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Bachelor's Thesis in Informatics

Exploring Barriers to Knowledge Sharing

A Case Study of a Virtual Community of Practice in a Swedish Multinational Corporation

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Abstract

This thesis reports on the results of a quantitative study of various barriers to knowledge sharing in a virtual community of practice within Sigma Kudos, a Swedish multinational organization. The study was undertaken to investigate the under-utilization of a virtual "teamroom". Members' views showed that the biggest barrier involved the way in which people chose to share their knowledge; the respondents preferred sharing knowledge in their existing face-to-face networks. Face-to-face sharing mainly seemed to occur between individuals who had a common ground and shared experiences, and between individuals who were in convenient proximity to each other. Time constraints in combination with perceived lack of intranet site structure implied a redundancy of the teamroom as yet another internal site. Another prominent set of barriers that emerged from the findings was related to aspects of uncertainty and unfamiliarity with the teamroom. Additionally, survey comments revealed the use of teamroom features to be a barrier. To enable co-evolved knowledge structures to occur via the community, it is necessary for management to understand face-to-face sharing behavior in terms of implicit and tacit knowledge. It is vital to change the perception of teamroom sharing as an extra task requiring more time. Moreover, the teamroom needs to be distinguished in context of the greater intranet structure, as well as when it comes to the different sections of the community itself. To foster knowledge sharing in the teamroom, it is also important to define and communicate the strategic meaning of it.

Keywords: knowledge sharing, knowledge management, barriers, virtual community of practice, face-to-face sharing

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1 Introduction

A former CEO of Hewlett-Packard once said: "If HP knew what HP knows, we would be three times as profitable" (Davenport & Prusak, 1998, p. xxi). This statement expresses the idea that knowledge holds great potential value. Also implied is the challenge organizations are faced with in ensuring that knowledge is fully shared and absorbed. When managed properly, knowledge can maximize the sustainable advantage of a business, and information technology (IT) is a knowledge enabler that can connect people over a distance. By utilizing a virtual knowledge pool, people throughout the organization are able to make available knowledge and access it on a worldwide basis. Technology, however, does not guarantee that there will be knowledge to share. The medium itself cannot bring people to truly share what they know, and there are a number of different reasons why this is the case. In this present study some of these barriers to knowledge sharing in an organization's online community will be examined.

1.1 Background

This research touches on an important aspect of knowledge management by investigating factors that hinder knowledge sharing. The idea of focusing on this field of study sprung from a conversation with a Unit Manager at Sigma Kudos about the various IT systems used within the company. One system provides the employees within a particular business area with a virtual community which is internally referred to as the Information Development teamroom, also known as IDTR. Having previously come into contact with the teamroom site, the researcher remarked on the unexpectedly low level of user participation. The discussion then progressed to the purpose of the community and the managerial desire to encourage knowledge sharing activities between employees, and especially so since teams are located at different sites in the world.

In order to disseminate and use knowledge, organizations may set up arrangements where members of a certain group can be brought together to discuss various issues, collaborate, ask questions, and solve problems (Jacobsen & Thorsvik, 2008). Communities of practice play a significant role in organizations in that there is a need for management of knowledge in a systematic way. Knowledge management has become widely favored concept (Alvesson, 2004), and it concerns creating a work environment that supports collaboration, team work, knowledge sharing, and continuous learning (Brown et al., 2003). Knowledge is often recognized as an asset that will give organizations a competitive advantage – it is the key to success (Alvesson, 2004; Wenger et al., 2002). From this standpoint, it is essential for companies

to identify the knowledge that can provide them with that leverage. Due to the rapid globalization of knowledge markets, knowledge sharing in communities is a decisive factor in achieving international success (Wenger et al., 2002).

Sigma Kudos is a Swedish-based company that develops and delivers information solutions. The company supplies technical documentation to customers operating in the telecommunication, software, and automotive sectors. Established in 2007, it employs approximately 500 people who work on providing various information logistics services. Offices are located in close proximity to customers so as to directly support them in their local market and during all phases of their product development. Not including the Swedish market, the presence of the company also extends to China, Hungary, Finland, and Ukraine. Aside from having their own local customers, the Hungarian office represents the largest back office where the employees work on the projects of the other offices, assisting them in providing technical documentation in the respective local markets. Thus, knowledge sharing represents a current matter of interest as this multinational corporation strives to find ways to disseminate local knowledge on a global level, and subsequently reuse the knowledge in local markets elsewhere. While business operations are performed locally, the collection of ideas and valuable insight is useful to employees in other geographical locations.

1.2 Previous Research

There is considerable research that focuses on the management of knowledge and the factors affecting the willingness of individuals to contribute their knowledge in various communities of practice. Based on the Theory of Planned Behavior and previous studies on Social Network Ties and Virtual Learning Communities, Chen et al. (2009) investigated the factors affecting knowledge sharing among academic students in a virtual learning community. Also focusing on an online learning community but adopting a social perspective, Li and Li (2010) researched how dimensions of social capital influence knowledge sharing behavior. Lei et al. (2009) investigated knowledge sharing in virtual communities, focusing on the knowledge sharing network resulting from the members' interactions. While Hsu et al. (2007) studied knowledge sharing behavior in the context of professional virtual communities, Cheung and Lee (2007) examined the continuance of such behaviors.

The study of knowledge sharing in communities has also included studies on barriers to such performance. Ardichvili et al. (2003) researched motivation and barriers to knowledge sharing amongst employees in virtual communities

of practice at Caterpillar Inc. Similarly, Hew and Hara (2007) researched what motivates or hinders teacher to share their knowledge in an online community. Riege (2005) identified potential barriers to knowledge sharing at an individual, organizational, and technological level. BenMoussa (2009) identified and explained organizational and personal barriers that impede on the success of knowledge management initiatives. Furthermore, Ling et al. (2009) examined executives' views on knowledge sharing and its barriers among them in an American multinational corporation based in Malaysia, and subsequently measured the barriers to find the most significant ones.

1.3 Problem Identification

In 2010 Sigma Kudos deployed the Information Development teamroom for the purpose of sharing information, knowledge, and competency in an online community so as to facilitate global collaboration by the provision of a central repository of knowledge resources. Based on the Microsoft SharePoint platform, this intra-organizational IT system is intended for use by all employees involved in the Information Development area. Although the actual site of the teamroom is merely the homepage from which members may reach several sub-sites, the term "teamroom" will be used throughout this study to refer to all sites of the teamroom. The employees work in different departments and are based at various geographical sites. To date, however, the teamroom primarily encompasses the employees who are assigned to the company's main customer.

The Information Development teamroom site allows insights to be recorded and shared amongst peers. The home page of the teamroom displays billboards that are specific to the locations. Users may start topics on knowledge and competence for the purpose of creating intra-educational material. Moreover, there is a sub-site for material related to the methods and tools (M&T) used in information development projects. Certain sites, to which access is restricted, are intended for postings related to the M&T used in specific customer projects. Additionally, there is a CPI (Customer Product Information) Forum where members may hold discussions on topics relevant to their own team. Employees may set up email alerts which will notify them of changes made in the teamroom, and the new post may be previewed in the email. Although people receive notifications from the appropriate billboard by default, the CPI Forum requires the set up of a subscription on one's own.

While management wishes to promote a culture in which people can benefit from knowledge contributed by others, knowledge sharing among employees has not lived up to expectations. The community proves to be showing low levels of employee participation. Accordingly, a team might encounter a

problem which unbeknownst to its members has already been faced and solved by another team in the past. If shared, the first team would be able to benefit from the advice and knowledge of the experienced second team. The exemplified issue raises the question on what prevents individuals to willingly participate in the sharing of knowledge.

Involvement is essential to the development of a community. Without it, the relationships that help to build community identity and trust cannot be established (Kimble et al., 2000). Encouraging and supporting communities of practice increases the sharing of expertise (Hinds & Pfeffer, 2003). When supporting knowledge sharing in the company, the way in which employees are motivated to communicate and share constitutes a central element to the success of knowledge sharing initiatives (Lin et al., 2009). Although a community of practice allows for wider dissemination of knowledge than what is feasible in a face-to-face setting, its success depends on the users to actively supply as well as demand knowledge.

Knowledge sharing and the barriers to knowledge sharing in virtual, as well as and non-virtual communities of practice, have been explored in past research. Although barriers have been ranked in order of significance, the context of employees in a virtual community of practice was lacking. This study thereby investigates the views of employees on barriers to knowledge sharing in a virtual community of practice.

1.4 Purpose and Research Question

The purpose of this study is to investigate impediments to knowledge sharing in a virtual community of practice by ascertaining employees' views on various barriers. Hence, the following research question provides the basis for this study.

> *What are the most significant barriers to knowledge sharing in a virtual intra-organizational community of practice, as rated by its members?*

1.5 Scope

In order to narrow the research to match the length and time constraints given as closely as possible, restrictions on scope have been imposed. The process of knowledge transfer effectively comprises two actions: transmission and absorption (Davenport & Prusak, 1998). Thus, simply making knowledge accessible is not sufficient, because it does not ensure the absorption and use of knowledge. The scope of this study, however, merely lies within the field

of knowledge sharing (transmission) in a community of practice, and more specifically, the barriers to performing such an action. Likewise, the willingness to seek or acquire knowledge have not been dealt with either, as opposed to the willingness to provide or disseminate knowledge.

1.6 Audience

From a practical point of view, the knowledge produced by this study is aimed at Sigma Kudos' managers who are responsible for the workings of the Information Development teamroom; the results of the survey indicate the major areas of knowledge sharing in terms of the barriers studied. The obtained knowledge gives managers an idea of which barriers are the most important to focus on in order to boost levels of knowledge sharing in the teamroom, as well as to identify a strategy for promoting knowledge sharing.

In respect to scientific gains and relevance, this study targets researchers or practitioners exploring the field of knowledge sharing or knowledge management through communities of practice. A general audience consisting of organizations that currently are, or aim to be, involved in knowledge sharing in communities of practice will also be further informed by the study. The findings are expected to be useful to managers who wish to understand the ways in which employees may be reluctant to share their knowledge. Although the findings are the result of a case study and therefore not transferable to a large extent, managers may develop a greater understanding and gain a better insight into barriers to knowledge sharing in a virtual community of practice.

2 Literature Review

To study barriers to knowledge sharing in the teamroom, this chapter describes theories about barriers which have been proposed by other researchers. Therefore, for a better understanding of the potential barriers, literature on communities of practice must also be reviewed. Before discussing these theories, however, it is necessary to first understand the notions of knowledge and knowledge management. Huseman and Goodman (1999) noted that knowledge is a multifaceted concept which must be grappled with, because the first step to managing knowledge is to determine what it is and what it is not.

2.1 Knowledge and Knowledge Management

A common approach to grasping the essence of knowledge is to distinguish it from *data* and *information* (Ahmed et al., 2002). Data can be described as "objective facts describing an event without any judgement, perspective, or context" (Huseman & Goodman, 1999, p. 105); it is represented by words, numbers, images, and sounds that are meaningless on their own unless they are put together appropriately. That is when a group of data is translated into information. Thus, information provides meaning by putting the raw data in a context, and it adds perspective to people's perceptions. Although information and knowledge are two distinct elements, the former tends to be mistaken for the latter because both flow through an organization's networks (Huseman & Goodman, 1999). However, information alone cannot convey knowledge because it lacks several critical elements: experience, truth, judgment, intuition, and values. Knowledge involves combining elements of thinking and feeling (Ahmed et al., 2002); it exists in the individual rather than in the set of information (Churchman, 1971 cited in Ahmed et al., 2002, p. 9). Huseman and Goodman (1999) noted that only the companies skilled at deriving knowledge from its building blocks will be able to harness knowledge and exploit the sustainable competitive advantage that it offers. Knowledge will always remain a vital part in the success of a business, because it provides a company with the only renewable resource that can be captured, leveraged, and created to maximize this advantage.

Beckman (1999) distinguished between three kinds of organizational knowledge, ranging from the structured content to the much more complex and internalized expertise. While *explicit knowledge* is documented, organized, and readily accessible, *implicit knowledge* needs communication (inquiries and discussion) for it to be accessible. *Tacit knowledge* is accessible only through complex elicitation procedures and observation of people's behavior (Beckman, 1999). This type of knowledge is personal in

nature and often context-specific, which makes it very difficult to externalize in words (Davenport & Prusak, 1998; Storey & Barnett, 2000).

Just as there is no agreement as to what exactly constitutes knowledge, the notion of knowledge management is yet to receive its universal definition. du Plessis (2008) stressed the importance of clearly defining knowledge management within the specific organizational context so that everybody has a common understanding of what it means. Ahmed et al. (2002) portrayed knowledge management as the merging of "organizational processes, information processing technologies, organizational strategies and culture for the enhanced management and leverage of human knowledge and learning to the benefit of the company" (Ahmed et al., 2002, p. 12). By this, they referred to a collection of cross-disciplinary processes in pursuit of continuous generation of new knowledge, which results from harvesting the synergy of technology and human creativity. In order for business benefits to occur, knowledge management needs to be aligned with the organization's strategy (Ahmed et al., 2002).

There is a tendency in knowledge management literature to regard knowledge as a commodity; while explicit knowledge is made more explicit and available through the use of computer systems, tacit knowledge is often overlooked (Storey & Barnett, 2000). For the knower, it may be near impossible to make such knowledge accessible via computer applications (Davenport & Prusak, 1998; Alavi & Leidner, 1999 cited in BenMoussa, 2009, p. 324). Fitzpatrick (2003) maintained that much of the sharing of embodied knowledge is about "smaller-grained information […] that is only triggered in the context of interpersonal relationships" (Fitzpatrick, 2003, p. 82), and that such information will not make any sense unless interconnected and used with preexisting knowledge. Edenius and Yakhlef (2003b) point out that although the transfer of tacit knowledge is based on a direct and immediate contact between people, it does not necessarily mean that people must meet face-to-face in order to generate or integrate tacit knowledge. As tacit knowledge encompasses so much learning that has been periodically accumulated over time, however, it cannot be *effectively* recorded in print (Davenport & Prusak, 1998).

While people are the generators of knowledge, the role of technologies is to support the dissemination of knowledge so that it can be leveraged (Huseman & Goodman, 1999). In order to understand the areas of weakness that a knowledge sharing initiative has, it is important to first identify and understand the specific context in which knowledge sharing takes place; by looking at the nature of communities of practice, organizations will be better equipped in attending to potential problem areas.

2.2 Communities of Practice

Organizational knowledge is underpinned by the ideas, discussions, and insights that people develop through interaction within communities of practice (Alvesson, 2004). Wenger et al. (2002) defined communities of practice as "groups of people who share a concern, a set of problems, or a passion about a topic" (Wenger et al., 2002, p. 4). These people come together to hold discussions, share information, and solve problems. Over time, they become more familiar with one another personally (Wenger et al., 2002) and form a mutual trust (Alvesson, 2004). They develop a shared set of knowledge, methods, and practices (Wenger et al., 2002).

People are brought together by their shared practice (Alvesson, 2004) and interact in a mainly informal setting (Edenius & Yakhlef, 2003a; Wenger et al., 2002). For instance, the members may come from one single business unit, or they may be structurally dispersed and cross divisional borders (Wenger & Snyder, 2006). Wenger et al. (2002) referred to a community of practice as distributed when its members cannot rely on face-to-face interactions as their main way of connecting. Typically, these types of communities are geographically distributed, and the members share their knowledge online across organizational units, countries, and time zones (Ardichvili et al., 2003; Wenger et al., 2002).

As summarized in Table 2.1, adapted from Wenger et al. (2002), there are many benefits to participating in a community of practice – not just to the organization as a whole but also to the community members. In the short term, business outcomes and members' experience of work are improved. A community of practice provides an area for problem solving; members receive help with challenges, and their questions are answered quickly (Wenger et al., 2002). Hence, new knowledge can be produced when people respond to specific issues and problems (Brown et al., 2003). Having more perspectives on problems, the community members can make better decisions and better contributions. They can gain more confidence in their approach to problems as they know they have the support of the community. In the long term, the individuals further their professional development, and the organization develops its capabilities. Thus, as the members help each other with immediate problems, they also add to their central collection of knowledge (Wenger et al., 2002).

Table 2.1 Short-term and long-term value to organizations and community members

	Short-term value	Long-term value
Benefits to Organization	• Area for problem solving • Quick answers to questions • Reduced time and costs • Improved quality of decisions • More perspectives on problems • Coordination, standardization, and synergies across units • Resources for implementing strategies • Strengthened quality assurance • Ability to take risks with backing of the community	• Ability to execute a strategic plan • Authority with clients • Increased retention of talent • Capacity for knowledge-development projects • Forum for "benchmarking" against rest of industry • Knowledge-based alliances • Emergence of unplanned capabilities • Capacity to develop new strategic options • Ability to foresee technological developments • Ability to take advantage of emerging market opportunities
Benefits to Community Members	• Help with challenges • Access to expertise • Better able to contribute to team • Confidence in one's approach to problems • Fun of being with colleagues • More meaningful participation • Sense of belonging	• Forum for expanding skills and expertise • Network for keeping abreast of a field • Enhanced professional reputation • Increased marketability and employability • Strong sense of professional identity

Source: Wenger et al. (2002)

The health of communities of practice relies on support in the form of effort, time, and resources (Ahmed et al., 2002). Communities are highly dependent on the voluntary participation of their members; the group will survive as long as people are interested in maintaining it (Wenger & Snyder, 2006). By removing barriers, encouraging involvement, valuing the learning that takes place, and allocating more resources, organizations can intentionally cultivate communities of practice (Wenger et al., 2002). Knowledge sharing will only occur in environments of mutual support, respect, and honesty between individuals (Ahmed et al., 2002). Nurtured communities will be more likely to reach their true potential. Strong communities consist of a spread of people across the entire organization, while the less cultivated ones tend to form

along the structured lines of friendship, geographical location, and organizational settings (Wenger et al., 2002).

2.3 Barriers to Knowledge Sharing

While there are many potential barriers to successful knowledge sharing and implementation of knowledge management in general, this study focuses on personal barriers that the researcher deemed relevant in relation to the case setting (a virtual community of practice) and the researcher's prior knowledge of the Information Development teamroom. Personal barriers involve the behaviors and attitudes held by users of knowledge management systems (BenMoussa, 2009). The perceptions of employees determine the acceptance or rejection of knowledge management and the use or non-use of the IT system. They will also ensure the creation or non-creation of an organizational culture receptive to knowledge management (du Plessis, 2008). The selected barriers therefore concern employee perceptions in terms of behaviors and attitudes which can be related to an organizational or a technological perspective. Appendix 1 shows the various barrier types and the respective authors by whom they have been referenced.

2.3.1 Lack of Time

People may feel that there is a general lack of time to share knowledge (Riege, 2005; Ling et al., 2009). Furthermore, Hew and Hara (2007) found that although people are generally motivated to share knowledge, the lack of time can cause people to prioritize their daily responsibilities. When time is scarce people center their attention on tasks that are more advantageous to themselves than others (Michailova & Husted., 2003). The barrier occurs because employees view knowledge sharing as a task outside of their daily work, therefore believing they need to invest extra time to share knowledge (BenMoussa, 2009). Fitzpatrick (2003) reported that employees are too busy with their jobs to commit any extra time and effort to making expertise available to others. People may be reluctant to dedicate the time and resources needed in order to share knowledge (Szulanski, 1996). Wenger et al. (2002) noted that when special effort is required to simply connect to other community members, the costs of participation (i.e. time and effort) increase, thus making people less inclined to engage themselves. In some businesses, employees are measured on how many hours they deliver in terms of outputs. From the viewpoint of these employees, time is money, which makes it a challenge to convince them that they can work smarter and faster by spending some time on knowledge management (du Plessis, 2008).

2.3.2 Benefits to Oneself and Others

The idea that knowledge is power has been identified as a reason why employees are reluctant to share their knowledge (Davenport & Prusak, 1998; Wheatley, 2000 cited in Ling et al., 2009, p. 129). Some employees hoard their knowledge because they reason that they will benefit more from doing that than from sharing it (Davenport and Prusak, 1998). Not contributing knowledge may help to maintain an individual's superiority in the organization (Wheatley, 2000 cited in Ling et al., 2009, p.129). Davenport and Prusak (1998) argued that those who know have power in controlling over who knows what, and so the advantage of being a sole owner of knowledge disappears when that knowledge is shared. Szulanski (1996) also noted that this reluctance may stem from the fear of losing ownership, a certain superiority, or a favorable position. Fitzpatrick (2003) found that knowledge sharing is against some people's interest as they will not be able to differentiate themselves as having good knowledge.

Perceiving management's intents and objectives for knowledge sharing to be unclear can also be a barrier (Lelic, 2001 cited in Riege, 2005, p. 24). It is easier for employees to participate in knowledge management when they feel trusting towards the implementation (du Plessis, 2008). As employees do not understand the reason for knowledge sharing in the organization, they may fear that sharing will reduce their job security (Lelic, 2001 cited in Riege, 2005, p. 24), status, or power (Wheatley, 2000 cited in Ling et al., 2009, p. 129). Employees often hoard knowledge because they do not expect to be given a promotion if appearing more knowledgeable than their superiors (Riege, 2005).

Users who see no usefulness or value offered by the implemented system only perceive it as a load or an added responsibility (BenMoussa, 2009). A perceived lack of incentive systems (such as rewards and recognition) acts as a barrier to knowledge sharing as well (Ling et al., 2009); employees may be unwilling to share their knowledge for fear of not being given fair recognition from managers and coworkers (Riege, 2005), and not receiving such adequate rewards may cause resentment (Szulanski, 1996). Another barrier concerns the seemingly low realization and awareness of that one's possessed knowledge has value and benefits to others (Riege, 2005). Some employees do not understand how their knowledge can be useful to the people who are in need of it (Ling et al., 2009).

2.3.3 Fear and Uncertainty

Ardichvili et al. (2003) identified another barrier in that knowledge network members are afraid of sharing knowledge that may not be considered

relevant, important, or accurate by others. In connection with this, a level of uncertainty about what information people are supposed to be sharing was found among the same network of members, hindering them from sharing knowledge. du Plessis (2008) similarly noted that a lack of understanding of what knowledge is important to keep can be a big barrier to knowledge management.

Another barrier related to fear is that new recruits frequently feel intimidated to participate, because they believe they have not yet earned the right to post in a company-wide community. There is also a worry of receiving possible ridicule or criticism as a result of sharing; people are concerned about receiving replies that diminish the value of one's knowledge contributions (Ardichvili et al., 2003). Furthermore, Hew and Hara's (2007) study of an online teacher community showed that perceived lack of knowledge could hinder knowledge sharing; there were teachers who felt they had limited knowledge relative to others in the community, thus preventing them from sharing.

2.3.4 Technological Context

IT plays a key role in knowledge management; it efficiently connects large numbers of people from distant geographical locations (Gupta & Govindarajan, 2006). However, the text-only technology setting of communities of practice presents a potential problem to knowledge sharing. Verbal and visual elements that are usually present in a face-to-face environment are now absent, and this introduces the risk of other people misconstruing the shared ideas and consequently criticizing the knowledge source unjustly. Therefore, the risk of being misunderstood brings about hesitation and unwillingness to contribute knowledge (Hew & Hara, 2007). Another technology related barrier is unfamiliarity of information systems or IT systems. Although people are not generally unwilling to adopt technology, the lack of experience with the IT system could result in a reluctance to use it (Riege, 2005).

Geographic separation and different time zones can be handled with the use of computer-based technologies, but these technologies cannot properly substitute face-to-face interactions. Distance is more than just physical; it is more difficult to feel the presence of the community itself and remember its existence when the community members are visible only when they post something. Members cannot see if people are actually reading – even benefitting from – a contribution they made or a question they posted. In-person communication offers better opportunities to engage in informal networking (Wenger et al., 2002). When it comes to utilizing a community of

practice as a “source of new knowledge” (Ardichvili et al. 2003, p. 66), past research indicated that already being a member of a closely knit, face-to-face community renders the community of practice redundant. It is considered more preferable to share knowledge in one’s existing networks where people communicate in each other’s physical presence. Thereby, it may be implied that another barrier to knowledge sharing in a virtual community is that of employees preferring to share knowledge in their existing and more intimate face-to-face networks.

3 Methodology

This chapter describes and explains how the research was carried out. The steps of the research methodology are structured below and involve selecting the research method, gathering the data from the sample, choosing the scientific measurements to measure the phenomenon appropriately, as well as compiling and analyzing the data. Aspects of reliability and validity are also discussed.

3.1 Research Method

Firstly, in order to determine the significance of barriers, the investigation built upon past research on knowledge sharing in terms of factors acting as impediments to such behavior; the general idea was formed that knowledge sharing is affected by factors that may or may not function as major barriers. With this in mind, a deductive approach was thereby used for the investigation. Secondly, this study took a descriptive approach because it set out to determine the main barriers to knowledge sharing. According to Jacobsen (2002), a research question is descriptive when one wishes to get an overview of a situation at a given point in time. Thirdly, a quantitative research method was used for the gathering of data because investigating the significance of certain barriers to knowledge sharing requires collecting answers that are quantitative by nature. Jacobsen (2002) argued that the quantitative method is useful when intending to describe the frequency or scope of a phenomenon, or as in this particular study, finding out the intensity of employees' agreement to statements and determining the frequency of answers.

Further, the purpose of the quantitative method is to obtain information that can be easily systemized in its standard form, allowing many objects to be analyzed collectively. Such an approach is most suitable when having a relatively clear research question as a result of holding prior information about the subject matter. Clarity allows for categorization of data before it has been collected (Jacobsen, 2002). The researcher found the above circumstances to be applicable to this case study as it aimed to quantitatively analyze a set of data obtained from questions mainly based on predefined barriers (which had also been categorized in advance). Empirical data was gathered via a computer-based survey and based on the results the factors which had garnered the highest mean values were identified. Thus, a quantitative approach was used for both collecting and then processing the data. The interpretation of the results, however, was carried out qualitatively, making this a qualitatively interpreted case study drawn from a quantitative

analysis, which in turn has been performed on a quantitatively collected set of data.

3.2 Data Collection

A quantitative data collection method requires data that provide a higher degree of standardization (Jacobsen, 2002). This case study targeted a population of more than 50 employees, and the fact that these people were located in three countries emphasized the need for a quantitative data collection method. Thus, for reasons of time and space, the way of collecting data was to administer an online survey in which the barriers to knowledge sharing had been predefined. The survey primarily consisted of close-ended questions as that would result in a smaller variation of answers (Trost, 2001). In addition to the survey, the researcher familiarized herself with the teamroom and its sub-sites in order to better understand their functioning. Access to the teamroom had been granted by Sigma Kudos so that the sites could be explored.

3.2.1 Sampling

The population was represented by the target group under investigation, as in the 70 globally dispersed members of the Information Development teamroom who work on the assignments provided by Sigma Kudos' main customer in Gothenburg. Although located in three countries, the employees all work for the same customer. The members of the population were chosen based on their relative ease of access since they are part of the aforementioned Unit Manager's area of responsibility. These individuals were close at hand, which made it a convenience sample consisting of 30 respondents who successfully completed the survey.

Among the 70 employees invited to take the survey, the majority were based in Gothenburg while the rest of them were based overseas in Budapest, Beijing, and Shanghai. Responses were submitted from all locations except Shanghai. However, the fact that no employees from Shanghai participated in the survey had no bearing on the study as there was no intent to make any comparisons of how different segments such as cities had answered the questions.

3.2.2 Survey Design

The procedure for designing the survey and formulating questions started with a review of methodology literature. Question parameters (see Appendix 3) were based on the barriers found in literature and previous studies.

Jacobsen (2002) noted that the most common quantitative method of data collection is to use closed-ended survey questions, allowing respondents to answer only within the framework that has been set by the researcher in advance. Statement questions are typically used to measure opinions and feelings (Jacobsen, 2002). Thus, the constructs were operationalized and formulated as statements, some of which had been adapted and modified from prior investigations relevant to the context of knowledge sharing. Alternating between two types of statements will keep the respondent from falling into rhythm of checking their options simply out of habit (Jacobsen, 2002). Therefore, the survey included some positively worded items which were then reverse-coded to make sure that all items were coded in the same direction. A couple of questions were hidden by default until they were triggered by an answer from the previous question, asking for a more detailed answer. Additional questions were added, serving as the last section of the survey so as to capture demographic background data about the respondents and their participation in the teamroom.

Because of the possibility of respondents not knowing which of the answers to select or being able to take a definite stand (Trost, 2001), a neutral answer option was included. Having more than seven or eight points on the scale is likely to result in difficulty of labeling each value with precise meaning. Consequently, the respondent may have trouble selecting an exact value, which negatively affects the probability of submitting the same answer if the respondent would to be asked once more in a couple of weeks. A seven-point scale may present the same problem and a three-point scale is not specific enough (Jacobsen, 2002). Hence, the survey items measured data on a five-point Likert scale, ranging from "strongly disagree" = 1 to "strongly agree" = 5. However, in instances where there was a positively worded statement the reporting values were reversed-coded to "strongly agree" = 1, "agree" = 2, "disagree" = 4 and "strongly disagree" = 5.

An optional open-ended question was put at the very end of the survey. Respondents were asked to add suggestions for the improvement of the teamroom, thereby allowing the potential discovery of any other barriers to knowledge sharing. Correspondingly, Jacobsen (2002) argued that such questions often result in the discovery of information that is of great interest. If there would have been hundreds of respondents giving different answers, the processing of information would be challenging. This survey, however, was directed at a more manageable sample of 70 employees. Furthermore, Trost (2001) strongly recommended the use of one unbiased, open-ended question to close every survey; often times the answers will leave the researcher with perceptions that may be useful in the interpretation and analysis of the data material. From a respondent's point of view, it might be

pleasing to finally be able to comment freely and not be limited to predefined answers (Trost, 2001).

During the survey design phase, feedback was given by the Unit Manager at Sigma Kudos. Just prior to distribution, the survey was pre-tested on an individual in order to detect possible issues. Carrying out such a test is considered to be highly important to the study and helps in discovering errors that have might have slipped through during the survey design process (Jacobsen, 2002). Seven days before the survey was made available to the selected sample, the Unit Manager released a message to briefly inform the employees of the soon-to-be-expected survey. This message was posted in the teamroom on the separate billboards for Gothenburg, China, and Hungary.

The survey was created with an online survey tool and a hyperlink to the survey was administered by email. Indicating the support of a higher-up member of the company adds to the legitimacy of the investigation (Jacobsen, 2002), and so the email was distributed by a colleague of the Unit Manager's in question. This email served as a survey cover letter which briefly described the purpose of the study, the approximate duration, assurance of confidentiality and anonymity, anticipated benefits resulting from the study, how to view the study results when published, and contact information (see Appendix 2). Anonymity is likely to influence the willingness of respondents to participate in a positive way, because they will know that their answers cannot be linked to them (Jacobsen, 2002; Trost, 2001).

In an attempt to increase the response rate, as suggested by Jacobsen (2002), a reminder was emailed to the entire sample six days after the launch of survey. This time, the email was sent by the Unit Manager. Again, the message emphasized the importance of participation and the aspects of anonymity and confidentiality. The idea was to encourage those who still intended to take the survey to do it without delay, as well as to motivate hesitaters.

By default, the data was collected and stored by the online survey tool. Out of the 70 employees matching the selection criteria, 30 respondents completed the survey, producing a response rate of 42.9%.

3.3 Data Analysis

After the survey was conducted and the data collected, a reporting feature in the survey tool was used to assemble the results in a table format. For each barrier item, the frequency count, number of total responses, sum, and

average value were calculated. The mean scores were then listed in descending order. Similarly, tables for the profile items displayed the value, count per value, number of total responses, and open text field responses. The written comments made by respondents were also processed and analyzed when linking them to the barriers, as well as identifying additional ones. In effect, the findings were qualitatively interpreted in relation to the theoretical framework established.

3.4 Reliability and Validity

Reliability refers to the degree of consistency of a study; a measurement or method is considered reliable if it repeatedly yields the same results (Jacobsen, 2002). Because the survey did not receive a 100% response rate, the reliability of the study was reduced.

Validity refers to the extent to which a study is actually reflecting or assessing the construct intended for measure (Jacobsen, 2002; Trost, 2001). Internal validity concerns the authenticity of the collected empirical materials and the conclusions drawn from it. External validity is in regards to whether or not a result would be valid with similar parameters, such as another organization, at a certain point in time. It shows to which extent the results of a study can be generalized or transferred to other contexts (Jacobsen, 2002). To reduce potential response errors and increase the internal validity of the study, the survey was developed carefully. The survey included a few positively worded items so that the respondents would consider each question rather than answer with the same response to all questions. A few of the constructs were measured using somewhat modified items from other researchers. Moreover, the number of options to pick an answer from was kept to a minimum. The intention was to reduce the risk of respondents losing track of all options, and therefore selecting the one answer that comes easily to mind and not the one that would be most accurate. Honesty may have been another response issue affecting the accuracy. If respondents deliberately falsified their answers the internal validity of the study would be significantly jeopardized. It is possible that some respondents felt they were being asked sensitive questions, which would have made them reluctant to answer truthfully. The external validity was greatly reduced due to the fact that the investigation was conducted as a case study.

Alvesson (2004) observed that knowledge cannot be directly observed or measured, and as it is partially implicit people are not able to give a full account of what they know and how they use their knowledge. Consequently, the respondents may not have been aware of the exact same knowledge residing in them when taking the survey again some other day, resulting in a

different response. This volatility makes it further difficult to generalize the results and have them be valid in another context. Thus, the nature of partly implicit knowledge was expected to have a negative effect on the reliability and external validity of the study.

4 Results

The employees of Sigma Kudos work in a multinational setting and for the purpose of encouraging and support knowledge collaboration between people at different geographical locations, the company set up an online community comprising a teamroom (the homepage) and various discussion sites (sub-sites). A survey was distributed to 70 teamroom members as a means to measure the significance of barriers to knowledge sharing. The respondents were asked to express their extent of agreement about how well each of the statements (barriers) was an accurate description of their perceptions of knowledge sharing in the teamroom, including the sub-sites. Demographic data and background information were also collected for the purpose of providing Sigma Kudos a clearer picture of the respondents' profiles. The results of the survey are reported in the following sections below.

Based on the demographic data and background information, as shown in Table 4.1, the respondents are located in three cities: Gothenburg (76.7%), Budapest (16.7%), and Beijing (6.7%). Most respondents are technical writers (90%) and have 0-1 year (66.7%) of working experience from their current assignment. In terms of the log-on frequency, the majority of the respondents log on to the teamroom site less than monthly (36.7%), followed by those who do so on a monthly basis (20%) and those who visit once every second week (16.7%). One respondent (3.3%) visits the teamroom and its sub-sites on a daily basis, and another respondent logs on every third week. Approximately half of the respondents (53.3%) say that they do receive email alerts when there is an update made to the teamroom. All respondents also subscribe to the Gothenburg billboard feed, whereas the billboards for Karlskrona and Hungary only amass one (6.3%) and two respondents (12.5%), respectively. Furthermore, most respondents (68.8%) have set up email alerts from the Method & Tools News sub-site.

Table 4.1 Demographic background data

Characteristic	Classification	Count	Percent %
Location	Beijing	2	6.7%
	Budapest	5	16.7%
	Gothenburg	23	76.7%
Organizational role (Multiple select question)	Editor	1	3.3%
	Responsible for M&T	1	3.3%
	Project Manager	5	16.7%
	Technical Writer	27	90%
Years of working on current assignment	0-1	20	66.7%
	2-3	9	30%

	4-5	1	3.3%
Log-on frequency	5 days a week	1	3.3%
	3-4 days a week	3	10%
	1-2 days a week	3	10%
	Once every second week	5	16.7%
	Once every third week	1	3.3%
	Monthly	6	20%
	Less than monthly	11	36.7%
Email alerts received	Yes	16	53.3%
	No	14	46.7%
Specific site alerts received (Hidden, multiple select question)	Gothenburg	16	100%
	Hungary	2	12.5%
	Karlskrona	1	6.3%
	Methods & Tools News	11	68.8%

Table 4.2 shows the respondents' extent of agreement for all 14 survey items; each statement represents a potential barrier to knowledge sharing in the teamroom. Also shown in the table are the frequency counts expressed as percentages within parentheses. The barriers are merely listed in the same order used for the actual survey, whereas the analysis section of this study ranks the barriers according to their significance. Below are thus the compiled data to give an overview of the barriers.

Table 4.2 Summary of respondents' views on the barriers to knowledge sharing

	Strongly disagree	**Disagree**	**Neutral**	**Agree**	**Strongly agree**
Lack of rewards or recognition makes me reluctant to share knowledge in the teamroom.	6 (20%)	8 (26.7%)	10 (33.3%)	5 (16.7%)	1 (3.3%)
I would have to invest extra time to share knowledge in the teamroom.	0 (0%)	6 (20%)	5 (16.7%)	18 (60%)	1 (3.3%)
Sharing my knowledge in the teamroom will reduce my advantage within the company.	10 (33.3%)	14 (46.7%)	6 (20%)	0 (0%)	0 (0%)
I am clear on management's objectives for sharing knowledge in the teamroom. (Reverse-coded)	2 (6.7%)	6 (20%)	10 (33.3%)	12 (40%)	0 (0%)
I believe my knowledge is valuable and beneficial to other members of the teamroom.	0 (0%)	1 (3.3%)	7 (23.3%)	16 (53.3%)	6 (20%)

(Reverse-coded)					
My knowledge is limited compared with other members of the teamroom.	1 (3.3%)	12 (40%)	16 (53.3%)	1 (3.3%)	0 (0%)
I am afraid of misleading other members of the teamroom by sharing knowledge that may not be considered relevant, important, or accurate.	5 (16.7%)	17 (56.7%)	6 (20%)	2 (6.7%)	0 (0%)
I am clear on what knowledge should be posted in the teamroom. (Reverse-coded)	0 (0%)	10 (33.3%)	8 (26.7%)	12 (40%)	0 (0%)
As a new recruit, I would feel that I need to earn the right to post in the teamroom.	3 (10%)	14 (46.7%)	7 (23.3%)	6 (20%)	0 (0%)
I am concerned about possibly receiving ridicule or criticism for what I might post in the teamroom.	4 (13.3%)	13 (43.3%)	9 (30%)	4 (13.3%)	0 (0%)
I fear that the lack of face-to-face elements in the teamroom (e.g. verbal and visual cues) will cause people to misunderstand my posts.	2 (6.7%)	17 (56.7%)	6 (20%)	4 (13.3%)	1 (3.3%)
I feel unfamiliar with the teamroom.	3 (10%)	5 (16.7%)	5 (16.7%)	12 (40%)	5 (16.7%)
I perceive that there are benefits provided by the teamroom. (Reverse-coded)	0 (0%)	4 (13.3%)	8 (26.7%)	15 (50%)	3 (10%)
I prefer sharing knowledge in my existing face-to-face networks within the company to sharing knowledge in the teamroom.	1 (3.3%)	4 (13.3%)	8 (26.7%)	13 (43.3%)	4 (13.3%)

The last barrier item hid a question by default until a reporting value of either 4 or 5 was selected by the respondent. Table 4.3 shows the spread of answers from 17 respondents when asked specifically about the face-to-face networks that respondents rather share their knowledge in, as opposed to using the online teamroom. Among this set of respondents, most prefer sharing knowledge in networks of colleagues who they work with on the same projects (94.1%), as well as colleagues with whom they are based in the same room (82.4%). Respondents are also inclined to share their knowledge with people working on a project related to their own (52.9%) and the network of co-workers from their previous projects (47.1%). A number of employees responded that they rather share knowledge with their colleagues who are based in the same building (41.2%). Roughly one-third of the group is more

willing to share knowledge face-to-face with colleagues who they know on a personal level (35.3%).

Table 4.3 Face-to-face networks of choice (hidden, multiple select question)

Type of network	Count	Percent %
Same room	14	82.4%
Same building	7	41.2%
Same city	3	17.6%
Same projects	16	94.1%
Same previous projects	8	47.1%
Related projects	9	52.9%
Same department	5	29.4%
Personal relationship	6	35.3%
Other	1	5.9%

4.1 Survey Comments

The optional question designed at the very end of the survey gave respondents the opportunity to freely add opinions about the teamroom. From the resulting 13 submissions, three central themes can be drawn. An additional submission was received, though the message only indicated that the commenter's thoughts already had been shared but not carried out. The participants are given alphabetical identifications to ensure anonymity in the following sections.

First and foremost, the most common issue being remarked on is the overall structure of, not only the IDTR but, all Sigma Kudos sites. Employee A would like to have the teamroom added – at least as a link – to the company's main intranet in order "to keep it visible at all time [sic]". Many respondents call attention to what they consider is an excessive number of sites, rooms and portals on which information is stored and shared across the organization. The plethora of different sites is cited by Employee F as a reason for not logging on to all those places more often. In relation to the company having far too many sites, users are "not always clear where the correct place is" (Employee M) for sharing information. The CPI Forum is pointed out as it "currently includes topics that are much better suited for the

MoT forum" (Employee M). Moreover, almost half of the respondents want the number of sites or rooms to be reduced, and they would prefer that the remaining ones are connected to make them easier to find. Thus, there is an overall desire to have one site, room, or portal that can provide access to everything – one that has all the intra-organizational sites connected to each other, or simply one that "does it all" (Employee D). Employee E agrees with this line of thought and finds that "having separate entries is a hassle". However, such reorganization turns out to be only partially motivating for Employee F who still may not utilize the teamroom; he or she has no time to look for something when "there is so much really old stuff on the sites", adding that "no longer valid info should be removed". For instance, the employee mentions that messages about someone being out-of-office are not removed once the person has returned.

Aside from the distinct need for an improved teamroom information structure, Employee G argues that the entire network of internal sites should be re-implemented with a better structure:

> *I think it's not enough to evaluate just the Information Development site. […] I think the whole intranet should be evaluated, and re-implementet [sic] with a much better structure. Because now the Information Development site is just another site for information sharing which no one has the time to use, because we don't see the benefits of it. All internal sites should be part of the same site hierarchy, that should make it more natural and quick to also use the ID site.* (Employee G)

In terms of adding to the teamroom site, Employee M ponders whether implementing a wiki meant for the exchange and organization of information within and between projects "would help to increase user activity".

The second area of concern is the perception that there is a lack of general information about the teamroom. A few people suggest that they be given more information about the teamroom, such as the basics on "how to start using it or what it is" (Employee I). Employee H proposes using stand-up meetings to inform the employees, whereas Employee J finds it better to receive a PowerPoint document about the teamroom "or related information before the tranning [sic]".

Lastly, the third category of comments centers on features of the teamroom. With respect to the optional notifications that may be received by email, there are respondents who wish they were initially mandatory so that people would have to actively remove them. If the subscriptions on the CPI forum were mandatory by default it would ensure that everyone subscribes to all the

teamroom sites. This allows information to "be pushed, rather than pulled" (Employee K), and hence the belief that "people in general will be more motivated to post things (as they WILL be read)" (Employee K). This perception is seconded by Employee L who up until the survey was unaware that he or she received notifications from the billboard only, and not from the CPI Forum. Another feature of the SharePoint technology mentioned is the text editor. Employee M considers the forum to be less than user friendly, referring to the *What You See Is What You Get* (WYSIWYG) editor's incompatibility with web browsers other than Internet Explorer: "Not everyone prefers or uses Internet Explorer, and the text editor only offers WYSIWYG capabilities in IE, which is a big barrier to even post an entry".

5 Analysis

In this chapter the results from the survey are first discussed by specifically looking at the answers given for each barrier. Next, the opinions obtained in the unrestricted section of the survey are examined. The comments essentially revealed what 13 users perceive to be problems or issues in the current teamroom environment. Most of their opinions can be linked to some of the barriers studied, and thus they may somewhat further explain the low level of member activity in the teamroom.

From Table 5.1, the preference for knowledge sharing in existing face-to-face networks was identified as the most significant barrier. Other major barriers identified in terms of mean value were lack of time for knowledge sharing because of the perceived extra time required, and sense of unfamiliarity with the teamroom. The view of knowledge as a personal advantage received the lowest ratings, followed by lack of awareness of the value one's knowledge has to fellow members, and fear of misleading others by sharing knowledge that may not be helpful.

Subsequently, the rest of the barriers were slightly more significant, but they had all been rated lower than 3 ("neutral"). The following subheadings are therefore classified into major barriers where the mean value has been rated higher than 3, and minor barriers where the mean value has been rated lower than 3.

Table 5.1 Barriers to knowledge sharing sorted by weighted significance in descending order

Barriers to knowledge sharing	Mean scores
I prefer sharing knowledge in my existing face-to-face networks within the company to sharing knowledge in the teamroom.	3.50
I would have to invest extra time to share knowledge in the teamroom.	3.47
I feel unfamiliar with the teamroom.	3.37
I am unclear on management's objectives for sharing knowledge in the teamroom. *	2.93
I am unclear on what knowledge should be posted in the teamroom. *	2.93
Lack of rewards or recognition makes me reluctant to share knowledge in the teamroom.	2.57
My knowledge is limited compared with other members of the teamroom.	2.57
As a new recruit, I would feel that I need to earn the right to post in the teamroom.	2.53
I fear that the lack of face-to-face elements in the teamroom (e.g. verbal and visual cues) will cause people to misunderstand my posts.	2.50
I am concerned about possibly receiving ridicule or criticism for what I might post in the teamroom.	2.43
I perceive that there are no benefits provided by the teamroom. *	2.43
I am afraid of misleading other members of the teamroom by sharing knowledge that may not be considered relevant, important, or accurate.	2.17
I do not believe my knowledge is valuable and beneficial to other members of the teamroom. *	2.10
Sharing my knowledge in the teamroom will reduce my advantage within the company.	1.87

*Item was positively worded in the survey

5.1 Major Barriers to Knowledge Sharing

Although the graphs in the sections below illustrate the specific results for each original survey item in their original wording (see Table 4.2), they are presented in descending order in terms of weighted significance as a barrier in Table 5.1.

Based on the results of the survey, the most significant barrier to knowledge sharing produced a mean value of 3.50 and related to the preference of more familiar face-to-face communities over the online community. The frequency count in Figure 5.1 shows a rather incremental change in the extent of agreement, not including “strongly agree” which had an equal number of respondents as “disagree”. Thus, there were more employees who, regardless

of the assessment level on the Likert scale, rather shared their knowledge in face-to-face encounters with co-workers from existing networks than there were those who did not find the teamroom unnecessary. The second largest individual group of answers was made up of the respondents who took the neutral standpoint. Furthermore, the results of the hidden question attached to this particular item suggest that the majority of the teamroom members were more inclined toward face-to-face networks derived from their current projects, physical location, as well as related projects (see Table 4.3). Sharing knowledge with people based on personal relationships was found to have been somewhat less of a choice.

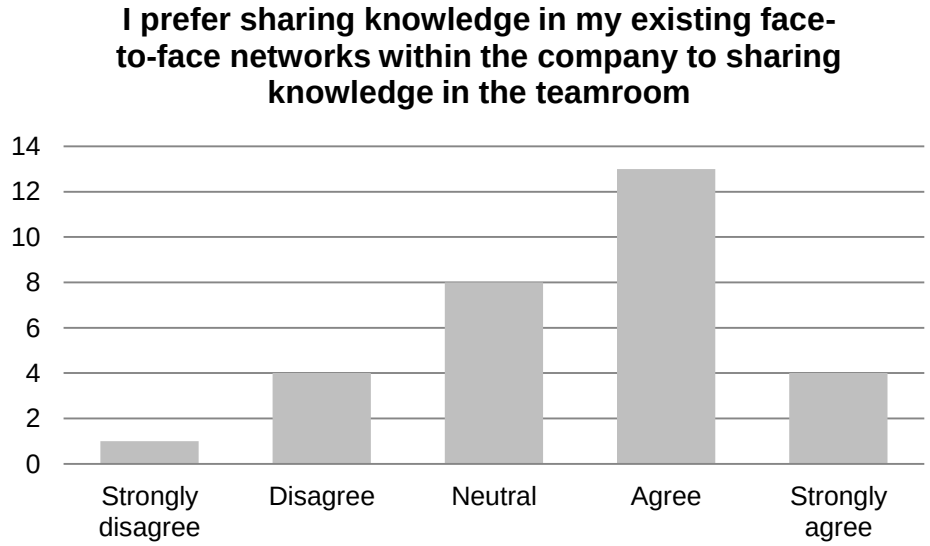

Figure 5.1 Knowledge sharing in face-to-face networks as opposed to in the teamroom

As shown in Figure 5.2, most respondents shared the view that knowledge sharing in the teamroom is an activity requiring extra time. By supporting this view, it is implied that they find knowledge sharing to require a particular effort not included in their regular work schedule. There were also some respondents who placed themselves at "disagree", indicating that they see knowledge sharing in the teamroom as being integrated into their day-to-day responsibilities. Rather than appearing reluctant or discouraged to participate, their response indicates that they were more likely to share their knowledge with the other members of the teamroom. Also taking into account the group of neutral respondents, the mean score produced the second highest value of them all at 3.47.

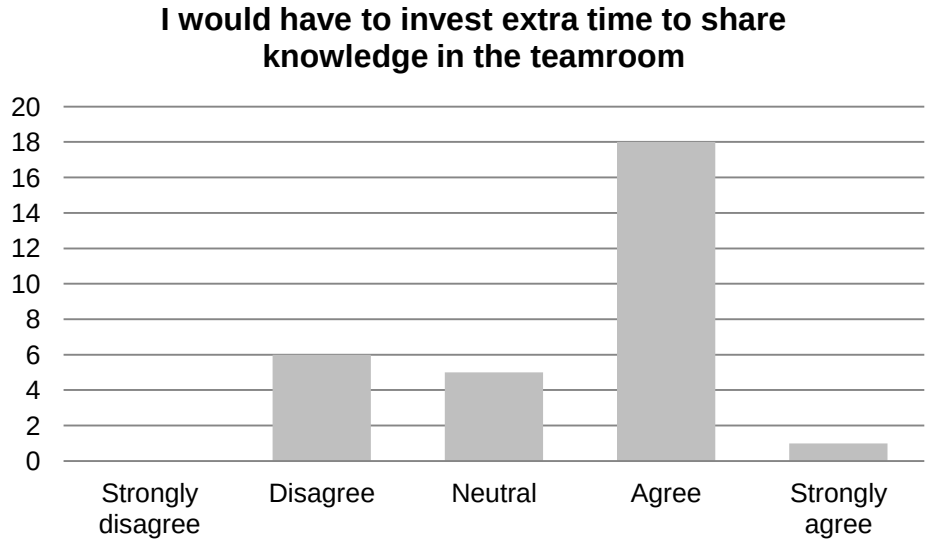

Figure 5.2 Invest extra time for knowledge sharing

Unfamiliarity with the teamroom turned out to be the third most common sentiment according to more than half of the respondents (Figure 5.3). “Agree” represented the most frequent reaction, whereas the rest of the responses were almost evenly distributed among the other four answers. The mean value produced was 3.37; this value indicates that the majority of respondents lack experience or familiarity with the platform on which the teamroom is built, which further suggests they are reluctant to use the technology to share knowledge.

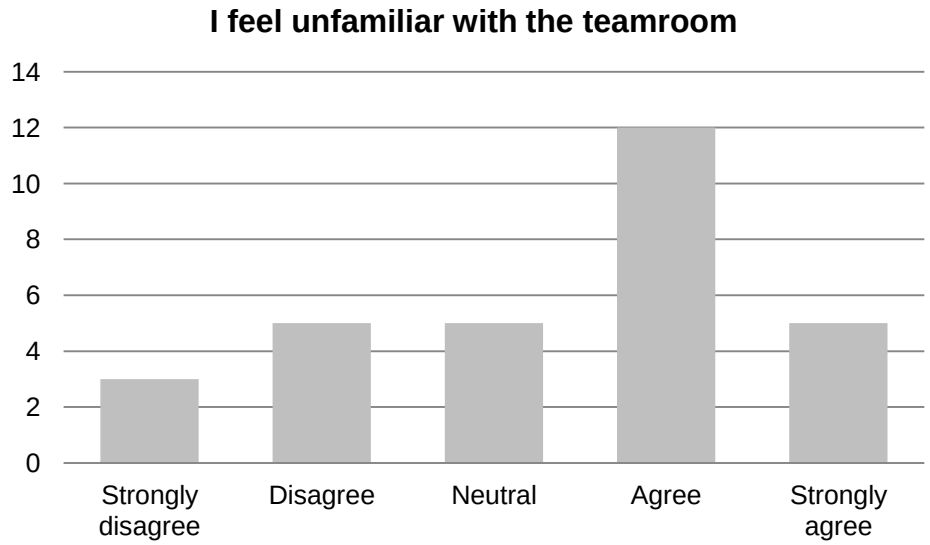

Figure 5.3 Sense of unfamiliarity with the teamroom

5.2 Minor Barriers to Knowledge Sharing

When it comes to employee uncertainty about the intent of management and the objectives of sharing knowledge, Figure 5.4 shows a continuous increase in the stated responses from “strongly disagree” to “agree”. Although nobody strongly stated that they clearly understand the objectives of sharing, the responses in overall support of this statement represented the largest of all biased views. There was a relatively large group of respondents (one third) stating their neutrality in the matter.

Note that Figure 5.4 represents a positively worded item exactly as published in the survey, which also means its reporting values have been reverse-coded. Hence, it explains how the mean score was determined to be 2.93 rather than a value higher than 3.

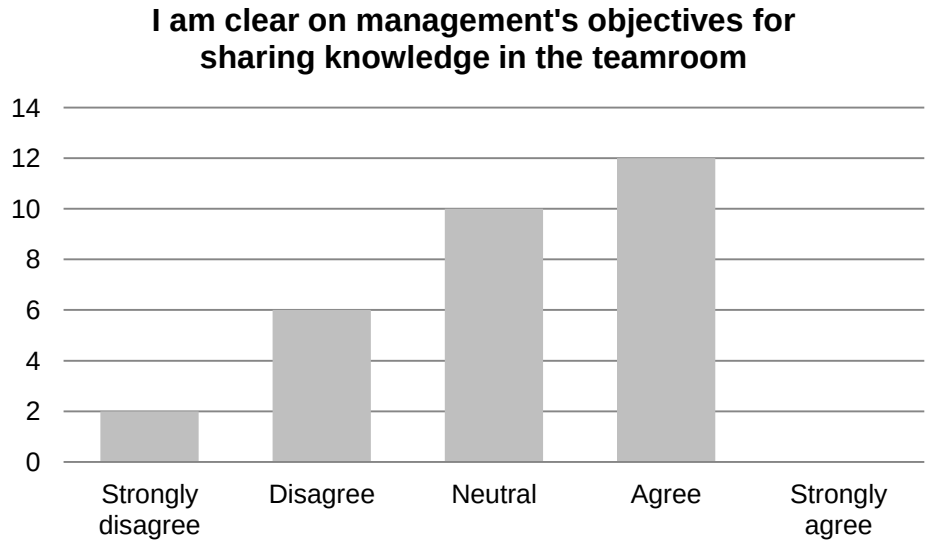

Figure 5.4 Comprehending the aims of knowledge sharing

Employees' uncertainty about what knowledge they are supposed to share in the teamroom is another reverse-coded barrier (Figure 5.5). While the mean score was found to be 2.93 just as for the previous barrier in Figure 5.4, the opinions were more balanced and only spread over three levels of assessments. The overall reaction did not include the two most extreme answers. Even though there were more respondents knowing what knowledge is most valuable and important than those who were unclear on it, the difference was no more than two people. The results show a certain level of general confusion experienced by the employees, as denoted by the lack of an overwhelming majority for any of the answers.

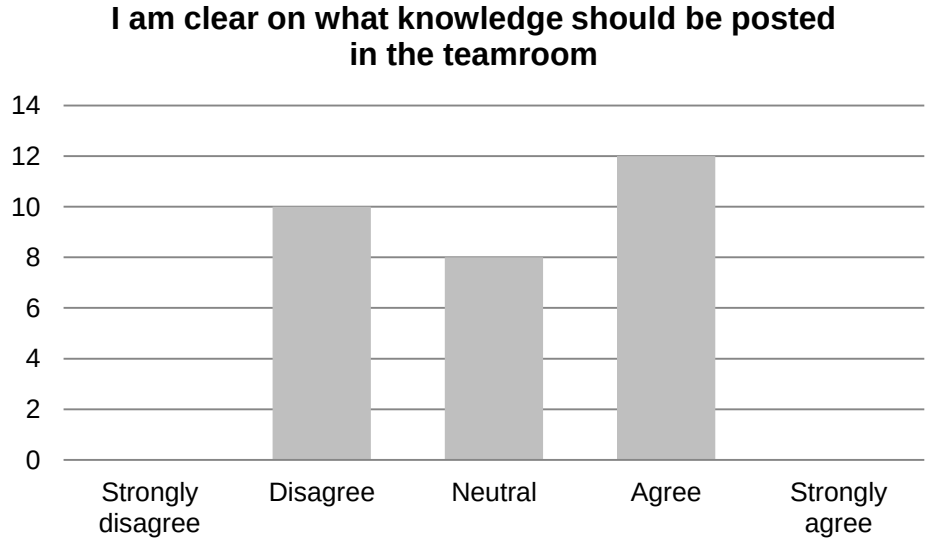

Figure 5.5 Being clear on what knowledge should be shared

The employees' views on whether an absence of rewards or recognition discourages them to share knowledge in the teamroom are shown in Figure 5.6. Most of the respondents either took on an unbiased stance, or they opposed the statement. Yet, there was one individual who strongly approved and with the other group of agreeing respondents ("agree"), these employees raised the mean score somewhat to 2.57. By looking at the frequency distribution, a growing uncertainty can be detected as to whether a lack of incentive systems does build reluctance to knowledge sharing; the number of respondents making up each category of answers grew from "strongly disagree" to "neutral" after which the numbers started to drop. Although the opinions were fairly divided, the middle category represented the most unanimous vote.

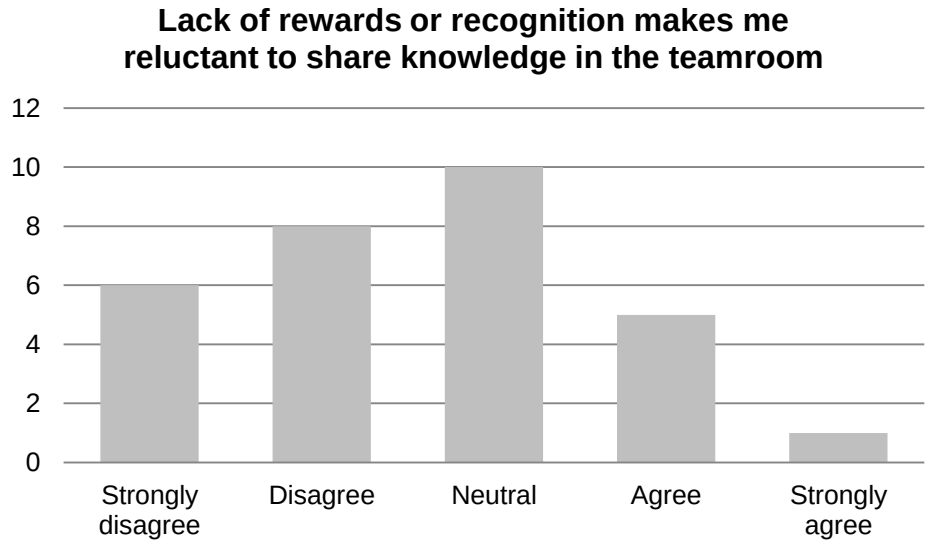

Figure 5.6 Reluctance to share knowledge due to lack of rewards or recognition

When asked if they feel their knowledge is limited relative to others in the teamroom, the majority of respondents gave a neutral answer (Figure 5.7). Second to that, a relatively large group of respondents did not perceive themselves to be lacking knowledge. Consequently, the mean value produced was 2.57 – just like in the aforementioned item. However, the responses in Figure 5.6 were a bit more widely distributed over the points on the Likert scale, whereas the responses for this item were concentrated to mainly two reactions. On the whole, the respondents were either undecided, or they did not feel that their knowledge is limited.

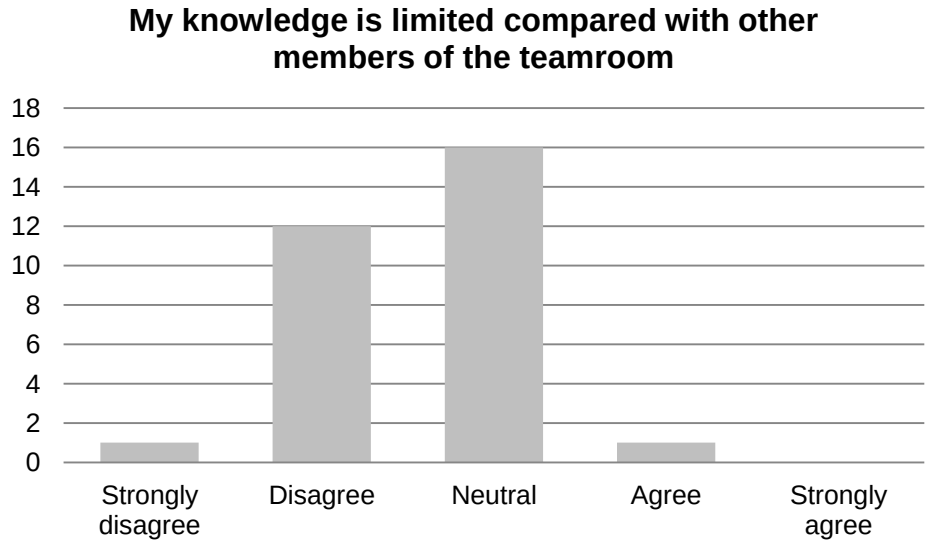

Figure 5.7 Lack of knowledge relative to others in the teamroom

The barrier in Figure 5.8 is distinct in its phrasing in how it addresses a situation that in actuality was not applicable to all respondents at that time. Respondents were to assume the role of a newly recruited employee and then state if they felt they would have to earn the right before posting in the teamroom community. The results produced a mean score of 2.53 and show a near majority whose reaction is to disagree with this perception. In addition, there were a few respondents who expressed a strong disagreement. The group who did identify with the perception was made up of a dozen people, but none of them were a strong supporter of it. The categories of "neutral" and "agree" were very close in numbers with only one respondent differing them apart.

However, caution must be applied when assessing this barrier since it involves a scenario. According to the respondents' profiles (see Table 4.1), two thirds of the respondents had been working on their current assignments for a year at most. However, this only refers to their respective assignment and does not necessarily reflect the length of their stay at Sigma Kudos. Therefore, it cannot be established how many respondents were actually new recruits. Nevertheless, the fact that a minority of the respondents agreed with the statement implies a feeling of intimidation, which in turn can act as a hinder to knowledge sharing.

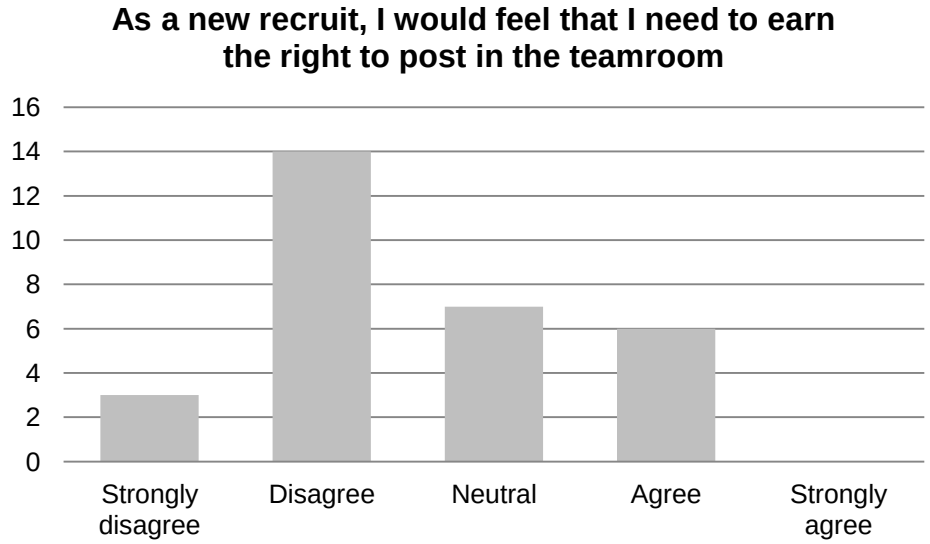

Figure 5.8 Earning the right to share knowledge in the teamroom

The text-based environment of the teamroom can deter employees from sharing their knowledge, and the total response for this barrier is shown in Figure 5.9. While quite a strong majority of respondents expressed their view as “disagree”, there were also two counts for “strongly disagree”; even though the teamroom lacks such visual and verbal cues that normally occur in a face-to-face environment, these respondents were not worried about fellow members misconstruing their shared opinions and ideas to something that deviates from the original meaning. For an agreeing group totaling five people, this was a valid concern, thereby suggesting that the risk posed by knowledge sharing in the teamroom brings about an automatic reluctance to sharing knowledge. The responses being distributed over all five levels on the rating scale, there were a dozen neutral answers collected as well. Identified as a minor barrier, the mean value was 2.50.

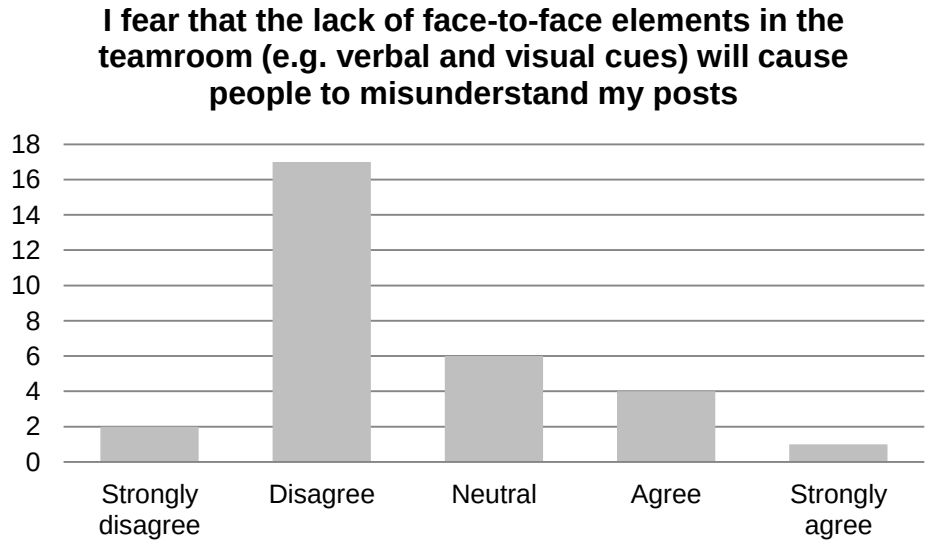

Figure 5.9 Fear of misunderstandings due to the virtual environment of the teamroom

The barrier shown in Figure 5.10 addressed the concern held by respondents that other teamroom members may belittle the importance of their knowledge contribution. No respondent strongly agreed with this viewpoint, whereas there were as many people who strongly opposed the statement as there were people who agreed. The undecided response applied to a pretty sizeable group of respondents, thus contributing to a mean value of 2.43. "Disagree" being most commonly stated indicates that many of the respondents are not too concerned about the risk of other employees deprecating their posts in the teamroom.

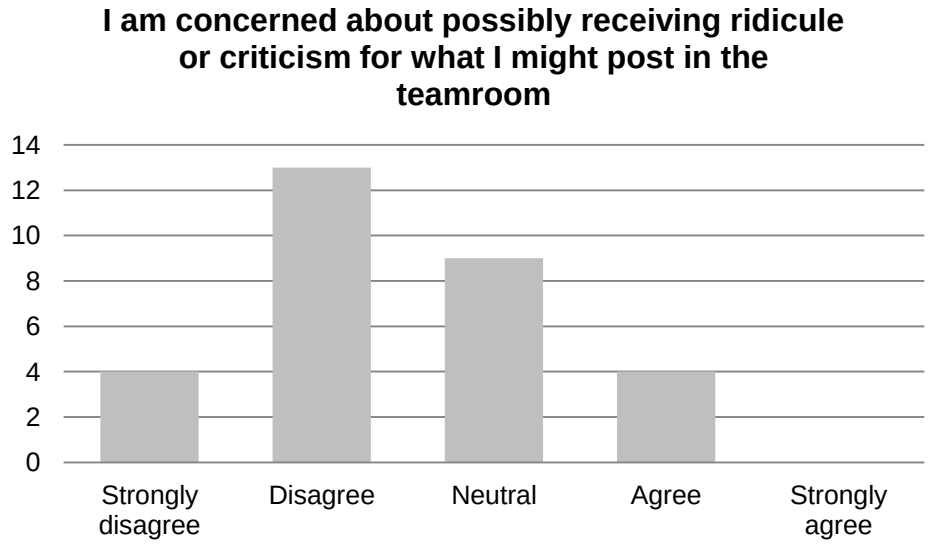

Figure 5.10 Fear of receiving replies that diminish one's shared knowledge

The responses illustrated in Figure 5.11 belong to another one of the four reversed barriers. As more than half of all respondents believed that there is indeed value offered by the system, the mean value was set below the neutral point on the spectrum at 2.43. While there were a few respondents who strongly agreed, nobody placed themselves on the opposite extreme. Evidently, the most common sentiment was that of "agree".

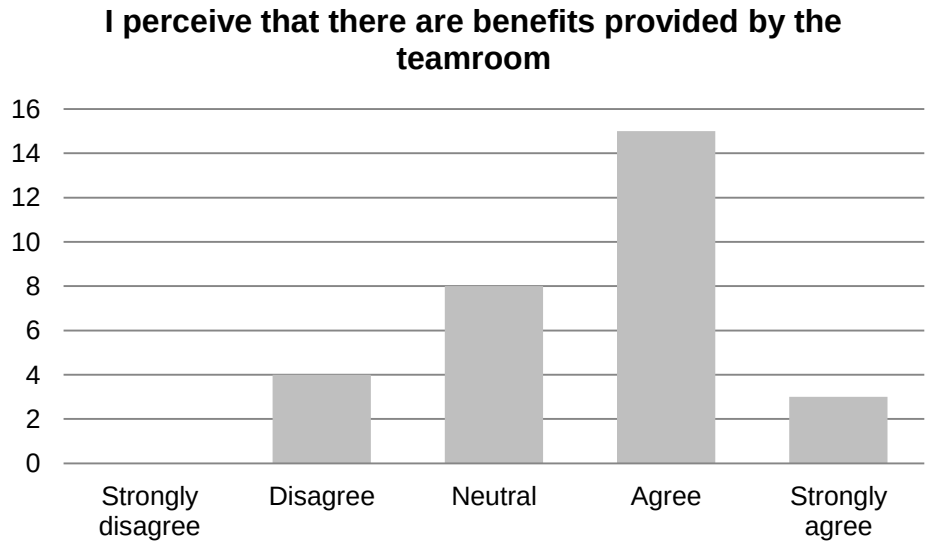

Figure 5.11 Finding value in the use of the teamroom

The risk of sharing knowledge that other teamroom members may regard as irrelevant, unimportant, or inaccurate is another barrier to knowledge sharing rooted in fear. However, the collective reaction to the statement, as presented in Figure 5.12, shows that a vast majority of respondents generally rejected the idea of such a perception. With "neutral" being the second largest category, and there being two notable respondents affirming their fear of misleading other colleagues, the mean score was lifted a little to 2.17.

Figure 5.12 Fear of misleading colleagues by sharing possibly inadequate knowledge

The fourth reversed statement was designed to determine if employees believe their possessed knowledge has benefits to other teamroom members. As illustrated in Figure 5.13, the collected data signify a substantially high awareness of this notion where "agree" represented the largest category on the scale. The unbiased category represented the second largest group, with "strongly agree" following closely behind. On the other side of the spectrum there was one respondent who disapproved of the statement. Considering this single expression of disagreement and that most respondents realized their knowledge is of interest to others, the mean score was measured at 2.10. Because 22 respondents did in fact believe their possessed knowledge is of use to others, being unaware was determined to be a minor barrier.

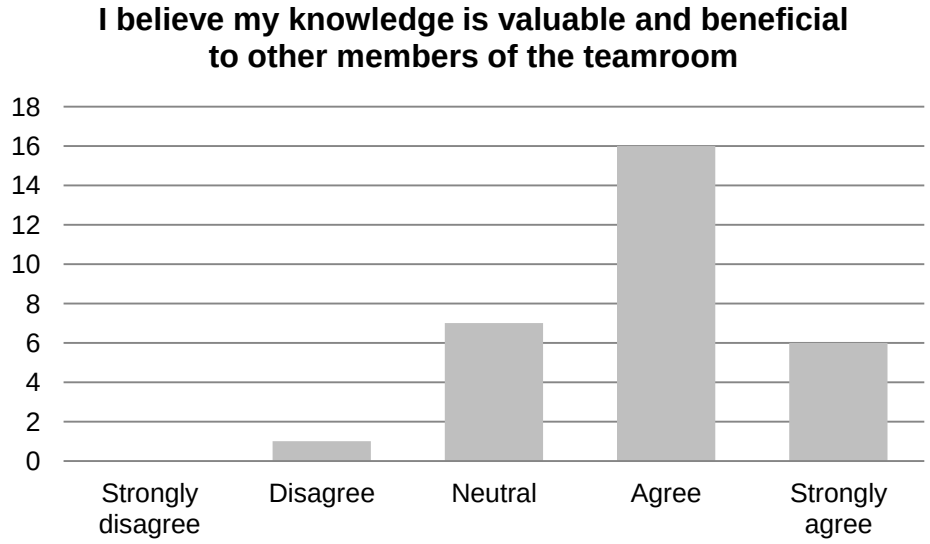

Figure 5.13 Having knowledge that is beneficial and valuable to others

The weakest of all potential barriers received a mean value of 1.87 and involves the perception of knowledge as a source of power (Figure 5.14). As evident in the graph below, not one respondent attested the idea that "knowledge is power" in terms of being able to control what others know, or that this advantage will be reduced when shared. On the contrary, all respondents placed themselves on either the disagreeing end of the scale or in the middle, effectively making the weakest barrier the most certain one as well. The results suggest that any desire to maintain an advantage has little effect on respondents' lack of enthusiasm for knowledge sharing. Also implied then is the belief that there are more benefits to sharing knowledge as opposed to hoarding it.

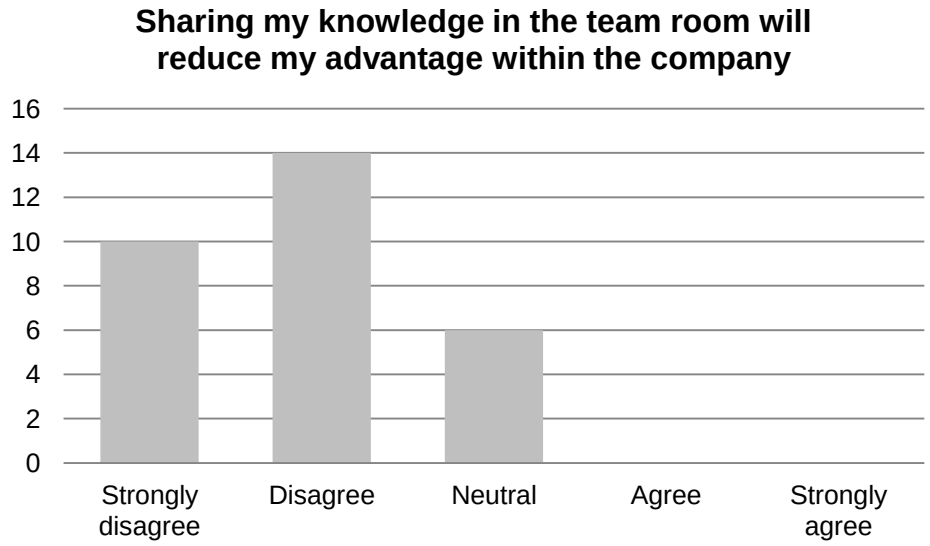

Figure 5.14 Diminished power due to knowledge sharing

6 Discussion

In this chapter, the results of the study and the implications of these are considered. Key findings are reflected upon in light of the literature reviewed. Lastly, situations which can limit the interpretation of data are also being reflected upon.

6.1 Key Findings

Only four of the barriers produced a mean score higher than 3.00 ("neutral"), but none of the values were equal to or higher than 4.00 ("agree"). The employees generally did not think they would lose a certain position of power or advantage as a result of sharing. They also were not ignorant to the idea of knowing something relevant for someone else, nor were they afraid of misleading others with their knowledge. It seems possible that this result is related to *how* people share their knowledge; the current study shows the respondents tended to want to share knowledge face-to-face, rather than utilize the virtual teamroom. There are several possible explanations for this result as many of the other barriers discussed are shown to be intertwined.

6.1.1 Preferred Types of Knowledge Sharing Networks

It seems possible that the employees possess tacit knowledge which they find difficult to write down, because the most preferred types of sharing networks were those consisting of co-workers in close proximity to the respondents, both task-wise (currently shared projects, related projects, previously shared projects) and location-wise (same room, same building). These results are in agreement with those of Wenger et al. (2002) who found that weak communities of practice tend to form around friendships, geographical locations, and organizational structures. The findings are also consistent with previous research which showed that implicit knowledge is made available through discussion and that tacit knowledge tends to be context-specific. In terms of organizational structure, the Sigma Kudos employees preferred interacting with people with whom they share past experiences, that is, colleagues with a similar frame of reference. It will therefore be less tedious for an individual to share tacit knowledge when the people in need of it already understand the specific context it was developed in. Communicating implicit knowledge may also be viewed as an easier activity when interacting face-to-face. In terms of geographical location, the employees were most inclined to share knowledge with colleagues who were in close physical proximity. It may be that these employees find face-to-face sharing more practically convenient and immediate, which ties in with the issue of time.

6.1.2 Time Constraints

It is evident that time represents a central factor; the employees did not have time for knowledge sharing activities in the teamroom for various reasons. The finding that employees generally did not have time for knowledge sharing *in the teamroom* may be a possible explanation for why face-to-face networks were favored. It may also be that the employees already had incorporated such knowledge sharing into their daily job, and thus did not have time to participate in the teamroom.

Not having time to utilize the teamroom was mentioned a couple of times in the comments left by respondents. These comments touched on the perceived lack of structure caused by the sheer number of intra-organizational sites available. The disorder would sometimes result in not knowing the suitable place to post when actually having something to share. This structural issue and the uncertainty surrounding it can be viewed as the special effort, referred to by Wenger et al. (2002), that increases the costs of participation. Therefore, when knowledge sharing involved spending time at trying to sort out the confusion, it meant a greater effort was required to simply connect to other teamroom members. Furthermore, a general lack of time was emphasized by respondents. Because of the lack of time, the majority of respondents seemed to focus on their daily, more beneficial tasks. In line with Hew and Hara's (2007) findings, these results indicate a prioritization of the most important tasks. Time was mentioned again when the teamroom was described as just another place for sharing information which "nobody" had time to use due to not seeing the benefits. Similar to what BenMoussa (2009) noted, this finding suggested that the employees were unwilling to adopt the system as long as they saw an added responsibility or burden.

6.1.3 Aspects of Uncertainty and Unfamiliarity

Uncertainty regarding what knowledge is supposed to be recorded in the teamroom may be another reason for preferring knowledge sharing in person. Instead of widely posting something in the teamroom, employees may only want to share it in a more contained, face-to-face network. Possibly also contributing to this network choice may be that some employees worry about publicly sharing misleading knowledge, as well as being chastised or ridiculed for what they post. The risk of people misunderstanding each other, as the teamroom lacks the verbal and visual elements of face-to-face communication, might also explain the biggest barrier of this study; already being restricted with time, it is likely that the employees would want to avoid having to commit time to sort out misunderstandings.

Approximately a fourth of the respondents felt that they, to various extents, did not understand their managers' intent of knowledge sharing in the teamroom. Further, a third of the respondents were neutral in this matter. These answers imply that the sharing objectives of management are unclear to some employees. Uncertainty regarding knowledge sharing objectives can have a significant impact on individuals' willingness to share; as described by Lelic (cited in Riege, 2005) and Wheatley (cited in Ling et al., 2009), unclear objectives may hinder knowledge sharing by inducing a fear of reduced job security, power, or status. These responses may therefore also imply an uncertainty related to the risk of reduced benefits in the organization.

There were comments that implied a lack of acquaintance with the teamroom in the sense of that a few people felt they needed more information about it. While one respondent's comment explicitly showed that he or she did not even know the basic details, the others were more ambiguous concerning their own level of experience with the teamroom as they suggested how to inform people. The state of being uninformed therefore seems to impede on the use of the system. Based on Riege's (2005) research when it comes to lack of familiarity, it seems plausible as well that the respondents felt reluctant to share knowledge as a result of not having sufficient information about the teamroom.

One too many intra-organizational sites, and lack of information about the teamroom, are likely to form another combination of knowledge-sharing barriers that can be related to unfamiliarity of the teamroom. The majority of employees who had commented on the teamroom were discouraged from using the community because of – what they felt – was the excessive number of intra-organizational sites. When combining this finding with the perceived lack of informative facts and instructions, it can thus be suggested that unfamiliarity also makes the employees choose the more conventional way of sharing knowledge in person.

6.1.4 The Use of Teamroom Features

Certain aspects of the technology were discovered as barriers to knowledge sharing. The WYSIWYG editor was said to be offered only when using Internet Explorer. Furthermore, comments from the survey pointed to how email alerts were not automatically subscribed to. The wish for the teamroom content to be pushed is consistent with the idea of Wenger et al. (2002), who explained that virtual communities are not only physically distant; the communities also feel more remote as the members and their activities are not visible unless they post something.

6.2 Implications of the Findings

The combinations of findings have important implications for implementing a virtual community of practice or cultivating one that struggles to establish itself. Greater willingness to share knowledge face-to-face corroborates the earlier research of Storey and Barnett (2000), who observed that the emphasis in literature tends to be on knowledge as a commodity, often resulting in making explicit knowledge more explicit and accessible. Managers of organizations need to be aware of the implicit and tacit forms of knowledge that reside in employees. Tacit knowledge is partly or mostly inexpressible – a factor that may explain the preferred way of sharing knowledge face-to-face rather than using the teamroom. Communities of practice facilitate the development of a common structure and meaning so that tacit knowledge may be converted into explicit form (Alvesson, 2004; Wenger et al., 2002). However, the most significant barrier in the present study suggested that people are reluctant to participate in the community already in the first place; certain factors are then crucial in the forming of a common attitude that is conducive to knowledge sharing in the distributed community.

Extra investment of time was rated the second highest in terms of barriers to knowledge sharing in teamroom. This result differs from previous research (Ling et al., 2009) which showed that executive level employees perceived lack of time to be a minor barrier amongst them. The discrepancy between the findings could be attributed to different contexts of the two studies, such as organizational or cultural elements. Nevertheless, the current finding goes some way towards enhancing the understanding of the role of time; it is vital that employees are allowed some time for knowledge sharing in the teamroom so that such activities become a natural part of their job.

The purpose of the teamroom needs to be distinctly conveyed to distinguish it from the other intra-organizational sites. Based on comments, distinctions also need to be made when it comes to the different sections of the community. If employees know what knowledge to share and where to find it, it will partly address the issues of uncertainty and unfamiliarity. With approximately 25% of the respondents feeling unclear on the sharing objectives of management, it is also important that management can define and communicate the strategic meaning of the teamroom so that as many employees as possible may share the same positive perception. As noted by Ahmed et al. (2002), knowledge management must be aligned with the strategy of the organization for business benefits to come about.

In view of the features of the teamroom technology, the content of the community would not even be visible to half of the respondents who stated that they did not receive any email notifications. An implication for management would then be to set up default subscriptions for all members. Automatic subscriptions would likely increase the chance of seeing the content, and thereby reduce the non-physical distance described by Wenger et

al. (2002), as well as contribute to a greater sense of familiarity with the teamroom.

6.3 Limitations of the Study

The results of this case study must be interpreted in the context of its limitations. First, the barriers discussed in this study are factors affecting knowledge sharing in a virtual community of practice. Second, these barriers can be used to investigate impediments to other virtual intra-organizational communities, but the numerical results presented here specifically relate to Sigma Kudos' virtual teamroom.

Furthermore, the timing of the distribution may have affected the potential response rate negatively as the survey was emailed the day after the Easter holiday in Sweden, and some of the Swedish employees might also have extended this public holiday. Once they returned to the office they were most likely busy catching up on work, making it less likely that they prioritized reading emails that did not pertain to their daily responsibilities. For the Hungarian employees in the sample, this type of circumstance may also hold true.

In addition to the 30 responses submitted, the online survey tool showed six partially completed responses. This means the individuals had clicked the link to the survey but then left either immediately or part of the way through. The number of complete responses could possibly have been some more if the survey had been designed to start off with harmless questions, that is, the demographic ones. Considering the size of the sample, a few more respondents could have resulted in a significant change in the results. On the other hand, people might find such questions too uninspiring or boring for them to be motivated enough to continue or even respond.

With a small sample size and the "neutral" response often being the second most unanimous answer in the survey items, the results need to be interpreted with caution. It may be the case that a considerable number of these responses were given because people did not wish to confirm or reject a statement.

7 Conclusion

In this research, a number of common knowledge sharing issues were explored in the setting of a virtual intra-organizational community of practice. The purpose of the study was to determine the major barriers to knowledge sharing as viewed by employees of the organization. A survey was designed to collect and evaluate the views of employees.

Returning to the question posed at the beginning of this study, it is now possible to state that the most significant barrier to knowledge sharing in the teamroom is the overall preference for face-to-face transmission. Secondary to this, teamroom participation is viewed as requiring extra investments of time. Other major barriers are aspects of teamroom unfamiliarity due to other intra-organizational online sites and being uninformed, and the uncertainty related to criteria for what knowledge to share.

7.1 Suggestions for Further Research

Finally, this research has introduced a number of possible future studies. First, further research will need to be done to confirm our findings; although useful, a more extensive collection of data is needed to improve the generalizability of the findings.

More research needs to be undertaken before the reasons for why employees prefer sharing knowledge face-to-face is more clearly understood. A qualitative study in terms of data collection would therefore be of great help in enhancing the understanding of employee perceptions.

A future study could assess the informal face-to-face networks by mapping relationships among teamroom members. Mapping the flow of information and knowledge would help managers understand the actual patterns of relationships stemming from day-to-day work interactions. The analysis may reveal the extent to which a group of people are reliant on one individual's valuable knowledge and how the relationships established by this individual hold the network together. Conversely, the analysis may identify under-utilized resources for the community. Knowing the community's ability to share knowledge would provide more insights on how the teamroom can be nurtured and put best to its use. It is also suggested that the second half of knowledge transfer, absorption, is investigated in the future to identify potential barriers to using accessible knowledge.

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Appendix 1 Types of Barriers to Knowledge Sharing Referenced in Literature

	Authors													
Barrier	Ardichvili et al. (2003)	Ben-Moussa (2009)	Davenport & Prusak	du Plessis (2008)	Fitzpatrick (2003)	Hew & Hara (2007)	Lelic (cited in Riege, 2005)	Ling et al. (2009)	Michailova & Husted	O'Dell & Gray-son	Riege (2005)	Szulanski (1996)	Wenger et al. (2002)	Wheatley (cited in Ling
Lack of time		✓			✓	✓		✓	✓	✓		✓	✓	
"Knowledge is power"			✓		✓							✓		✓
Unclear intents and objectives of management							✓							✓
Lack of benefits to oneself		✓												
Lack of rewards and recognition								✓			✓	✓		
Low realization of the benefits to others											✓			
Fear of posting unimportant, irrelevant, or inaccurate knowledge	✓													
Uncertainty regarding what knowledge is supposed to be shared	✓			✓										
Not yet having earned the right to post in the community	✓													
Fear of receiving belittling responses	✓													
Lack of knowledge relative to others						✓								
Fear of misunderstandings caused by the lack of face-to-face elements						✓								
Unfamiliarity of IS/IT system											✓			
Preference for knowledge sharing in face-to-face networks	✓													

Appendix 2 Survey Letter

Hi all,

As you may know from XX's previous post in the Information Development teamroom, I am conducting this survey as part of my bachelor's thesis. The purpose of the study is to weigh potential barriers to knowledge sharing in a virtual community of practice.

I would like to know your extent of agreement about how well each of the statements is an accurate description of your perceptions related to knowledge sharing in the Information Development teamroom. The survey is available at [URL] and should only take you about 5 minutes to complete. Since the validity of the results depend on obtaining a high response rate, your participation is vital to the success of this study.

Please be assured that your responses will be held in the strictest confidence. You will be anonymous and your response cannot be traced back. Only I will have access to the data.

This study will provide information on knowledge-sharing behavior to Sigma Kudos, helping the company to better understand impediments to knowledge sharing in the Information Development teamroom and its sub-sites. Sigma Kudos may use the results in order to facilitate the sharing of knowledge. Respondents will be able to view the published results in approximately four months by contacting me at [email address].

Best regards,

Kitty Yip

Appendix 3 Survey Items

Note: the term "teamroom" refers to **any or all sub-sites** of the Information Development teamroom.

1. Lack of rewards or recognition makes me reluctant to share knowledge in the teamroom.

2. I would have to invest extra time to share knowledge in the teamroom.

3. Sharing my knowledge in the teamroom will reduce my advantage within the company.

4. I am clear on management's objectives for sharing knowledge in the teamroom.

5. I believe my knowledge is valuable and beneficial to other members of the teamroom.

6. My knowledge is limited compared with other members of the teamroom.

7. I am afraid of misleading other members of the teamroom by sharing knowledge that may not be considered relevant, important, or accurate.

8. I am clear on what knowledge should be posted in the teamroom.

9. As a new recruit, I would feel that I need to earn the right to post in the teamroom.

10. I am concerned about possibly receiving ridicule or criticism for what I might post in the teamroom.

11. I fear that the lack of face-to-face elements in the teamroom (e.g. verbal and visual cues) will cause people to misunderstand my posts.

12. I feel unfamiliar with the teamroom.

13. I perceive that there are benefits provided by the teamroom.

14a. I prefer sharing knowledge in my existing face-to-face networks within the company to sharing knowledge in the teamroom.

14b. Please specify the network(s):*

- □ Colleagues based in the same room as I
- □ Colleagues based in the same building as I
- □ Colleagues based in the same city as I
- □ Colleagues based in the same country as I
- □ Colleagues working on the same project(s) as I
- □ Colleagues with whom I have worked on project(s)
- □ Colleagues working on a project related to the one I am working on
- □ Colleagues working in my department
- □ Colleagues who I know on a personal level
- □ Other

15. Where are you based?

- o Beijing (SK office)
- o Beijing (customer's office)
- o Budapest (SK office)
- o Budapest (customer's office)
- o Gothenburg (SK office)
- o Gothenburg (customer's office)
- o Shanghai (customer's office),

16. What role(s) do you have?

- □ Editor
- □ Responsible for M&T
- □ Project Manager
- □ Technical Writer

17. How long have you been working on your current assignment?

18a. Do you currently receive email alerts notifying you of changes made to the teamroom?

- o Yes
- o No

18b. Please specify the site(s):*

- □ China billboard
- □ Gothenburg billboard
- □ Hungary billboard
- □ Karlskrona billboard
- □ Stockholm billboard
- □ M&T News
- □ Other

19. How often do you log on to the teamroom?
- 5 days a week
- 3-4 days a week
- 1-2 days a week
- Once every second week
- Once every third week
- Monthly
- Less than monthly

20. Have you ever posted in the teamroom?
- Yes
- No

21. Do you have any suggestions for the improvement of the teamroom?

*Question hidden by default

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