comprise "losses from inefficient group decisions, plans, arrangements or agreements (...)" (Milgrom and Roberts, p. 60-61, 1990).

[4] One assumption that has not been mentioned explicitly in this article is the concept of methodological individualism, stipulating that the derived theory is applicable to society, state, people, firm, parties, or other social units and individuals alike, as long as positions and actions of such groups are based on the positions and actions of their individual members (for a more detailed description of this assumption, see Furobotn and Richter, p. 4, 1991).

that holds the knowledge. It is the cost for communication with others and the time spent for searching. It also includes the resources utilized to identify the specific knowledge that is sought after.

2.2.2 Negotiation cost

Once the information is available as to where to find the desired knowledge, negotiation cost is incurred. The transfer of knowledge is subject to the eagerness of the knowledge holder to share the desired knowledge. In the case that knowledge is considered a public good within a company (that is, free of charge), negotiation cost is zero as there is no need to negotiate a price for transferring it. If knowledge is considered to be a private good, the parties have to agree on a price for it. The price could be either monetary or a non financial equivalent. Negotiation cost, however, is not the price for the knowledge itself but rather the cost of finding the price. Without market mechanisms, the identification of the value for a good is subject to the assessment of each party involved.

Negotiation costs also include the efforts to stipulate the level of quality to be delivered. If there is no common understanding on the units how to measure the quality of knowledge, the negotiation phase in knowledge transfer may account for a substantial share of total transaction cost.

2.2.3 Transaction cost

Due to the nature of knowledge, the cost for transferring it varies strongly on whether it is explicit or implicit. Explicit knowledge may be codified in databases and hence the transfer process can be limited to codifying and consuming it. In the case of implicit knowledge, the cost for accomplishment of the knowledge sharing process is much higher. As we mentioned above, Nonaka and Konno suggest the transfer of tacit knowledge requires externalization, combination, internalization, and socialization of the parties involved and thus incurs substantially more cost. (Nonaka and Konno, 1998). Consider, for example, a manual for a technical device, that comprises the knowledge necessary to operate that device. In this case a well written and illustrated description can be considered sufficient for knowledge transfer purposes at comparably low cost. However, in the case of transferring knowledge on how to perform medical surgery, mere codification of the relevant knowledge appears to be inadequate. A comprehensive transfer of knowledge in this case requires a substantial amount of resources.

2.2.4 Control cost

Specifications made in the negotiation phase with respect to the scope and quality of the knowledge to be transferred need to be verified throughout the process of knowledge acquisition. Again, the lack of commonly accepted means to measure knowledge makes it difficult to exactly verify the degree of fulfilling. Hence the cost incurred for control depends on the degree of specificability of the underlying contract.

2.2.5 Adaptation cost

Adaptation cost refers to the cost incurred when ex-post negotiation becomes necessary. If the specifications of the contract have not been accomplished by one party or gaps in the contract resulted in opportunistic behavior of one of the parties involved, revising is inevitable.

Accurate calculation of transaction cost for the exchange of knowledge is difficult due to the lack of commonly agreed upon measures to describe the specific features of the asset to be exchanged. Also, interdependencies between the various components of transaction cost exist. Control cost, for example, can be reduced by an increase of specificity in the negotiation phase, hence increasing negotiation cost. The total amount of transaction cost depends on the level of *uncertainty*, *specificity*, and *frequency*, according to Picot et al (Picot et al., p. 68, 1997). These features can also be applied to knowledge. Before acquiring knowledge, it is impossible to assess its quality. Therefore the level of *uncertainty* is high. The second variable - *specificity* - also accounts for a substantial amount of transaction cost, as it is difficult to exactly specify the desired knowledge prior to having it. Finally, the *frequency* of knowledge transfer between two parties is also an important driver for transaction cost, due to the fact that with recurrent exchange of knowledge both parties gain a better understanding of the granularity of knowledge that can be transferred between them. This is particularly true for knowledge because in synchronous communication knowledge is exchanged in small fragments, each followed by feedback from the consumer, which in turn helps the provider to shape the next pieces of knowledge accordingly.

2.3 Property Rights Theory

Property Rights Theory focuses on the attribution of goods with specific rights. Analyzing the structure of the attributed rights among the parties involved yields the possibility to predict their actions according to their share of rights. Picot et al. (Picot et al., p. 54, 1997) differentiate between the following rights that are attributed with goods:

- The right to use a good
- The right to manipulate a good
- The right to accrue the benefit (profit) of a good
- The right to sell a good and keep the premium.

2.3.1 Dead weight loss

The dissemination of property rights to more than one party results in external effects which – in turn – lead to a loss for the community of participants in the exchange. This connection is referred to as dead weight loss. For example, the value of a software product is limited if the customer is not allowed to modify the code in accordance with his specific requirements. The business consultant is not willing to make an extra effort to sell products unless there is a compensation scheme with respect to her personal success in sales.

Therefore, internalization of external effects - that is concentration of all property rights in one party - will minimize external effects and hence dead weight loss of an organization or an economy. Figure 2 illustrates this concept.

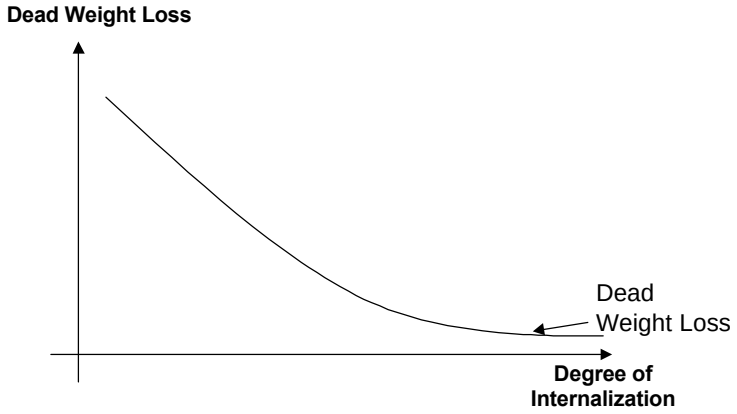

Figure 2: Internalization of external effects reduces dead weight loss

2.3.2 Transaction cost

However, in order to avoid dilution of property rights it is also necessary to attribute to one party all cost and benefits associated with a good. This, in turn, may require substantial control, which in many cases results in prohibitive cost. Consider, for example, that driving a car is the reason for pollution of the environment. However, the cost for restoration of environmental damages is not charged to the driver of the car but to society, because it is virtually impossible to calculate the specific share of damage of each individual driver. Figure 3 illustrates the notion that transaction cost[5] will increase with the degree of internalization of external effects.

[5] Please note that in Property Rights Theory the term "transaction cost" is used differently from its meaning in Transaction Cost Theory: In the latter theory, transaction cost refers to the cost incurred by initiation, negotiation, transaction, control, and adaptation of the exchange. In Property Rights Theory, transaction cost is used to describe the expenditure necessary to associate rights of a good to one ore more parties.

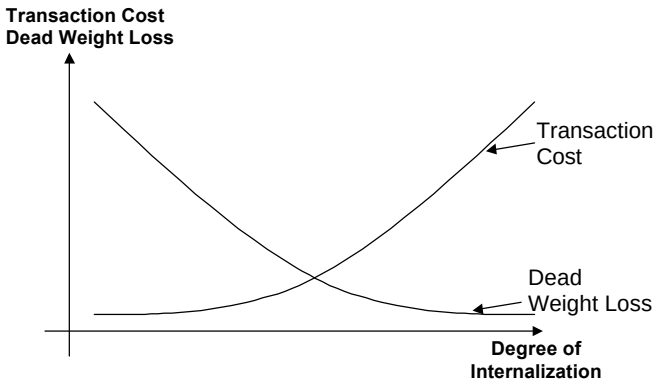

Figure 3: Transaction Cost increase with the degree of internalization of external effects

2.3.3 Overall effect

As a consequence, internalization of all external effects appears not to be efficient because transaction would become prohibitive. Only a combined view on the necessity to internalize external effects and the cost induced by associating property rights to one party will yield an efficient degree of internalization. The combined view is illustrated in Figure 4.

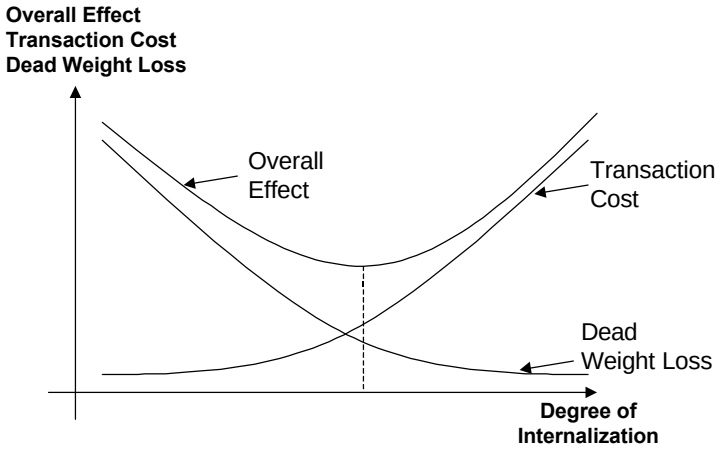

Figure 4: Internalization of external effects, transaction costs, and dead weight loss

2.3.4 Introduction of new media

Finally, we will briefly discuss the influence of new media in the context of knowledge sharing. With the potential to drastically reduce transaction cost, new media has a substantial effect on the level of dead weight loss for an organization. Rather than exchanging paper based files and handbooks, new media provides the tools to optimize the transfer of interactive, online and just in time knowledge. Reducing transaction cost helps to increase the degree of internalization of

external effects, hence a reduction of dead weight loss and the overall effect for an organization. Figure 5 illustrates this aspect.

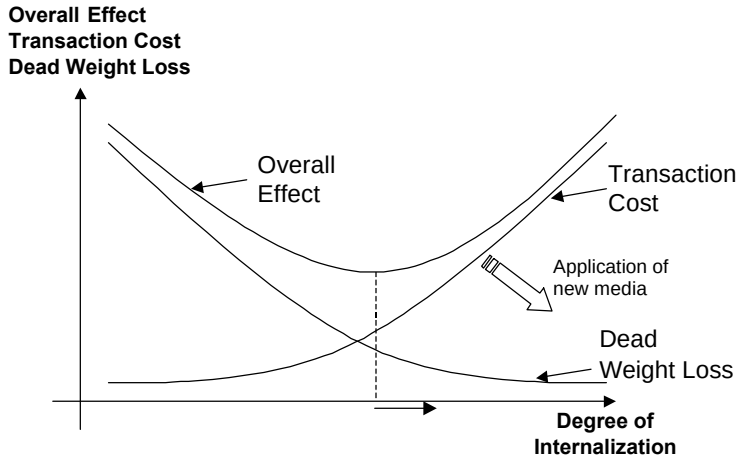

Figure 5: Effect of new media on external effects, transaction costs, and dead weight loss

The key implications of the theories outlined above are summarized in table 1.

Theoretical perspective	Key constructs	Implication on Knowledge Transfer
Transaction Cost Theory	Transaction cost consist of cost for initiation, agreement, processing, control, and adjustment.	In order to foster knowledge transfer, transaction cost should be reduced. The application of new media can help to enhance knowledge transfer in organizations.
Property Rights Theory	External effects are the source for substantial dead weight loss within a society as individuals tend to benefit from assets provided by society without paying for it.	Individuals tend not to share their knowledge voluntarily without additional compensation as they have paid for its acquisition but are not rewarded for sharing it.

Table 1: Key constructs of transaction cost and property rights theory and their implications on knowledge transfer (Source Coase, 1937 and Picot et al., 1997)

3. APPLICATION OF NEO-INSTITUTIONAL ECONOMICS TO KNOWLEDGE MANAGEMENT

In this chapter, we will show how Property Rights Theory and Transaction Cost Theory can be applied to knowledge as a good and knowledge sharing mechanisms, respectively.

First, we will explore the consequences applying the Property Rights concept to knowledge as a good that is exchanged and that can be attributed with specific rights.

3.1 Implications of property rights theory on knowledge sharing

If knowledge is shared in an organization asynchronously, a knowledge object is generated. This knowledge object might have different formats: It could be e.g. an entry in a lessons learned database, the description of a method, the design of a process, the technical drawing for a machine, or a manual for a medical instrument.

From a Property Rights point of view the author of a knowledge object owns this piece of knowledge. In addition to that, the author also owns the rights to use it, to manipulate it, to benefit from it and to sell it. However, in the case that knowledge in an organization is provided free of charge, the property rights structure of this resource can be considered to be fundamentally diluted, because the author's rights have been drastically limited. The owner is not supposed to be able to obtain any profits that result from his good nor is he able to sell the knowledge and keep the premium. These rights have been granted to everybody in the organization, hence the dilution of the Property Rights structure. It is safe to assume, therefore, that from the author's point of view the provision of the piece of knowledge has been associated with some cost, e.g. the acquisition of the knowledge, the opportunity cost to transform implicit knowledge to explicit knowledge, the actual provision of knowledge in some format (such as databases, documents, illustrations, manuals and the like).

Thus, despite the fact that there has been cost involved to contribute the knowledge, the owner has not been reimbursed for his contribution other than his regular compensation[6].

From the author's point of view, it is rational not to provide knowledge due to the lack of a mechanism to honor this effort. In particular, the author is not allowed to exclude others from using his knowledge without compensating him. From the company's point of view, the piece of knowledge is considered to be a public good, with no mechanisms available to exclude anybody from using it[7]. From the company perspective, this is imperative as the company wants its employees to have free access to all necessary knowledge that is available within the company. For the author, this is a dilution of his property rights, hence his unwillingness to share knowledge.

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[6] Please note that, in general, employees agree to surrender the property rights attributed to their knowledge by signing their work contract. Therefore, from a legal standpoint, the employees are obliged to share their knowledge without additional compensation. However, the enforcement of this clause in the contract is subject to substantial transaction cost and thus usually not feasible.

[7] There might be restricted access for *confidential* knowledge.

The result of any dilution of the property rights structure of a good are referred to as external effects which result in dead weight loss for an organization.

However, if it was possible to reduce external effects by internalizing them, the originator of knowledge would be able to obtain the profits from the usage of his or her piece of knowledge by others. This requires that all rights (especially the one to use a good) associated with a piece of knowledge remain with the author. In turn, that limits the rights of all other members of the organization, because they cannot use the knowledge for free. They will have to buy the knowledge from the author and thus reimburse the author's expenses.

As a consequence, it appears to be necessary to discontinue granting free access to knowledge in an organization. Instead, members of an organization should pay a certain price for the piece of knowledge they desire[8]. If knowledge is considered a private good and is traded within an organization, it is possible to encourage active knowledge sharing and hence minimize dead weight loss. Unfortunately, this is only possible by accepting additional cost (transaction cost) e.g. for excluding others from using the knowledge, for sanctioning free riders, for calculation of author's compensations, for keeping track of user accounts, etc. Or, in a rather formal way, transaction cost increase with the degree of internalization of external effects. Therefore, it is imperative to ensure transaction cost not to exceed the benefits from internalization of external effects. This can be achieved by well designed IT-systems with the potential to substantially decrease transaction cost and thus maximize the positive effect of granting all rights associated with a knowledge object to the owner.

3.2 Implications of transaction cost theory on knowledge sharing

As we discussed earlier, granting property rights to the author is only one out of two aspects. The other aspect refers to the necessity to reduce transaction cost resulting from treating knowledge as a product[9]. However, due to its specific features, there are some implications in treating knowledge as a good.

Particularly the fact that it is difficult to exactly articulate and evaluate desired knowledge prior to consuming it poses an important barrier to the first phase in knowledge exchange: identifying a source of knowledge and negotiating a price for it. Also, customization of knowledge objects to user needs is difficult, when knowledge objects are treated as goods. Consider, for example, a database entry on how to manage a project, which inadequately covers the reader's needs for a very specific element, say, a certain checklist. Customization of the knowledge object is difficult,

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[8] There might be reluctance to make employees pay for knowledge that is available in the company as it interferes with a culture which is aligned towards openness and mutual support. In this case, the author's compensation can be provided by the company rather than its employees. For that, each employee can be granted an account with a specific amount of some fictitious currency to buy (and sell) knowledge from other employees or from other sources such as corporate or external seminars. The specific mechanisms of the "knowledge dollar" concept will not be elaborated in this paper.

[9] Once again, please note that in Property Rights Theory the term "transaction cost" is used differently from its meaning in Transaction Cost Theory: In the latter theory, transaction cost refers to the cost incurred by initiation, negotiation, transaction, control, and adaptation of the exchange. In Property Rights Theory, transaction cost is used to describe the expenditure necessary to associate rights of a good to one ore more parties.

because the author cannot foresee the desired granularity and the user cannot sufficiently articulate his needs.

In order to systematically analyze the various problems associated with the unique features of knowledge, we will apply Transaction Cost Theory to the process of knowledge exchange. Transaction Cost Theory indicates that whenever goods are exchanged, specific costs for that transaction are incurred. Considering knowledge as a good, the exchange of knowledge thus is likewise affiliated with transaction cost. However, there are several approaches to reduce transaction cost.

3.3 Measures to reduce transaction cost for knowledge sharing

We will present those measures to reduce transaction cost aligned with the five components of transaction cost:

Initiation: The first step in the knowledge exchange process is the identification of a knowledge source to fill a specific gap. There are several approaches that are applied in current knowledge management suites[10]. Modern knowledge portals include software based functionality such as multidimensional search, multilingual search, meta information based search, automatic user profiling, personalization, filtering, automatically generated content taxonomies. These features of today's knowledge management software help to significantly reduce transaction cost of identifying knowledge in an organization.

Negotiation: Once adequate knowledge objects have been found, it comes to negotiating the price. As it is impossible to evaluate knowledge prior to consuming it, price finding is difficult. It is possible though to provide a derived measure to constitute a price by using market mechanisms. The number of users of a specific knowledge object in conjunction with their individual evaluation of the knowledge after having consumed it is a strong indicator of the quality of the knowledge object and can thus be used to formulate a market based price[11].

Another way to display quality of a knowledge object is to provide additional information on the author's level of expertise. This can be done by indicating formal facts such as the author's university degree, certificates for additional training (for example Microsoft Certified Systems Engineer - MCSE), patents, etc. Apart from the formal facts trust in the author can also be built up by encompassing the author's reputation. Expert status of an author results from peer-to-peer reviewing of knowledge objects. Consider, for example an author of a knowledge object who already shared some 42 other knowledge objects on similar topics, all of which have been considered to be valuable to the readers. This track record would give way to the assumption that the author is an expert, the knowledge object is probably valuable and the price is adequate.

These indicators may not guarantee high quality knowledge objects but they certainly reduce the uncertainty of choosing the right ones. Therefore, branding knowledge[12] is helpful for several reasons: It helps reduce transaction cost for negotiating the price of knowledge objects; it provides the employees with a means to build up a reputation as experts; it can be used to identify experts in specific topics, and it can help to identify knowledge gaps of a company.

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[10] For a detailed analysis of leading knowledge management suits, see (Seifried and Eppler, 1999)

[11] There are more elaborate pricing mechanisms than this, for a sample see (Schmitt, 2000)

[12] A more detailed view on the knowledge brands can be found in (Eppler and Will, 2001)

Transaction: While the perception of knowledge as a private good rather than a public good does not particularly influence transaction cost of transfer and consumption of knowledge objects, new media enables the reduction of this sort of transaction cost in general. New media can significantly increase the bandwidth of knowledge transfer if employees are provided the means to use video functionality, application sharing, interactive multimedia animation, online availability indicators and the like for distant knowledge transfer. In contrast to traditionally paper based knowledge objects, new media can help to optimize the learning success of the consumer of knowledge objects.

Control and **Adaptation:** As soon as the knowledge object has been acquired, the consumer can determine whether or not the agreed upon level of quality has been achieved. If the acquired knowledge object does not fulfil the expectations, individual customization becomes necessary. This can only be accomplished by switching to synchronous communication or enabling asynchronous interaction between buyer and seller of the knowledge object.

4. SUMMARY

Electronic knowledge bases sometimes are regarded as an easy-to-achieve knowledge management tool. They seem to enable the exploitation of the vast reservoirs of a company's knowledge sources, providing all available knowledge of its employees to anybody within the company, avoiding "reinventing the wheel" all over again. In practice, however, electronic knowledge bases often are disregarded and abandoned by the employees it should serve.

We identified two potential reasons why an electronic knowledge base will fail when it is designed to be kept alive only by individuals submitting their knowledge: For one, due to the nature of knowledge, it is difficult if not impossible to codify implicit knowledge with reasonable effort as it usually does not fit into the mostly text-based forms of electronic knowledge bases. And secondly, individuals are not willing to share their knowledge with others voluntarily as personal knowledge is an important factor to differentiate oneself from others. As a consequence, we have to conclude that pure electronic knowledge bases are not suitable to support implicit knowledge sharing in an organization.

While the first impediment – the implicit character of knowledge – can be addressed by limiting the scope of an electronic knowledge base to explicit knowledge, the latter obstacle – a lack of willingness to share knowledge – can be overcome by an appropriate design of the database, by associating a price to knowledge, and by reimbursing the author/owner of a knowledge object for his expenses to generate and share his knowledge.

However, electronic knowledge bases are designed to provide knowledge "just in time" or "on demand". The immediate access to knowledge in this concept does not allow for real, synchronous, human interaction which is considered to be necessary in order to find the "right" knowledge in terms of context, granularity and level of expertise. Also, as mentioned above, complex knowledge and individual experiences are unlikely to be shared in electronic knowledge bases but rather require personal interaction due to its implicit (or tacit) character.

And yet there are ways to ensure successful e-KB: Incorporating not only infrastructural and service features into the design but also enabling processes and motivational aspects for the community of users.

The application of a mature economic theory to knowledge sharing mechanisms appears to be useful for gaining a better understanding of the underlying principles for the motivation to share knowledge. However, it might be rewarding to further explore these principles from a psychological and behavioristic perspective.

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