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Sharing is Caring

- examining enablers and barriers for tacit knowledge sharing in virtual teams

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Abstract

Purpose - The purpose of this paper is to identify enablers and barriers for tacit knowledge sharing in a virtual team.

Design/methodology/approach - The empirical data were obtained by conducting in-depth interviews with members of a virtual team in a Norwegian bank. Half of the participants were located in Norway, while the remaining participants were located in offices in Europe and the US.

Findings - The results show several enablers and barriers for tacit knowledge sharing in a virtual team. The identified enablers are attitudes and motivation, organizational culture and trust, competitive advantage, and available technological tools. The identified barriers are communication, underused technological tools, lack of face-to-face meetings, and working with different countries. Furthermore, we added a new category for circumstantial factors, including the factor uncertainty.

Research limitations/implications - Future research should focus on further exploring the category circumstantial factors, in order to examine if it is applicable beyond the present study and possibly identify other circumstantial factors. In addition, future research should investigate the findings in different cases and by using other research methods.

Practical implications - This paper highlights three implications: the importance of physical meetings, the value of a knowledge sharing culture in the organization, and the benefits of communicating via video conference instead of phone calls.

Originality/value - This study has found that the scope of previously identified enablers and barriers for knowledge sharing in related research fields, are also applicable in the sphere of tacit knowledge sharing in a virtual setting.

Keywords - Tacit knowledge, virtual teamwork, knowledge sharing, enablers, barriers

Content

Appendices

Introduction

Virtual teams have become common in most organizations. Nearly half of all organizations and approximately 66% of all multinational organizations use virtual teams (Society for Human Resource Management, 2012). An underlying assumption of such teams is the use of technology to communicate (Gilson, Maynard, Jones Young, Vartiainen, & Hakonen, 2015). Due to the technological tools available today, organizations can facilitate for teamwork across both geographical and organizational boundaries (Martins, Gilson, & Maynard, 2004), which may lead to better team compositions, and thus better quality of decisions and team performance. According to Gilson et al. (2015), knowledge sharing is a key process when predicting the efficiency and effectiveness of a virtual team. Furthermore, knowledge assets within an organization are perceived to be a resource that can induce competitive advantage (Wang & Noe, 2010; Zarraga & Bonache, 2003), which is an overall strategic aim of most organizations (Thompson, 2012). Knowledge management is thus a crucial element organizations should focus on in order to be successful, and encouraging knowledge sharing is highlighted as an important aspect within knowledge management (Pangil & Chan, 2014). The overall topic for this thesis is knowledge sharing, and the context is knowledge sharing within virtual teams.

Knowledge can be separated into *tacit* and *explicit*, and both forms have different mechanisms for sharing (Filstad & Blåka, 2007). In the last few decades, tacit knowledge has often been referred to as the primary source of knowledge in an organization (Nonaka & Takeuchi, 1995). The suggested way to share such knowledge is through interaction, where the knowledge is transferred through learning-by-doing (Nonaka, 1991). Since limited face-to-face interaction is a main characteristic of a virtual team, the traditional view of tacit knowledge sharing may not be completely suitable for a virtual environment.

Much research has been done on knowledge sharing, tacit knowledge, and virtual teams. However, research with all these elements combined seems to be limited. Studies investigating tacit knowledge sharing in virtual teams have usually focused on few and specific aspects, such as organizational culture (e.g. Ardichvili, 2008), trust (e.g. Rutten, Blaas-Franken, & Martin, 2016), or on a specific discipline (e.g. Olaniran, 2017). This study will take a broad approach, trying to identify multiple enablers and barriers.

In regard to research gaps, Jones (2016) highlighted a need for more research on barriers for tacit knowledge sharing in virtual teams. Olaniran (2017) found that few studies have aimed at identifying barriers for tacit knowledge sharing in organizational teams, with even less attention given to tacit knowledge sharing in project settings. Furthermore, it has been hypothesized that types of knowledge that are harder to share might not be shared in a virtual setting. Thus, there is a need for more research on the influence communication media has on what knowledge team members choose to share (Witherspoon, Bergner, Cockrell, & Stone, 2013). The present study will attempt to answer these gaps.

This thesis will address knowledge management in virtual teams. More specifically, we focus on tacit knowledge sharing. The purpose of the thesis is to examine and gain insight into factors organizations can focus on to enhance the tacit knowledge sharing in their virtual teams. Based on the growing widespreadness of virtual teams, and the importance of sharing tacit knowledge in such teams, we propose the following research questions:

- *What enable team members' willingness to contribute their tacit knowledge to their virtual team?*
- *What are the barriers for team members to contribute their tacit knowledge to their virtual team?*

To answer these research questions we will study a virtual project team in a Norwegian bank. The project team consists of members located in both Norwegian and foreign branches of the bank, and works almost exclusively in a virtual manner.

This thesis is laid out to first present the theoretical framework, including key concepts and an overview of relevant research. Second, we present the research methods, discussing strengths and weaknesses and highlighting ethical considerations. Third, we present the relevant findings and these are then discussed in light of applicable research. Lastly, we introduce practical and theoretical implications, limitations and suggestions for future research, and finally using the main findings to conclude the research questions.

Theoretical Framework

This section will introduce the theoretical concepts used in this thesis: virtual teams, knowledge and knowledge sharing. Furthermore, relevant research on enablers and barriers for knowledge sharing will be presented.

Virtual Teams

A team can be defined as "a social system of three or more people, which is embedded in an organization (context), whose members perceive themselves as such and are perceived as members by others (identity), and who collaborate on a common task (team-work)" (Hoegl & Gemuenden, 2001, p. 436). It is possible to distinguish between virtual and traditional teams in terms of their spatial proximity and communication technologies. While members of traditional teams work in close physical proximity, members of virtual teams are physically separated from each other. The primary communication form for members of traditional teams is face-to-face interaction. As the members of virtual teams are geographically dispersed, their main form for communication occurs through technological tools, such as video conferences and e-mail (Bell & Kozlowski, 2002). A virtual team can therefore be thought of as "a group of geographically dispersed people who interact through interdependent tasks guided by a common purpose with the support of communication technology" (Montoya, Massey & Lockwood, 2011, as cited in Jones, 2016, p. 111).

It can be difficult to separate where a traditional team ends and a virtual team begins. One can for example ask how much electronic communication is needed for a team to be considered virtual; e.g. is a team virtual if team members in the same office e-mails each other? This challenge has been addressed by some researchers, arguing that a certain degree of virtualness is expected in most teams. Virtualness is viewed as a team characteristic, and the focus is instead on the extent of virtualness in a team (Martins et al., 2004). As such, the following definition of virtual teams has been proposed: "teams whose members use technology to varying degrees in working across locational, temporal, and relational boundaries to accomplish an interdependent task" (Martins et al., 2004, p. 808). As stated in this definition, the use of technology and communication tools are some of the characteristics of a virtual team. Such tools may include e-mail, document collaboration (e.g. GoogleDocs), video conferencing (e.g. Skype), shared cloud storage (e.g. Dropbox) or code hosting

services (e.g. Github). The aim of these tools is to replace or supplement the face-to-face contact, which is crucial in traditional teams (Bell & Kozlowski, 2002).

Knowledge

Knowledge does not have a widely accepted definition, instead different researchers approach the concept from varying perspectives, which result in several definitions (Bratianu & Orzea, 2010). It is possible to view knowledge as "a familiarity, awareness or understanding of someone or something, such as facts, information, descriptions, or skills, which is acquired through experience or education by perceiving, discovering or learning" (Chauhan & Raksha, 2016, p. 118). The epistemology of possession is a viewpoint that can be linked to this definition, and views knowledge as something people have and emphasizes its cognitive aspects. This perspective view knowledge as a possession of the human mind, and is treated as a mental resource which can be developed, applied and used to improve effectiveness in organizations (Newell, Robertson, Scarbrough, & Swan, 2009). The epistemology of possession constitutes the basic assumption for this study.

Types of Knowledge

It is possible to distinguish between two types of knowledge: *explicit* and *tacit* (Filstad & Blåka, 2007; Newell et al., 2009). The differentiation was first introduced by Polanyi (1966), who considered *tacit knowledge* as something not formally taught, which cannot always be explained through language. Polanyi (1966) further suggested that knowledge exists on a spectrum between tacit and explicit, and that all knowledge has a tacit dimension. This was further elaborated by Leonard and Sensiper (1998), who explained the spectrum by describing the extreme opposites. At the extreme tacit end, knowledge is semi- or unconscious and held within each individual. At the extreme explicit end, knowledge is completely codified, structured and accessible to other people. Most knowledge resides somewhere in between these extreme opposites.

Nonaka (1991) characterized tacit knowledge as something highly personal and deeply rooted in actions and context. It is often referred to as know-how, which reside in our heads as practical actions and skills. Tacit knowledge is also difficult to formalize and often hard to articulate (Newell et al., 2009). Such knowledge is often acquired through the process of learning by doing

(Panahi, Watson, & Partridge, 2013). More specifically, Nonaka and Takeuchi (1995, as cited in Panahi et al., 2013) identified two elements of tacit knowledge. One is the cognitive dimension which includes a person's beliefs, ideas, understandings, perspectives, and mental models. The second dimension is the technical dimension which includes more informal skills, such as hands-on experience, skills, expertise, and know-how (Panahi et al., 2013).

Knowledge Sharing

Knowledge sharing can be defined as "the process of mutually exchanging knowledge and jointly creating new knowledge" (van den Hooff & de Ridder, 2004, as cited in Gagné, Minbaeva, Foss, & Snell, 2009, p. 571). More specifically, knowledge sharing is a way to facilitate for the distribution of task information and know-how, to collaborate on problem solving, to develop new ideas, or to implement policies or procedures. This can for instance occur through written correspondence or face-to-face communication (Wang & Noe, 2010).

There are different mechanisms for tacit and explicit knowledge sharing (Filstad & Blåka, 2007). Applicable ways to share tacit knowledge involves observation, mentoring, face-to-face interaction, and sharing of personal experiences, i.e. means other than written language (Panahi et al., 2013). Another way of sharing tacit knowledge is described by Nonaka (1994, as cited in Newell et al., 2009), who explained how tacit knowledge can be converted into explicit knowledge. In this way the knowledge can be communicated to other members of the organization, and others can thus also "know", without having the same experiences (Newell et al., 2009). Tacit and explicit knowledge can therefore be viewed as complementary, because tacit knowledge may provide meaning to explicit knowledge (Maznevski & Athanassiou, 2003).

Additionally, because tacit knowledge is derived from experiences and thus difficult to replicate, it may act as a source of sustainable competitive advantage (Joia & Lemos, 2010). However, the same characteristics may also prevent the sharing of tacit knowledge within the organization (Bou-Llusar & Segarra-Ciprés, 2006, as cited in Joia & Lemos, 2010). Therefore, for tacit knowledge to become an effective source of sustainable competitive advantage, it must be successfully shared within the organization (Bou-Llusar and Segarra-Ciprés, 2006; Murray and Peyrefitte, 2007, as cited in Joia & Lemos, 2010).

Previous Findings on Enablers and Barriers for Knowledge Sharing

Existing research has identified various enabling and hindering factors which may influence knowledge sharing between team members. We have performed an extensive literature study, and table 1 and 2 summarize research and findings relevant to this thesis. These studies form the theoretical framework for the present research. The findings presented in the following tables will be further elaborated in the context of this study's findings in the discussion chapter.

Table 1
Enablers for knowledge sharing

Enabler	Description	Source
Attitudes	Positive attitudes towards knowledge sharing has been found to positively impact employees' willingness to share their knowledge	(Charband & Jafari Navimipour, 2016; W. S. Chow & Chan, 2008)
Motivation	Motivation can influence willingness by acting as a facilitator, and lead to successful tacit knowledge sharing	(Riege, 2005; Witherspoon et al., 2013)
Organizational culture	Supportive organizational culture has been found to positively influence successful knowledge sharing	(Ardichvili, 2008)
Trust	Trust has been found to positively influence knowledge sharing and enhance participants' willingness towards knowledge sharing	(Naicker & Benjamin, 2014; Rutten et al., 2016)
Competitive advantage	Employees' perception of their competitive advantage has been found to influence their willingness to share knowledge	(Ardichvili, Page, & Wentling, 2003)
Technology	Technology can influence knowledge sharing by acting as a facilitator	(Charband & Jafari Navimipour, 2016; N.-K. Chow, 2011; Falconer, 2006; Hislop, 2002; Jones, 2016; Marlow, Lacerenza, & Salas, 2017; Panahi et al., 2013)

Table 2
Barriers for knowledge sharing

Barrier	Description	Source
Competitive advantage	Employees may experience loss of power and choose to hide their knowledge	(Connelly, Zweig, Webster, & Trougakos, 2012; Davenport & Prusak, 1998; Zhang & Dawes, 2006)
Communication	Effective communication can inhibit knowledge sharing, and employees may perceive knowledge sharing as difficult, demanding and ambiguous	(Daim et al., 2012; Riege, 2005)
Misunderstandings	Virtual communication increase risks for misunderstandings and clear communication	(Daim et al., 2012; Klitmøller & Lauring, 2013; Verburg, Bosch-Sijtsema, & Vartiainen, 2013)
Lack of visual cues	Lack of nonverbal communication and social cues act as a barrier for effective virtual communication	(Daim et al., 2012; Klitmøller & Lauring, 2013; Panahi et al., 2013)
Communicating with different backgrounds/expertise	Differences in interpretation and understanding of what is known can act as a barrier to knowledge sharing	(Daim et al., 2012; Fang, Yang, & Hsu, 2013; Olaniran, 2017; Riege, 2005)
Technology	Technology can serve as a barrier when tools are perceived as ineffective or inadequate	(N.-K. Chow, 2011; Hislop, 2002; Marlow et al., 2017; Olaniran, 2017)
Lack of face-to-face meetings	Virtual meetings can be perceived as ineffective and more impersonal, and may reduce knowledge sharing	(Arnfalk & Kogg, 2003; Douglas, Lubbe, & Fabris-Rotelli, 2013; Gold, Malhotra, & Segars, 2001; Mason, 2002; Michailova & Husted, 2003; Riege, 2005)
Working with different countries	Working across borders can reduce effective communication and knowledge sharing	(Ardichvili, Maurer, Li, Wentling, & Stuedemann, 2006; Klitmøller & Lauring, 2013; Solli-Sæther, Karlsen, & Van Oorschot, 2015)
Uncertainty	Employees can experience uncertainty regarding the relevance of their knowledge and lack of awareness of what knowledge should be transferred	(Fang et al., 2013; Haas & Cummings, 2015; Lilleoere & Holme Hansen, 2011; Tidd & Bessant, 2013)

Methodology

The aim of empirical studies is to provide new knowledge within their field of research (Jacobsen, 2005). The aim of this study was determined by the two research questions; to provide new insights on factors which enables or hinders the sharing of tacit knowledge in a virtual team. These research questions served as the foundation for our methodological choices (Jacobsen, 2005). To best answer the present research questions, we wanted to take an inductive approach where qualitative data would serve as the foundation for theory creation (Bryman & Bell, 2011).

Single Case-Design

In order to gain as much insight as possible, we chose what Jacobsen (2005) refers to as an intensive research design. The aim was to gain in-depth and nuanced data from a low number of units, where individual understanding and interpretation were to be highlighted and analyzed. Furthermore, the research questions required a design that was sensitive to unexpected information and contextual factors, because of the exploratory nature of the study (Yin, 2014). We found that a single case-study design would be fitting for our research, with the unit of analysis being a specific virtual project team. By choosing this design, we were able to gain detailed information about tacit knowledge sharing among the participants in the chosen case. This design was chosen instead of a multiple case-design because we found such a design to be too extensive for this thesis. Although relevant information was likely to be found when comparing enablers and barriers highlighted by different virtual teams, such a study would be too comprehensive within the limited scope of this study.

We chose a cross-sectional study where all data were collected at one single point in time (Jacobsen, 2005). There were two reasons for this choice: first and foremost because it allowed us to answer the research questions by describing the potential enablers and barriers at a given point in time. Second, we chose this due to practical issues related to time constraints and available resources.

The case

When selecting the case, we used the method of purposeful sampling. This requires access to key informants in the field who can help in identifying

information-rich cases (Suri, 2011). We had three criteria when selecting the case: (1) the team had to work virtually to an extensive degree, (2) the project had to be ongoing, and (3) the team members had to be located in different physical locations, preferably different countries. We chose to study a virtual project team in a Norwegian bank which fulfilled all these criteria.

The project team in this study has approximately 60 members, where about half are internal employees and the rest are temporal consultants hired through a staffing agency. About 15 team members work in offices abroad. The present team is working on a subproject as part of an organization wide project. The overall aim is to ensure that the bank's activities and databases both in Norway and abroad are updated to be in compliance with Norwegian legislation on money laundering. The organization is separated into several business areas, where the present project is working with Large Customers and International (LCI). They report through two lines, both to the project owner and to the LCI-group who owns the clients. The overall project started in the third quarter of 2015, whereas the present subproject started working in the fall/winter of 2016. The aim is to finish the overall project by the end of 2017. Information about our participants will be given below.

Data Collection

We found that individual interviews with team members were the best way to learn how they experienced tacit knowledge sharing in their virtual team. The interviews were conducted in a fairly unstructured way, but with an interview guide to make sure all the important topics were covered. The interviews were recorded to ease the process of data analysis, and to make sure the interviews were not disrupted by extensive note taking (Jacobsen, 2005). Both researchers were present for all interviews. One was in charge of asking questions and the other took notes and asked additional follow up questions.

According to Nevin (1974, as cited in Jacobsen, 2005), the location of the interview might affect the quality of the answers. He stated that an artificial surrounding may cause the person to give artificial answers, and that individuals may act differently in an artificial or natural context. To reduce this challenge, we chose to do the interviews in a meeting room at the bank. We interviewed the Norwegian participants face-to-face, and the foreign participants were interviewed by using the bank's audio conference tool. We found this to be a strength, because both face-to-face meetings and virtual calls are part of the

natural context for these participants. It was also a practical way to get insights from more than just the rather homogenous Norwegian group. However, we know from both this and other studies that lack of face-to-face interaction may act as a barrier for good communication. Even though our international participants were used to communicating virtually, this should be highlighted as a potential weakness in our data collection.

We chose to send the interview guide to the participants prior to the interviews. Tacit knowledge was assumed to be an unfamiliar topic for most participants, and by providing them with the questions beforehand, we hoped they would reflect upon the topics before the interview. Since one of the characteristics of tacit knowledge is that it is hard to articulate with words (Nonaka, 1991), we hoped that time to prepare could help provide us with more thought-through and nuanced answers. However, this could also have influenced the participants to give their answers based on what they thought we wanted to investigate. Because our participants were both Norwegian and foreign, we chose to have both a Norwegian and an English version of the interview guide. This way, most of the participants could do the interview in their native tongues, which could increase the quality of their answers in terms of e.g. the use of metaphors or expressions (Polkinghorne, 2005).

The optimal qualitative study draws upon several methods of data collection to create a more accurate description of reality. By using different techniques to gather data, the aim is to see different aspects of a phenomenon (Jacobsen, 2005), which in this thesis is tacit knowledge sharing. We wanted to study this by using individual interviews and supplement these findings by asking for written guidelines or procedures for working in virtual teams. Such written material could help shed light onto the context in which the project team was operating. However, we were informed by the bank that no such written material existed. The data in this study is thus based exclusively on the information given during the interviews.

Participants

According to Yin (2014), the chosen case should reflect the research questions in regard to characteristics and problems. Participants should be chosen with the aim to get the best possible picture of the topic (Jacobsen, 2005). In order to gain as varied insights as possible, we wanted a 50/50 distribution of Norwegian and foreign participants, and a 50/50 distribution of men and women.

We also wished to interview participants with different seniority and experiences with virtual and/or international projects, in order to see how this might affect their answers. Jacobsen (2005) refers to this as selecting participants based on distribution.

We interviewed eight participants, where four were located at the Oslo office, and the others were located in Sweden, Finland, England and the US. Five of our participants were female, three were male. In regard to seniority, our participants ranged from having just started in the bank, with no experience with neither international nor virtual projects, to having worked there for over a decade and having experience with both international and virtual project work. We assumed this to be a strength, because participants with different backgrounds could provide us with a broader understanding of the tacit knowledge sharing in the project group. Support for this was found in Shenton (2004), who referred to this as a form of triangulation to increase a study's credibility.

Transcribing and Analysis

In order to quote the participants as accurately as possible, the answers were transcribed as similar as possible to the way they were spoken. This was done to reduce the risk of misquoting or misinterpreting the answers, and also to provide accurate quotes for the analysis and discussion (Jacobsen, 2005). The interviews conducted in Norwegian were first transcribed in full, and then translated into English. We aimed to make the translation as close to the original text as possible, but some Norwegian phrases were difficult to translate word for word. In such cases we kept both the Norwegian original phrase and the English translation in the transcript.

We performed a content analysis. The transcribed data material was sorted into categories and subcategories, which was a way to simplify the complex and detailed data. This was done to highlight differences and similarities within and across specific topics in the dataset. Data (in this case quotes) were moved from one context (the interview) into another (the relevant category) (Jacobsen, 2005). We then analyzed the data with the aim to identify potential enablers or barriers for tacit knowledge sharing. The findings are elaborated in the analysis and discussion chapters.

Evaluation of Research Methodology

Evaluating the quality of research is important, and one way of doing this is by examining potential sources of error related to the methodological choices taken. This section will provide discussions and evaluations of this study's methodological quality and trustworthiness. We will apply four criteria introduced by Lincoln and Guba (1985) in order to evaluate this, namely credibility, transferability, dependability, and confirmability.

Credibility in qualitative studies refers to the effort and ability of the researchers (Golafshani, 2003). This criterion require that the results are believable from the perspective of the participants (Research Methods Knowledge Base, 2006). To ensure this, we emphasized on preventing misunderstandings by formulating terms and questions as understandable as possible. We also performed a pilot interview, as well as providing the participants with the interview guide prior to the interviews. However, interviewers may direct the interview with leading questions in order to obtain desired data (Kaplan, 2016). We tried to avoid this, but it may nevertheless have occurred unconsciously. Further, it is of importance that the results are deemed credible by the participants, meaning they should be able to view and comment on the results (Shenton, 2004). The participants in this case had the opportunity to read and approve the transcribed interviews. Most declined, while a few received their transcript and approved them. Lastly, one factor that might positively affect the credibility of this study, was that our case is part of an ongoing project, which provided them with fresh memories of the discussed topics.

In a qualitative study, *transferability* refers to the degree to which the results can be transferred to other settings or contexts. This is met by providing a detailed description of the context the phenomenon is studied in (Shenton, 2004). We attempted to meet this criterion by providing a detailed description of the case, including the participants, the project, and the organization. Transferability can be related to generalizability (Shenton, 2004), which has been argued as low in case-studies (Jacobsen, 2005). However, this may not be fully accurate, as two forms of generalizability have been described by Jacobsen (2005); statistical and theoretical. *Statistical* generalization was likely to be inexpedient for the findings in this study, as they were based on one specific case with a low number of studied units. However, the findings could be suited for

theoretical generalization, which occurs when data form the foundation for further research on the topic (Jacobsen, 2005). This is in line with the aim of the study, where we seek to obtain new information on our research topic.

The *dependability* criterion is evaluated by assessing how data is collected and how accurate the data are processed (Shenton, 2004). As previously presented, all interviews were recorded and then transcribed for the purpose of quoting the participants as accurately as possible. In addition, the participants had the opportunity to read and approve their transcribed interview. We argue that our methods for data processing and analysis show that the research process can be viewed as dependable.

Confirmability involves ensuring that the data, interpretations and results are based on the participants and not created by the researchers (Shenton, 2004). We argue that this study's confirmability is high, since the interviews were recorded and then transcribed in their entirety, ensuring that the participants were quoted directly. This allows others to re-examine the interviews, and re-evaluate our interpretations, results and conclusions.

Ethical Considerations

According to Jacobsen (2005), there are three important ethical issues to address in order to conduct research in Norway. These are the obligation to obtain informed consent, the right to privacy and the right to be cited correctly. In addition to these considerations, we also want to refer to the other guidelines presented by The Norwegian National Research Ethics Committees (2016), which are relevant within our field of study.

The Personal Data Act sets out the obligation to obtain *informed*, *explicit* consent, which must be *given freely*. This is in order to ensure that participants understand what they are taking part of, what the information they give will be used for, and to ensure that they do not feel pressured into participating in the research. In addition, the participants must have actual opportunities to refrain from taking part or withdraw from the study at any time (The Norwegian National Research Ethics Committees, 2016). Before conducting the interviews, we made sure to obtain such consent.

In regard to the *right to privacy*, the collected data are not covered by The Personal Data Act's definition of sensitive personal data as described in § 2 item 8. The data were focusing on a work-related topic, which for most people are placed in the public sphere rather than in their private sphere (Jacobsen,

2005). A more pressing issue, was the possibility of *identifying* specific participants. To prevent this, we refer to participants as participant 1, 2, 3 etc., leave out identifiable information (e.g. age or gender), and present data with few details (e.g. by stating that the participant is Norwegian, but not specifying their role in the project) (Jacobsen, 2005). Also, confidentiality should be ensured throughout the research process. This means to guarantee that even though it is technically possible to connect the participant's identity to his/hers data, this will not be done (Jacobsen, 2005).

Finally, participants have the right to be *cited correctly*. This can be an issue when quotes are given new meaning when placed in another context. It is, of course, impractical to present the entire set of transcribed raw data, but during the analysis and discussion we always aimed to present the data as complete as possible. Furthermore, data or results should never be *faked*, either through intentionally leaving out results or "tweaking" the results to make them fit the study better (Jacobsen, 2005). This has been an important consideration throughout the process of writing this thesis.

Analysis

In the following chapter, we present the findings extracted from the data collection. First, we introduce findings related to tacit knowledge by identifying such knowledge within the project team and how this is shared. Second, we present findings categorized as enablers for willingness to share tacit knowledge. Third, we describe the barriers for sharing. Finally, we highlight findings categorized as circumstantial. These findings cannot be viewed binary as an enabler or a barrier, but may act as both depending on the context.

Identifying Tacit Knowledge

We wished to identify the participants' tacit knowledge as a basis for the study. Six participants stated they had knowledge they found difficult to share with others, which indicated the presence of tacit knowledge. The general opinion among the participants was that some forms of knowledge could not easily be explained, but had to be demonstrated and worked with over time. Participant 2 mentioned tacit knowledge directly by saying: "[…] those I am working with, they have a lot of tacit knowledge that I am very dependent on them sharing. But what is hard, you can't summarize everything you know or have learnt." Another participant also highlighted that such knowledge was harder to share, mainly due to difficulties when explaining things to colleagues without the same background knowledge:

> So I can be sharing an experience or a how-to, but if the person or the colleague that I'm talking to has never maybe worked in that system or has seen it, it's very hard for them to understand what we're really talking about (participant 5).

The same participant also explained why sharing experiences with other team members is important: "[…] it all comes down to what we each experience. If I've never experienced anything, or been exposed to anything, I might not even know that that path exists." This was further supported by participant 3, who stated: "[...] some things are best learned by experience."

Sharing Tacit Knowledge

We wished to gain a general understanding of the participants' perception of sharing tacit knowledge, and how such knowledge was shared in the project. Seven participants expressed they have forms of knowledge they perceived as harder to share virtually, and that they would have preferred to do so face-to-face. One participant highlighted the challenges of sharing:

> You know, what are you thinking, what are you trying to... you know, some things you may see in a bigger picture or a smaller picture. It's easier to be in person, and write it

> on post-it notes or write it on the board or you know, change course and speak up and bounce ideas off each other. Those things are much easier to do in person. It's much more difficult to show you on a computer or through a call (participant 5).

Contrariwise, participant 2 said the challenge was not related to the communication medium as such, but that tacit knowledge sharing in general was more challenging and time-consuming: "[…] there are some things that are hard to share and things you have to, like, if you have built experiences and knowledge over time, then it is not just to communicate that in five minutes", and concluded that "[…] it just takes time. Whether it is virtual or physical I think doesn't matter, in relation to that type of knowledge."

Further, six participants expressed experiencing less informal communication when working in a virtual team, compared to in a traditional team. Two participants estimated that informal communication accounts for 10-15 percent of the communication in a virtual team. One participant highlighted the value of informal communication as a good way of learning:

> […] asking those silly questions and talking it through, and being able to explain what I mean by my question. And in writing a lot of those things may be taken out of context, so being able to talk it through and explain, you know, what you mean by these words, you know, you achieve more that way (participant 5).

In addition, participant 4 explained that informal communication differs when communicating with Norwegian colleagues in the same office, compared to when talking to team members in foreign offices: "[…] when we talk together before we contact the outside locations, then we small talk a little. There is not a lot of small talk when we speak to the outside locations, then it is pretty straight forward."

Enablers

In this section, we present findings categorized as potential enablers for team members' willingness to share their tacit knowledge. The findings are divided into four main categories; attitudes and motivation, organizational culture and trust, competitive advantage, and technology.

Attitudes and motivation

We found that all participants inhibited a general positive attitude towards knowledge sharing, and they characterized this as an important part of the project's success. One of the leaders emphasized the importance of all members sharing their knowledge:

> I think it is really important. I think it is some of the success factor, to share that knowledge. Because when you slip on that part, then you slip on a routine, and then you

> can make some mistakes. So to ensure that everyone has the same knowledge and information is extremely important (participant 7).

The emphasis on sharing knowledge to make the project advance was a recurring theme, for instance illustrated by participant 5: "I think it's a must in order to work together, work as a team, learn from each other and to achieve your goals." A similar viewpoint was shared by participant 4: "So I think it is very crucial that if people experience something, that they forward that input. That is what makes the project progress." In addition, one participant expressed the importance of sharing in order to acquire knowledge for themselves: "I would say that if one doesn't share, then one shouldn't expect to gain understanding into how one does things" (participant 6). Nevertheless, two participants additionally stated one should not share without being critical, but rather assess the relevance of the knowledge. In addition, seven participants expressed willingness to share their knowledge with external actors, such as consultants only participating in a specific project. The participants expressed this did not affect whether they would share their tacit knowledge, supporting the general positive attitude towards knowledge sharing.

We also wished to investigate the motivation to share tacit knowledge with other team members. None of the participants reported low motivation towards sharing their tacit knowledge, which support an underlying positive attitude towards sharing their tacit knowledge. As all participants exhibited positive attitudes and motivation, this will be discussed as an enabler in the next chapter.

Organizational culture and trust

In terms of organizational culture, seven participants reported there is a culture for sharing their tacit knowledge with team members, while one participant did not believe such a culture existed. Participant 7 described the culture: "It is to ask, and share, and tell each other." Another participant, however, described the culture as something that needs to be worked on: "It is a little mixed. Because there is a little different culture towards it. And that has to be worked on a lot, to get people to share" (participant 2). Still, two participants explained how this was not explicitly encouraged, but rather viewed as favorable: "I think it's welcomed, but it is not like asked" (participant 5).

With regard to trust, the findings revealed divided opinions. Four participants believed trust could affect their tacit knowledge sharing. One of

these linked trust to building relations in a virtual team, and stated: "[…] getting that trust to want to share some of that knowledge, that requires knowing each other, that you can build on that trust. And that is a lot more difficult to build virtually" (participant 2). In relation, one participant highlighted that trust is important in order to ask questions:

> If I don't know what my audience is going to use the information in question for, you know, if I think they're going to turn around and start harassing at me, I definitely would not be raising my hand and asking the silly question (participant 5).

In contrast, two participants did not perceive trust to influence their motivation to share tacit knowledge, and they do not make distinctions based on trust. The final two participants expressed how sharing their tacit knowledge is part of their job, and therefore not influenced by trusting their team members. This was explained by participant 4: "[...] my job entails that I have to share. So if I don't have trust to a person, then I still have to share if he or she asks specifically about something."

Competitive advantage

Seven participants explained how sharing their tacit knowledge affected their competitive advantage in a positive manner. None believed there was anything to gain by keeping knowledge to themselves, as evident by participant 4's statement: "The leaders see that you do a good job when you share. At least what you experience and the knowledge you have. They pick up on that. And they see it as positive that you contribute to the team." One participant emphasized the relationship between individual competitive advantage and building a successful organization:

> I think that if we as a company shall move forward we have to share. And if one does not share, you become very vulnerable. [...] I think one has to more… put one the company hat when that question pops up in your head. 'Is it smart to share?' Yes! That makes us earn more money, then you are much safer (participant 7).

This was further supported by participant 2: "I think that the more you share of insight, whether it is experiences or knowledge, the more it will favor the company. There is nothing to gain by me sitting and holding back or portioning out." Our findings showed that demonstrating and sharing knowledge would favor both individual team members and the team itself. This was illustrated by the following statement:

> It shows that you work in a team and that you're a team player. And you achieve more by working in a team. And it really strengthens the organization. If each person knows something and keeps it to themselves, how are we really growing together? We may be growing individually, but not together. And this is an organization, so we're together and strengthened as a unit. And by sharing knowledge, you're really putting what you

> learn into practice, and building a team. You know, you're only as strong as your weakest link (participant 5).

Available technological tools

The findings showed that the participants viewed technology as both an enabler and a barrier, where in this section we will focus on the former. The project group conduct most of their communication via Lync, a Skype-like service which enables communication and screen sharing with team members across locations. Six participants consistently mentioned this as a facilitator for knowledge sharing, for instance through screen sharing: "It is like showing someone sitting beside you. So technology is not a barrier to share such things" (participant 7). This was further supported by participant 5, describing that "[...] we try to share a screen if we have Lync-meetings and presentations, have something visual so it is much easier to understand." Further, the ability to share knowledge visually through technological tools was also highlighted as an enabler. Participant 7 explained: "If one thinks virtually in terms of Lync, then we have the presentation up, and then it is almost like sitting in the same meeting face-to-face."

Barriers

In this section, we present findings categorized as potential barriers for tacit knowledge sharing. The findings are divided into four main categories; communication, technology, collaboration across borders, and lack of face-to-face contact with team members.

Communication

The findings revealed communication as a barrier with different types of challenges. These will be presented separately in the following.

Misunderstandings

One challenge with virtual communication was related to making sure the message was understood the intended way. Participant 8 stated: "I think it is more difficult to communicate and get the message across in virtual teams than other work teams." This challenge was highlighted by seven participants. Another example was given by participant 5: "I think that it is easier to sit in a room with somebody and go through the process and sit at the same screen and walk through it." The increased risk for misunderstandings was highlighted by participant 6:

> [...] when you have short time then maybe you can't express yourself so clearly that others should understand what you mean [...] So the risk of misunderstandings are more apparent in virtual meetings perhaps. [...] You have to be very clear in what you're trying to say, and it's maybe also more… making sure that the others have understood what you're saying [...]" (participant 6).

Lack of visual cues

When asked to describe the biggest challenge of working virtually, six participants answered not being able to see the person they were communicating with. One participant found it challenging "to understand and read between the lines, and really understand that everyone is on the same page" (participant 8). Additionally, participant 2 mentioned reading between the lines as a challenge when visual input were lacking. In order to counteract this, one participant explained that you have "[...] to be more clear in your communication because people may not take some visual information that they would have otherwise" (participant 3). One reason why face-to-face communication is preferred, was described by participant 7: "[...] generally I think things are harder to explain virtually. […] I think it is easier to explain face-to-face because then you can see when they have questions." Another participant also reflected upon this challenge:

> I think it is more difficult when one is working virtually. [...] You are lacking facial expressions to see if the message comes across. To say something is one thing, but to actually understand the meaning of that word is a completely different matter. Getting the message across, knowing it's understood (participant 8).

One participant felt that all virtual communication has limitations which cannot be completely eradicated by use of proper technology: "Even though you have video or Lync you don't see the mimic, you don't see the body language in the same way, you don't hear if the person is frustrated, annoyed, or very enthusiastic that easily" (participant 2).

Communicating with other backgrounds/expertise

Three participants saw it as a challenge to communicate with team members with different backgrounds or expertise. When participant 6, who has a financial background, explained communication with the "IT-people", the participant stated: "They have trouble understanding me, and I have trouble understanding them. And it's not always that easy to communicate, and then get each other to understand." This was further explained by participant 5:

> So I can be sharing an experience or a how-to, but if the person or the colleague that I'm talking to has never maybe worked in that system or has seen it, it's very hard for them to understand what we're really talking about. […] For me, if I've never

> experienced something, it's hard for me to really understand what message is being related to me (participant 5).

Another viewpoint was given by participant 3, who explained that different experiences may come from working in different locations. Such differences can be hard to describe to other team members: "[…] there's differences there between [location X] and other areas, that can take some... uh, quite a lot of describing to help people understand."

Underused technological tools

Above we presented how technology might act as an enabler for tacit knowledge sharing. In this section, we will focus on how it might be a barrier. Most of the virtual communication in the present case is done via Lync, but according to the participants, this tool is mostly used for one-to-one calls or conference calls without video. When asked how their virtual work could be improved, two participants who found lack of visual cues to be a barrier, stated they would like a more extensive use of video conferences. Participant 4 explained that: "The way we operate I think is quite alright, but it would have been easier if we had video conference. That function is available, but maybe it is a little more difficult to set up six different places at once." Participant 1 further elaborated: "We only have one room [in the Oslo-office] where we can have video with three countries simultaneously." Participant 2 highlighted the use of visual aids: "[...] you are unable to understand each other, you are unable to explain. And then it is much easier to put it on a board", which further underlines the limitations of regular phone calls.

Three participants assessed technology as a potential barrier for their motivation to share tacit knowledge. One participant explained how the virtual setting can cause team members to abstain from sharing knowledge:

> [...] there are probably times when there may have been things that may have been said or drawn on some experience if we were in a face-to-face meeting. And that didn't happen because of sort of more virtual. Hopefully not too much, but I think it creates some form of potential barrier (participant 3).

Lack of face-to-face meetings

Limited face-to-face contact with other team members was highlighted as a barrier by all participants. Participant 3 focused on how interpersonal relationships can be weaker when only communicating virtually: "[…] it's harder to create a team spirit in a virtual environment than in a face-to-face, traditional environment." When asked if this could impact the knowledge

sharing in the team, the participant answered: “I think it’s a difference there. Not intentionally, but just through natural flow.” The same participant expressed that: “when you know somebody face to face, I think it’s easier to work virtually with them.”

Another participant highlighted the need for at least some face-to-face contact: “I have a lot of faith in that you have to meet in some way. Not a lot, but to work only virtually and not meet, I don’t have a lot of faith in that” (participant 2). Participant 8 viewed the face-to-face meetings as a way to sort out practical issues: “I believe that before one starts a project, that the work material one is working with should be communicated and is discussed before it is used.” This was also supported by participant 5: “To have those meet and greets, and just [discuss] needs and challenges upfront is helpful.” Another participant highlighted Lync as a good tool for follow-up meetings, but that valuable discussions are more likely to occur face-to-face: “[...] when you’re sitting around the same table, the discussion is different from when you’re in a Lync or a video-meeting” (participant 6). This participant suggested a mix of face-to-face and virtual meetings, depending on the current needs.

The participants were also asked to mention successful ways to overcome challenges of working virtually. Five of them suggested an initial face-to-face meeting to improve the future virtual work. During the interviews, all participants did at some point mention the need to meet the other team members face-to-face. One participant explained the following solution:

> Travel to people. At least in the beginning. [...] Everyone say that immediately after you have met people, it is much easier to call if there are problems or you have to clarify something, but you have to meet them first (participant 1).

This view was also supported by participant 2, who illustrated another initial need: “[...] do things by starting talking about how you should work together, how important it is because you don’t see each other, and that you are clear on what you mean, that you ask”. Travelling and building relations was a recurring theme during all the interviews. As emphasized by participant 1: “[...] you should travel to visit those you are working with, because it makes it easier afterwards.” Participant 4 gave an example of how a physical meeting later proved to improve virtual work: “[...] he said that it was very good that he actually went down there. It was much easier to get things in place, rather than sitting and e-mailing each other.” One participant explained how meeting others face-to-face could also increase the virtual informal communication:

> But we feel that right after we have visited them, then it is much easier to either call or just have a meeting with that person, and not the group we are working with, then it is much more informal. And I might get the answers I am after, which they might not have said if they were in a meeting with others (participant 1).

Another participant further emphasized the importance of building relations: "I notice that when you meet a person, you get to know each other better. [...] It becomes easier and informal, and one can ask critical questions, and one is not offended by it" (participant 4). The need to meet face-to-face at the beginning of a project is further highlighted by participant 7: "So optimally it would be best to meet first, and then do the rest over Lync." Participant 3 added the importance of building relations and have face-to-face meetings throughout the project: "Virtual becomes easier if you have face-to-face meetings separately. When you know somebody face-to-face, I think it's easier to work virtually with them."

Some of the participants also discussed the content of virtual meetings as a barrier for tacit knowledge sharing. Participant 6 explained: "The level of discussion isn't as thorough. […] More like moving from point to point and make decisions." Several times throughout the interview, this participant mentioned how the virtual setting makes it more difficult to "bounce ideas" with other team members. Participant 3 also commented on the limited room for interaction: "I guess it's more that if you're in a virtual team, after that conversation or meeting, project meeting, is over, you are then more alone. Unable to have immediate contact with people, because they are not around you." Both of these participants are located in foreign branches of the bank, which highlight an important distinction between the Norwegian and foreign team members' access to communication. This was also described by one of the Norwegian participants:

> But when you work over Lync you lose some of the small talk. When you are done you just hang up, but in a physical meeting you often sit out the time you have set aside, because 'I am not going to the new meeting until ten minutes, so I might as well…' (participant 2).

Furthermore, the choice between efficiency and clear communication can be viewed as a trade-off:

> [...] those discussions [in virtual meetings] are not as good, because you interrupt one another. It is difficult to catch everything being said, you don't see the other's body language, you only hear what they say. And they can completely disagree and say yes, and then they do something else. So it is more efficient, you get through the meeting more quickly, but you might miss some discussions or some of the inputs (participant 7).

Working with different countries

Participant 1 described some challenges when working with different countries:

> […] it is difficult when there are different cultures. People have different work cultures in addition to the country they come from. So you have to have understanding and even tolerance that people work differently. You see it very well when you work with other countries. Not everyone answers e-mails, keep deadlines, and then it is even more difficult when we don't see people every day, that we have to communicate over e-mail or Lync (participant 1).

Furthermore, culture and hierarchy was mentioned as a source of potential conflict: "[...] there is this with culture crashes. So it is very difficult if they do not understand what we do, and we have to ask critical questions they might be afraid to ask regarding that we are from the main office" (participant 4). This was further elaborated on by participant 7:

> Not all cultures have that openness, and that you ask questions whether everyone has understood, then there is someone who has not understood, or when you ask is someone has used something before and they answer 'yes', and then they have not. Because they do not want to embarrass themselves if they do not know how to do it (participant 7).

One example mentioned by two Norwegian participants, was the collaboration with Singapore and the extreme cultural differences between the two countries. Participant 1 gave the following description: "We have had four meetings with Singapore and discussed the same thing, and they all the time said 'yes, yes, yes', but when we started digging they had misunderstood. It was actually 'no'." Another example given by the same participant was related to deadlines and communication:

> When they say something, even if they don't have the opportunity to deliver by Friday for example, that they say to us that they are able. We often see with the foreign offices that they avoid answering entirely concretely and then we are struggling (participant 1).

Circumstantial Factors

We discovered some factors which may serve as either enablers or barriers. If conditions surrounding the factor are met, it can be act as an enabler for the participants' willingness to share. On the other hand, if conditions are not met, it may act as a barrier. After analyzing the data, we decided that uncertainty related to sharing tacit knowledge could be characterized as such a factor.

Across the interviews, six participants stated that uncertainty regarding the relevance of their knowledge affected whether they shared it. Two of these six participants said they had difficulties determining the relevance of their tacit knowledge. This uncertainty negatively influenced their decision to share. The remaining four participants did not view uncertainty as a barrier, and expressed

not having issues determining the relevance of their tacit knowledge. These participants highlighted that if they deemed their tacit knowledge relevant for others, it would be shared. Two of these emphasized they would rather share too much, and then give the receiver the opportunity to extract relevant information. Participant 2 described the ability to determine relevance as: "[...] probably something that comes with experience." Another participant explained how the evaluation of relevance can occur in an everyday setting:

> But in a hectic day where there is a lot of input and where you are sitting and making a quick evaluation on 'This does not affect them', then you might think that you are saving them for that information or that e-mail, and that might not be completely correct (participant 7).

Participant 8 explained that uncertainty may be a result of missing feedback: "[...] it is connected to that we are still waiting for the information from the clearance of our work. Until we have that, then I don't want to share information, since I don't know if it is sufficiently good." Another example was given by participant 5:

> I think if I don't think it's relevant, or if I'm unsure of it, I would hold back and maybe try to learn a little bit more about it. I may just hold back, I wouldn't necessarily keep something to myself, I just may be a little bit restrained about it or do some more research on my own before I speak up (participant 5).

Seven participants expressed they never deliberately withhold tacit knowledge from project-members. However, most participants stated that perceived relevance affected if they share, as illustrated by participant 4: "At least what I think is useful or is a need for and can be useful, I always share that."

Discussion

In this chapter, we discuss the findings against existing theories, with the aim to answer the present research questions and generate new insight. The discussion is presented in the same order as the previous chapter, starting with tacit knowledge, and then discussing potential enablers, barriers and circumstantial factors. The enablers and barriers are discussed separately, although such factors are often not isolated and many of them are likely to be related to each other (Riege, 2005).

Identifying Tacit Knowledge

Before discussing enablers and barriers for tacit knowledge sharing, the tacit knowledge within the project group needed to be identified. According to the descriptions presented in the theory chapter, tacit knowledge is often acquired through experience, can be difficult to articulate and is often shared through learning-by-doing (Newell et al., 2009; Nonaka, 1991). Our findings identified that most participants had some knowledge in accordance with this definition. This indicate awareness among the participants in terms of possessing different forms of knowledge. Some participants also emphasized that knowledge acquired from experiences (i.e. tacit knowledge) was more difficult to share than explicit knowledge. This was even harder if the receiver did not have the same basic knowledge about the topic.

In addition, Tidd and Bessant (2013) stated that employees who possess tacit knowledge might not know where their knowledge can be useful. This is similar to one participant's description of experience, involving that if a person has never been exposed to a particular experience, awareness of this concept might not exist. This highlights the importance of increasing employees' willingness to share and identifying barriers to overcome, since tacit knowledge easily can become invisible in an organization. By increasing the willingness and reducing the barriers, the organization can facilitate for better tacit knowledge sharing.

Sharing Tacit Knowledge

Filstad and Blåka (2007) stated that sharing experiences is one way to share tacit knowledge. Nonaka (1991) highlighted that such knowledge sharing occurs between individuals who interact. Since tacit knowledge is shared through interaction, the organization as a whole may not be able to draw upon

this knowledge. This emphasizes the need to share tacit knowledge, in order to reach as many as possible. Further, sharing experiences may often occur in informal arenas involving face-to-face interaction, for instance as impulsive meetings in the hallway (Werr & Stjernberg, 2003).

In regard to sharing tacit knowledge in a virtual team, most participants said they have forms of knowledge they find difficult to share virtually. One participant explained how describing something from different points of view is harder to do virtually, especially when the understanding is based on personal experiences. The same participant said it was harder to communicate an understanding of a topic or bounce ideas when in a virtual meeting. Research on tacit knowledge sharing has found that such knowledge is best shared face-to-face, and that trying to communicate tacit knowledge virtually is challenging (Nonaka, 1991).

Most participants expressed that they experience less informal communication when working virtually. This may induce a barrier for tacit knowledge sharing, since research had found that tacit knowledge is easier shared by informal face-to-face interaction (e.g. Werr & Stjernberg, 2003). Two participants estimated that 10-15 percent of the communication in a virtual team is informal, which imply limited available communication channels for tacit knowledge sharing. This further increases the importance of sharing tacit knowledge when possible, since there are fewer available arenas.

We found informal communication to be a valuable way to acquire tacit knowledge. This emphasized the importance of creating informal arenas for the team members to interact. This is in accordance with Riege (2005), who stated that the creation of formal and informal spaces for interaction is a way to improve knowledge sharing in the organization. Such informal arenas occur more naturally among co-located team members, which may induce a difference between co-located and dispersed team members in terms of informal knowledge sharing. This difference was highlighted by one of the participants in this study, who explained that informal communication was greater among team members located at the same office. This will be further discussed below as a potential barrier.

Enablers

In this section, we discuss the identified enabling factors against previous research. The discussion will then be applied to answer the research question *"What enable team members' willingness to contribute their tacit knowledge to their virtual team?"*

Attitudes and motivation

An attitude is defined as "a psychological tendency that is expressed by evaluating a particular entity with some degree of favor or disfavor" (Eagly & Chaiken, 1993, p. 1). The entity relevant for this study is whether to share tacit knowledge with other team members. Our findings showed that all participants had a general positive attitude toward tacit knowledge sharing. One participant referred to sharing tacit knowledge as a success factor, and highlighted the importance of all team members having the same knowledge. The overall positive attitudes was related both to organizational success and personal growth. This was further emphasized since none of the participants reported not sharing relevant knowledge with external actors. These findings indicate a high degree of willingness to share tacit knowledge, and that this willingness is influenced by their attitudes. This is in accordance with Charband and Jafari Navimipour (2016) and W. S. Chow and Chan (2008), who found that positive attitudes toward knowledge sharing were positively linked to the employee sharing their knowledge.

In terms of work motivation, the participants showed a generally high level. In an organizational setting, work motivation can be defined as "a set of energetic forces that originate both within as well as beyond an individual's being, to initiate work-related behavior and to determine its form, direction, intensity, and duration" (Latham & Pinder, 2005, p. 486). The work-related behavior relevant for this study was tacit knowledge sharing. None of the participants reported low motivation in this regard. This coincided with their positive attitudes toward knowledge sharing, and indicated that motivation was an enabler for willingness in the present case. This is in accordance with a meta-analysis performed by Witherspoon et al. (2013), who found that attitudes and motivation were antecedents for knowledge sharing. Furthermore, Riege (2005) stated that successful knowledge sharing, especially of tacit knowledge, among other factors depend on employee motivation.

Organizational culture and trust

A study performed by Ardichvili (2008) on knowledge sharing in virtual communities of practice, found organizational culture to be an important enabler. The author presented several studies which found a direct relationship between a supportive organizational culture and successful knowledge sharing. In the present study, several participants explained that there is a culture for sharing experiences in the current project. One participant stated that sharing and acquiring knowledge is part of the bank's organizational culture. Some participants did not find knowledge sharing to be specifically required or encouraged, but instead a voluntary activity. These findings indicate that organizational culture work as an enabler for tacit knowledge sharing in the present case. This is in accordance with the findings presented by Ardichvili (2008).

Trust has been described by many scholars as a key element for knowledge sharing. Rutten et al. (2016) concluded that "current research suggests that trust has a significant positive effect on knowledge sharing" (p. 199). Furthermore, Naicker and Benjamin (2014) stated that trusting other members of an organization might enhance the willingness to share knowledge. In the present study, the findings indicate that trust *can* influence the willingness to share tacit knowledge, but this was only highlighted by half of the participants. One of the participants stated that building trust made them want to share their knowledge, and another participant linked trust to whether they would dare to share. On the contrary, some stated they did not make distinctions based on trust. Yet others explained that sharing knowledge was part of the job, and that trust does not influence whether they share their tacit knowledge with team members. For these participants, trust was neither an enabler or barrier for their willingness to share tacit knowledge. According to these findings, trust did not act as the powerful enabler suggested by literature. We propose two potential explanations: one is that trust actually does not influence willingness to share. The second explanation is that the level of trust between team members is sufficient, and that team members thus are unaware of its effect. Support for the first explanation was found in Amayah (2013), who was surprised to find that trust was not a significant predictor for willingness to share knowledge, despite this being the most common conclusion in previous studies.

Competitive advantage

Some scholars have viewed competitive advantage as a barrier for knowledge sharing. Connelly et al. (2012) found that knowledge hiding (i.e. intendedly not sharing knowledge with others) in competitive organizations could lead to short-term rewards for the individual employee. However, hiding knowledge would also lead to long-term performance decrease for the organization. Zhang and Dawes (2006) linked knowledge sharing to loss of individual power. They found that this could lead to knowledge hiding in order to maintain individual competitive edge. Furthermore, Davenport and Prusak (1998) specifically highlighted tacit knowledge as something employees hide in order to maintain their competitive advantage.

The present findings show the opposite conclusion. In this study, all participants said sharing their tacit knowledge had a positive impact on their competitive advantage. None felt deliberately holding knowledge back would benefit them in any way. As stated by participant 2: "There is nothing to gain by me sitting and holding back or portioning out." One participant explained how sharing knowledge led to being promoted, and another highlighted how tacit knowledge sharing help build and improve strong teams. This point of view reflected how tacit knowledge sharing is beneficial for individuals and teams.

Another point of view discussed by some of the participants, was how sharing tacit knowledge improve the organization as a whole. One participant linked tacit knowledge sharing to the company moving forward, and how not sharing would leave the company vulnerable. The participant highlighted the reciprocal relationship between the organization and individual knowledge sharing: "'Is it smart to share?' Yes! That makes us earn more money, then you are much safer" (participant 7). The present findings indicate a high willingness to share tacit knowledge, which may partly be explained by the participants' view on sharing as a way to improve their competitive advantage. A link should also be drawn to the previously discussed positive attitudes and sharing culture.

The present findings is in accordance with Ardichvili et al. (2003) who found that withholding knowledge to gain competitive advantage could not be considered a barrier for knowledge sharing. As in the present case, the authors found strong evidence for a willingness to share. Less than 10 percent of the participants in their study reported unwillingness to share, fearing it could negatively affect their competitive advantage (Ardichvili et al., 2003). This

shows that even though our findings contradict much of the existing research, evidence can be found for a more nuanced view.

Available technological tools

According to Panahi et al. (2013) there is an ongoing discussion among researchers whether technology serve as an enabler or barrier for tacit knowledge sharing. Falconer (2006) supported technology's role as an enabler, for instance by providing mechanisms to exchange valuable knowledge, even though such communication might not be as rich as face-to-face interactions (Panahi et al., 2013). Furthermore, Falconer (2006) argued that technology "offer significant potential to transform and communicate tacit knowledge" (p. 149), and strongly disagreed with researchers who stated technology cannot facilitate for tacit knowledge sharing. This view was supported by Jones (2016), who explained that the use of rich media (e.g. Skype), to some degree can compensate for the lack of face-to-face interactions. In contrast, other researchers have argued that tacit knowledge cannot be shared through technology without converting it to an explicit form. They argued that tacit knowledge can only be shared through face-to-face interactions, and technology can thus only have a small role in sharing and capturing it (Panahi et al., 2013).

Most of the participants in the present case highlighted Lync as a useful tool to facilitate for tacit knowledge sharing. For instance, screen sharing allows participants to collaborate and demonstrate even though they are based at different geographical locations. Sharing visual illustrations was emphasized as a way of simplifying tacit knowledge sharing between team members. One participant stated that Lync removes the barrier of sharing tacit knowledge. By allowing participants to view the same presentations and work in the same programs, it can be argued that knowledge is made more available through the use of Lync. Arguably, when all team members have access to the same information, it can be easier to exchange experiences and know-how, and consequently share tacit knowledge. Based on this, it can be argued that the available technological tools may serve as an enabler for the willingness to share tacit knowledge.

Barriers

In this section, we discuss the identified barriers against previous research. The discussion will then be applied to answer the research question *"What are the barriers for team members to contribute their tacit knowledge in virtual teams?"*

Communication

Several researchers have found that the ability to share knowledge often rely on communication skills. Effective knowledge sharing is thus dependent on effective communication, both in terms of written and verbal (Riege, 2005). Furthermore, research has found that communicating knowledge through technological tools is difficult, cognitively demanding and ambiguous (Daim et al., 2012). In the present case, communication was found to be a barrier for tacit knowledge sharing. It is possible to divide this barrier into three categories; misunderstandings, lack of visual cues, and communicating with other backgrounds/expertise.

Misunderstandings

When communicating virtually, the risk of misunderstandings is increased (Klitmøller & Lauring, 2013). According to Daim et al. (2012), such misunderstandings can lead to reduced team communication and productivity, and also reduce innovation and team success. The risk of misunderstandings was specifically mentioned by almost all participants. The challenge was underlined by participant 8: "I think it is more difficult to communicate and get the message across in virtual teams than other work teams." Verburg et al. (2013) highlighted clear communication as one of the most important conditions for effective virtual work, resulting in fewer misunderstandings and conflicts.

In the present study, clear communication was only mentioned by a few participants as a way to counter the risk of misunderstandings. Since all participants highlighted the concern for misunderstandings, but only a few highlighted specific countermeasures, the findings indicate that the participants might not have the necessary awareness of the value of clear communication. This may result in insufficiently clear communication and thus increase the risk of misunderstandings. This indicates that lack of clear enough communication can act as a barrier for tacit knowledge sharing. However, one participant highlighted that as you work together over time and get to know the other team

members, you learn to communicate more efficiently with them. This implies the possibility to reduce the effect of misunderstandings as a barrier for tacit knowledge sharing.

Lack of visual cues

Nonverbal expressions are important aspects of communication, since they provide additional meaning. This can be used to gain a comprehensive understanding and avoid miscommunication and confusion (Daim et al., 2012). According to Klitmøller and Lauring (2013), nonverbal expressions might be missing in virtual communication. Such communication has been argued to be insufficient compared to face-to-face interactions, which are viewed as richer (Panahi et al., 2013).

In the present case, phone or conference calls were the most common forms of communication between team members. Such communication provides few nonverbal cues. During the interviews, several participants expressed that lack of visual cues presented a barrier for effective communication. Not being able to see who they communicate with, was highlighted by several participants as one of the biggest challenges of working virtually. They explained that the absence of facial expressions limited their understanding of whether the message came across as intended. This indicates that tacit knowledge sharing in a virtual team might not be as good as tacit knowledge sharing in a traditional team. This was further underlined by one participant who explained that even when using video calls, some visual cues such as mimic, body language and tone of voice, were still insufficient. These findings coincide with previous research, where lack of social cues such as eye contact and body language have been argued as a barrier for virtual communication (Hislop, 2001; Hooff & Weenen, 2004, as cited in Panahi et al., 2013).

Communicating with other backgrounds/expertise

Daim et al. (2012) described differences in "knowledge bases, reasoning abilities, motivations, and […] thinking approaches" (p. 203) as a source for communication issues. Furthermore, Riege (2005) listed both differences in experience and educational level as potential barriers for knowledge sharing. The present findings are in accordance with this, where some participants mentioned the challenge of communicating with team members from other disciplines or with different work experience. These participants said they experienced

difficulties trying to make themselves understood, and that much time was spent on explaining and describing. Visual aids to help them explain were oftentimes not available, as much of the communication occurred through phone calls. Some participants linked the challenges directly to tacit knowledge by highlighting communicating across different experiences as a barrier.

This barrier was described by Fang et al. (2013) as equivocality; meaning the problem that occurs when information is interpreted differently. When equivocality is high, this act as a barrier for knowledge sharing since it can result in confusion and lack of common understanding. Because of these outcomes, more information may lead to more confusion (Daft and Weick, 1984, as cited in Fang et al., 2013). This was supported by Wilson (2002, as cited in Olaniran, 2017), who stated that some of the challenges of sharing tacit knowledge is caused by a limited control over what is known. In the present study, equivocality can be found when communicating across different professions and also when evaluating what knowledge was relevant to share.

Underused technological tools

Research has shown that users in online communities include digital images as a way to assist their tacit knowledge sharing (Charband & Jafari Navimipour, 2016). Video conferences can thus be a useful technological tool when sharing such knowledge (Panahi et al., 2013). However, ineffective tools has been argued to impede such sharing (Olaniran, 2017).

In the present study, most participants viewed lack of nonverbal communication as a barrier when working virtually, and some participants suggested that the organization should extend the use of video conferences to counter this challenge. This was argued to reduce the barrier related to lack of visual cues and thus make it easier to work virtually. This represents a view that some technological tools can enable tacit knowledge sharing. However, the commonly used tools in the present case, were perceived as insufficient by some participants and might act as a barrier for tacit knowledge sharing. In accordance, research has found that virtual teams using communication tools which provide face-to-face contact (e.g. video conferences), has a higher degree of performance compared to teams that do not operate with face-to-face contact (Marlow et al., 2017).

Regarding technological tools and motivation, Hislop (2002) argued that technology can facilitate for knowledge sharing, but the actual sharing is

embedded in the personal motivation to use the tools. In the present case, some participants assessed technology as a potential barrier for their motivation to share tacit knowledge. One participant explained that team members may sometimes choose not to discuss matters virtually, which may impede the virtual tacit knowledge sharing. Additionally, N.-K. Chow (2011) found that perceived usefulness and user-friendliness were important factors when motivating the usage of technology. Since some participants in this case perceived usefulness as low, this may be an explanation for why some matters are not discussed virtually. As the participants highlighted it can be more difficult to share tacit knowledge virtually and that the discussions might not be as thorough, we argue that underused technological tools may act as a barrier.

Lack of face-to-face meetings

Some researchers have claimed that face-to-face meetings are more valuable than virtual meetings (Douglas et al., 2013). Mason (2002) found that face-to-face interaction cannot be replaced by virtual communication. According to Clark (1996, as cited in Douglas et al., 2013), virtual team members who mainly communicate by phone and e-mail, find it difficult to create the common ground necessary for establishing a shared understanding. Virtual meetings using only audio have been described as inferior to face-to-face meetings, as they often are ineffective due to the limited level of interaction between participants (de Lind van Wijngaarden, Erman, Matthews, Sharp & Sutter, 2010, as cited in Douglas et al., 2013). One possible explanation is that use of technology to communicate is likely to enhance an impersonal impression among the team members (Armstrong 2007, as cited in Douglas et al., 2013). In the present case, most of the virtual communication was either done by phone or e-mail. One participant explained the difficulties of creating a team spirit in a virtual environment and that this may impede tacit knowledge sharing. The participant further elaborated how knowing someone in person could enable their virtual work together. This can be related to previously mentioned development of a common ground among participants, and the lack of personal impressions.

One participant underlined the importance of having physical meetings, and expressed limited confidence in purely virtual collaboration. This view was supported by several participants, which highlight the need for meeting team members face-to-face. Arnfalk and Kogg (2003) stated that face-to-face meetings allow team members to build personal networks and thereby deeper

personal relations, a factor missing in virtual meetings. Their findings showed that virtual meetings were appropriate for short and repetitive meetings, and also for information tasks and follow-ups (Arnfalk & Kogg, 2003). In this study, one participant emphasized how virtual meetings are good for follow-ups, but that a combination of physical and virtual meetings throughout the project was needed. All participants explained how meeting other team members face-to-face would be a beneficial way to improve the teamwork. Most participants wanted such meetings to take place at the beginning of the project, in order to build relations and clarify needs and requirements. These findings are in accordance with Arnfalk and Kogg (2003), who stated that physical meetings are most beneficial at the beginning and end of a project. Further, some participants explained how they found it easier to communicate virtually with team members they had met in person. One participant stated that having met face-to-face may also increase the informal communication even after going back to communicating virtually. Although previous research has found that physical meetings may improve virtual teamwork, such meetings are of very limited extent in the present case, making it a barrier for tacit knowledge sharing.

Several participants said that virtual meetings are very structured and follow a set time frame. One participant highlighted that the good discussions were often lost when communicating virtually. In relation, Michailova and Husted (2003) found that time restrictions are one reason why employees may end up hoarding their knowledge, instead of spending time sharing it. To counter this, it might be beneficial to structure virtual meetings in a way that provide the space and opportunity to produce and share knowledge.

The absence of formal and informal arenas for employees to interact can create barriers for knowledge sharing (Gold et al., 2001). It has been argued that such arenas may increase the opportunities for discussion and knowledge sharing. This can be linked to the descriptions given in this study, about how the virtual discussions are often short and insufficient, indicating that the virtual arena does not provide enough opportunity for tacit knowledge sharing. As discussed above, a good way of sharing tacit knowledge is through informal communication. The lack of face-to-face meetings may inhibit the tacit knowledge sharing by reducing the arenas for informal communication.

Working with different countries

Some participants mentioned specific examples of challenges when working with team members from different countries. One participant highlighted different work routines: "Not everyone answers e-mails, keep deadlines, and then it is even more difficult when we don't see people every day, that we have to communicate over e-mail or Lync" (participant 1). This is in accordance with previous research which found that behavior within online communities can vary significantly from country to country. Expected behavior should therefore be clearly expressed or adjusted to fit local preferences (Ardichvili et al., 2006). Moreover, one participant explained that culture crashes sometimes led to misunderstandings, since some foreign team members were reluctant to ask questions or show uncertainty toward the main office in Norway. One participant linked this to openness, and stated that not all cultures dare to ask or show that they do not understand. In relation, one Norwegian participant explained how some foreign team members avoided answering e-mails instead of being honest about difficulties or inabilities to deliver by an agreed upon deadline. The communication between Norway and Singapore was specifically highlighted: "We have had four meetings with Singapore and discussed the same thing, and they all the time said 'yes, yes, yes', but when we started digging they had misunderstood. It was actually 'no'" (participant 1). The present challenges are similar to previous findings comparing Western and Asian culture. Being modest and preserving dignity was found to be of great importance in Asian cultures, which may result in team members concealing that they do not understand (Ardichvili et al., 2006). As discussed above, misunderstandings can be a challenge in virtual communication, and the best way to counter this is by asking questions and having clearer communication. If some team members are reluctant to do so, this can be a barrier for successful knowledge sharing.

The present findings are in accordance with research on cross-border knowledge transfer. One study found that knowledge transfer between different cultures are more challenging than between similar cultures (Bhagat, Kedia, Harveston, and Triandis, 2002, as cited in Solli-Sæther et al., 2015). Cultural differences were also highlighted as a perceived challenge for both communication effectiveness and knowledge sharing. The exchange of complex ideas and notions has been highlighted as particularly challenging to effectively communicate virtually (Klitmøller & Lauring, 2013). Since Panahi et al. (2013)

defined ideas and notions as forms of tacit knowledge, this implies that the cultural differences highlighted in this study may be a barrier for tacit knowledge sharing.

Circumstantial Factors

As described in the analysis chapter, circumstantial factors act as enablers if enabling circumstances are present. If not, the factors act as barriers for virtual tacit knowledge sharing. In this study, we found uncertainty regarding relevance to be a circumstantial factor. In current literature, uncertainty about the value of one's knowledge has been considered a barrier for knowledge sharing (e.g. Lilleoere & Holme Hansen, 2011; Riege, 2005).

Almost all participants in the present study said that uncertainty regarding the relevance of their knowledge did affect whether they chose to share it. However, some participants did not view uncertainty as a barrier, since they normally did not experience uncertainty regarding relevance. One participant reflected that their assessment of relevance might sometimes be wrong, and that some knowledge could wrongfully be deemed irrelevant. Some participants explained that the quality of their knowledge affected the assessment of relevance. One participant said that until they knew the information was good enough, they would delay sharing it. All participants said they would share relevant tacit knowledge with others. Since the participants would always share if relevant, this can indicate that certainty regarding relevance act as an enabler for willingness to share tacit knowledge. However, some participants stated that they occasionally experienced uncertainty when determining relevance, which sometimes made them not share. For these participants, uncertainty act as a barrier for their tacit knowledge sharing.

In regard to previous research on the relationship between uncertainty and knowledge sharing, Fang et al. (2013) identified uncertainty as one of the main barriers for knowledge transfer. They defined uncertainty as a gap in information, e.g. uncertainty about what knowledge other team members need. The way to handle this is to gather information to close the gap (Daft & Lengel, 1986, as cited in Fang et al., 2013). In the present study, this indicates that team members should acquire more information about the other team members' knowledge needs. However, according to Haas and Cummings (2015), different geographic locations can often lead to lack of awareness and appreciation for other team members' knowledge. This was illustrated by the few opportunities

team members have to obtain information about available knowledge and needs in the group. This makes it difficult for virtual teams to close the gap (Napier & Ferris, 1993, as cited in Lilleoere & Holme Hansen, 2011).

Implications, Limitations and Conclusion

In this chapter, we first present the practical and theoretical implications provided by this study's findings. We then look at relevant limitations and present suggestions for future research. Finally, we present the conclusion of this thesis, including answers to the research questions and introduce the study's contribution to the research field.

Implications

The present study identifies several factors which affect tacit knowledge sharing in a virtual context. The findings may have practical implications for the management of virtual teams, as well as theoretical implications.

In terms of practical implications, we want to highlight three main areas of importance in terms of virtual tacit knowledge sharing. First, the findings in this study highlight the importance of physical meetings. The findings indicate that meeting other team members at the beginning of the project can increase the sense of "team spirit". In addition, creating personal connections between team members can increase the communication and tacit knowledge sharing, as well as reduce the occurrence of misunderstandings. Second, leaders should encourage a culture for tacit knowledge sharing. One way of doing this is by creating arenas for informal communication, in order to counter the absence of face-to-face contact. Finally, virtual teams can use video conferences to overcome some of the challenges posed by being geographically dispersed. Results from our study show that more extensive use of video conferences may increase team members sharing of tacit knowledge, as well as enhance communication.

In regard to theoretical implications, this study suggests an extended area of application for existing knowledge sharing literature. Many of the factors discussed in this thesis have been identified by previous studies, but not necessarily in the specific context of tacit knowledge sharing in virtual teams. We found that most of the identified factors in this study coincided with previous findings, regardless of the contexts of the other studies. Further, we found one factor we chose to characterize as a circumstantial factor. We have not found such categories in previous studies, where factors were set as either enablers or barriers. We argue that this new category is important, since its binary nature imply that such factors are never neutral.

Limitations and Future Research

As this study used a single-case design, the narrow context might be characterized as a limitation. Also, we did not interview all team members in the project, and thus we might have missed interesting viewpoints. We suggest that further research expand the population beyond a small qualitative sample in order to generalize the findings. Further research should also examine virtual tacit knowledge sharing in other contexts than the finance sector. Furthermore, the factors identified in this study could also be examined using a quantitative approach to e.g. identify empirical relationships.

Another limitation we want to mention, is the theoretical foundation for the added category on circumstantial factors. This category was created based solely on the present data, and we do not know if it is applicable beyond the present study. We suggest that additional research should be done to examine this and possibly identify other circumstantial factors.

One final limitation to highlight, is the possibility of our participants being influenced by cooperation bias (Heath et al., 1998, as cited in Witherspoon et al., 2013). Since participants in this study voluntarily contributed their insights, the cooperation bias may have led to them overemphasizing their tacit knowledge sharing. As the interview guide was distributed prior to the interviews, the participants may have formed opinions about the aim of the study, and framed their answers thereafter. Since this is a bias which is nearly impossible to prevent, it is important for future researchers to be aware of its potential effect on findings.

Conclusion

The aim of this thesis was to identify enablers and barriers for tacit knowledge sharing in virtual teams. Several enablers and barriers were found. The *enablers* were sorted into four categories;

- the team members' attitudes and motivation towards knowledge sharing
- the organizational culture and trust among team members
- perceived competitive advantage gained by sharing knowledge
- available technological tools

The *barriers* were also sorted into four categories;

- challenges related to communication (increased risk of misunderstandings, lack of visual cues and challenges when communicating with team members of other professions or skill sets)

- underused technological tools
- lack of face-to-face meetings
- cultural challenges when working with different countries

We also created a new category named circumstantial factors, which discussed team members' judgment and perception of the relevance of their knowledge. Previous research has viewed enablers and barriers as either present or non-existent, where factors do not change from being enablers to becoming barriers, or vice versa. This study however, found that (un)certainty could be both, depending on context and if certain requirements were fulfilled. This opens for a new view that some factors could be either/or and not just on/off, depending on circumstances. This view may be extended to include other factors not identified in this study.

All of these enablers and barriers have practical implications for virtual teamwork. One of the most notable findings was the need for face-to-face contact between the geographically dispersed team members, for instance through a meeting at the beginning of the project. Another finding to emphasize is the importance of creating a culture for knowledge sharing within the organization, which highlights the benefits of sharing and making project members feel encouraged to do so.

Most of the enablers and barriers identified in this thesis have also been identified in other research. However, many of these studies focused on related topics such as knowledge sharing in general, tacit knowledge sharing in traditional teams, or general knowledge sharing in virtual teams. The present study found that most of these findings were also applicable for the specific topic of this thesis. Our biggest contribution has thus been to extend the scope of existing research into the sphere of tacit knowledge sharing in a virtual setting.

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Appendix A: interview guides

Intervjuguide

Generelle definisjoner - korte forklaringer av hva vi mener med nøkkelbegrepene våre

- **Virtuelle team:** Team som i stor grad kommuniserer via PC, sosiale media og internett og som sjeldent/aldri møtes face-to-face. Et eksempel er team hvor noen medlemmer sitter i Norge og andre i USA, og kommunikasjonen foregår elektronisk via f.eks. Skype.
- **Erfaringsbasert (taus) kunnskap:** de erfaringene og kunnskapen man får når man utøver en aktivitet. Slik kunnskap kan være vanskelig å forklare med ord og den er ofte veldig individuell. Et eksempel er kulturell kunnskap du har tilegnet deg gjennom å jobbe med personer i andre land, f.eks hvordan du skal "lese mellom linjene".
- I oppgaven vår vil vi prøve å finne ut hva som kan gjøre det enklere eller vanskeligere å dele denne typen kunnskap i virtuelle prosjekter.

***

1. Hvor lenge har du jobbet i dette prosjektet?
2. Hender det at du møter de andre i prosjektet face-to-face?
3. Hvordan vil du beskrive ditt behov for kunnskapsdeling i dette prosjektet?
4. Har du jobbet i virtuelle prosjekter tidligere?
    a. Hvor mange?
5. Har du jobbet med internasjonale prosjekter tidligere?
6. Hva er din faglige bakgrunn?

7. Har du noen ganger kunnskap det er vanskelig å forklare for andre i prosjektet?
    a. Er dette vanskeligere/enklere når teamet er virtuelt?
8. Hva legger du i begrepet erfaringsbasert kunnskap?

9. Deler du erfaringer med andre i prosjektet (uformelt eller formelt)?
10. Hvor stor grad av uformell kommunikasjon vil du si det er i virtuelle team?
11. Formidler du noen ganger erfaringsbasert kunnskap til andre i prosjektet ved å skrive den ned? *(f.eks. i "oppskrifter" eller på Facebook @ Work)*

12. Deler du noen ganger erfaringsbasert kunnskap til andre i prosjektet ved å forklare/vise?
13. Løser andre i prosjektet noen ganger problemer på måter du ikke hadde tenkt på?
    a. Hvordan?
    b. Deler dere slike løsninger med resten av prosjektteamet etterpå?

14. Når du avslutter prosjekter, deler du dine erfaringer med andre?
    a. Hvordan? *formelt (f.eks. skrive det ned i rapport) eller uformelt (f.eks. prate om erfaringer mens feirer at prosjektet er ferdig)*

15. Hvordan deler dere erfaringsbasert kunnskap i dette prosjektet?
16. Finnes det former for kunnskap du synes er vanskelig å dele virtuelt?
17. Poster du på Facebook @ Work?
    a. Hvorfor/hvorfor ikke? Når? Til hva?

18. Hva føler du generelt om å dele dine erfaringer med andre i prosjektet?
    a. Er dette annerledes dersom det gjelder eksterne aktører, kun inne i dette prosjektet?
19. Er det en kultur for å dele erfaringer med hverandre i prosjektet?
    a. Oppfordres det til det?
20. Føler du noen ganger mangel på motivasjon for å dele erfaringsbasert kunnskap i prosjektet?

21. Jobber du annerledes i virtuelle team, enn i tradisjonelle team?
22. Føler du kunnskapen din er tilgjengelig for andre i prosjektet?
    a. Vet andre hva du er god på?
23. Er det noe du vil trekke fram som DNB kan forbedre i bruken av virtuelle team?
24. Hva mener du er de største utfordringene med å jobbe i et virtuelt team?
25. Kan du trekke frem noen vellykkede måter å håndtere slike utfordringer på?

26. I jobbsammenheng, hva legger du i begrepet tillit?
27. Påvirker tillit din motivasjon til å dele erfaringsbasert kunnskap i prosjektet?
    a. Hvordan?
28. Påvirker teknologien dere bruker din motivasjon til å dele erfaringsbasert kunnskap?
    a. Hvordan?
29. Tror du deling av erfaringsbasert kunnskap kan påvirke ditt konkurransefortrinn i bedriften?
30. Lar du noen gang være å dele erfaringer med andre i prosjektet?
    a. Hvorfor?

31. Er du deg noen ganger usikker på hvor relevant din erfaringsbaserte kunnskap er for andre i prosjektet?
    a. Påvirker dette hvorvidt du velger å dele den?

***

32. Nå har du svart på alle våre spørsmål. Har du noen spørsmål til oss?
33. Vi skal gjøre flere intervjuer. Er det noen spørsmål du mener vi burde stille som vi ikke har tatt med? Eventuelt andre endringer du mener vi bør gjøre?
34. Ønsker du at vi sender deg en utskrift av dette intervjuet til godkjenning før vi analyserer dataene?

Interview Guide

General definitions - short definitions of our key terms

- **Virtual teams -** Teams that to a large extent communicate through computers, social media, and the Internet, and that rarely/never meet in person. One example is a team where some members are located in Norway, and others in the US, and where communication occurs electronically, for instance via Skype.
- **Experience-based (tacit) knowledge -** Those experiences and knowledge one acquires when one exerts an activity. This knowledge is often hard to explain with words and is often individual. An example is cultural knowledge one has obtained through working with people in other countries, for instance how to "read between the lines".

- Our thesis aims to uncover what makes it easier or harder to share experience-based knowledge in virtual teams.

***

1. How long have you worked in this project?
2. Do you ever meet others in this project face-to-face?
3. How would you describe your need for knowledge sharing in this project?
4. Do you have any previous experience from virtual projects?
    a. How many?
5. Have you previously worked in international projects?
6. What is your professional background?

7. Do you ever possess knowledge which you find difficult to share with other project-members?
    a. Do you find this to be easier/harder when the team is virtual?
8. What do you associate with experience-based knowledge?

9. Do you share experiences with project-members (formally or informally)?
10. How much of the communication in a virtual team would you describe as informal?
11. Do you ever share experience-based knowledge to other project-members by writing it down? *(e.g. in the form of "recipes" or on Facebook @ Work)*
12. Do you ever communicate experience-based knowledge to other project-members by showing them and/or explaining it?

13. Do project-members ever solve problems in ways you hadn't thought of?
    a. How?
    b. Do you share this new knowledge with the rest of the project-team?
14. When you wrap-up a project, do you share your experiences with others?
    a. How? *Formally (e.g. by writing it down in a report) or informally (e.g. by sharing experiences while celebrating the end of the project)*

15. How does this project-team share experience-based knowledge?
16. Are there types of knowledge you think is more difficult to share virtually?
17. Do you ever post on Facebook @ Work?
    a. Why/why not? When? For what reasons?

18. What is your general opinion toward sharing your experiences with project-members?
    a. Do you feel differently about sharing knowledge with external actors, which are only a part of this specific project?
19. Is there a culture for sharing experiences in this project?
    a. Is this encouraged?
20. Do you ever experience a lack of motivation to share experience-based knowledge in this project?

21. Do you work differently in a virtual team, compared to a traditional team?
22. Do you consider your knowledge to be available for other project-members?
    a. Do others know what you are good at?
23. Is there anything you want to highlight that DNB should develop further in the use of virtual teams?
24. What do you consider to be the biggest challenges when working in a virtual team?
25. Can you mention some successful ways to handle these challenges?

26. In a work setting, what do you associate with trust?
27. Does trust influence your motivation to share experience-based knowledge with project-members?
    a. How?
28. Does the technology you use influence your motivation to share experience-based knowledge?
    a. How?

29. Do you believe sharing your experience-based knowledge can influence your competitive advantage in the organization?
30. Do you ever choose not to share experiences with project-members?
    a. Why?
31. Do you ever feel uncertain of how relevant your experience-based knowledge is to others in this project?
    a. Does this influence whether or not you share it?

***

32. You have answered all our questions; do you have any questions for us?
33. We are conducting more interviews; are there any questions we should ask that we have not included? Are there any changes you think we should make?
34. Do you want us to send you a transcript of this interview for your approval before we analyze our data?

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Tacit knowledge sharing in virtual teams

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Content

Introduction

Virtual teams have become a commonplace element in many organizations. A study conducted by the Society for Human Resource Management (2012) found that almost half of all organizations utilize virtual teams. The survey further suggests that approximately 66% of multinational organizations use virtual teams in their workplace, and that one of the most important contributions is enhanced collaborations among employees in different geographic locations (Society for Human Resource Management, 2012). In the creation of a virtual team, physical location can be disregarded when choosing team members, which may lead to better team compositions, and thus better quality of decisions and team performance. Due to the technology available today, organizations can facilitate for teamwork across both geographical and organizational boundaries (Martins, Gilson, & Maynard, 2004). Furthermore, research has shown a positive relationship between team performance and knowledge management (Dechurch, Mesmer-Magnus, & Kozlowski, 2010) The knowledge assets within an organization is perceived to be a resource that can induce competitive advantages (Wang & Noe, 2010; Zarraga & Bonache, 2003), which is an overall strategic aim of most organizations (Thompson, 2012).

Knowledge can be separated into *tacit* and *explicit*, and both forms have different mechanisms for how they best should be shared with others (Filstad & Blåka, 2007). It is claimed that the focus on explicit knowledge is deeply rooted in the Western world's traditional view of the organization as a "machine for information processing" (Nonaka, 1991). However, over the last few decades, explicit knowledge is being viewed as just "the tip of the iceberg", and tacit knowledge is now often believed to be the primary source of knowledge in an organization (Nonaka & Takeuchi, 1995a). The challenge with the tacit knowledge residing within an organization, is that it is acquired through experience, and thus deeply individual. This oftentimes make it difficult to articulate and explain to others, which means that sharing tacit knowledge within an organization or team can be difficult. The recommended way of sharing tacit knowledge is through interaction between "master and apprentice", where the skill is taught through learning-by-doing (Nonaka, 1991). The lack of face-to-face interaction is one of the characteristics of a virtual team, and this can contribute further to the challenges related to tacit knowledge sharing.

Arguments for the relevance of our study can be found in an extensive literature review by Martins et al. (2004), where the aim was to assess the state of the literature within the field of virtual teams. Several gaps in literature were found, and it is stated that research related to intellectual capital is "surprisingly missing", and that implications of virtualness in relation to the tacit and explicit knowledge in an organization should be examined (Martins et al., 2004). This gap is also highlighted by Jones (2016), who states that more research is needed on barriers for tacit knowledge sharing in virtual teams. A more specific gap is presented by Pardalis and Xygkogianni (2014), who state that future studies should examine the importance of language barriers in virtual knowledge sharing. This is one example of a possible barrier for tacit knowledge sharing in virtual teams. This thesis, however, aims to examine multiple barriers.

Based on the growing widespreadness of virtual teams and the documented lack of research on tacit knowledge sharing in such teams, we propose the following research questions:

- *What are the enablers for team members' willingness to contribute their tacit knowledge to virtual teams?*
- *What are the barriers for team members' willingness to contribute their tacit knowledge to virtual teams?*

With this thesis, we want to shed light on factors that can affect effective tacit knowledge sharing in virtual teams, by either enabling or impeding it. As stated above, research has found correlations between team performance and knowledge management (Dechurch et al., 2010). This implies that our findings can help improve performance in virtual teams, by identifying concrete factors organizations can focus on. Furthermore, we hope that our findings can be used to generate theories which can be tested by using quantitative methods, in order to see if our findings can be generalized to a bigger population.

Theoretical framework

Virtual teams

A team can be defined as "a social system of three or more people, which is embedded in an organization (context), whose members perceive themselves as such and are perceived as members by others (identity), and who collaborate on a common task (team-work)" (Hoegl & Gemuenden, 2001, p. 436). According to Martins et al. (2004), the same characteristics apply for virtual teams, but with some additional factors. Their literature review found that the most common way of defining virtual teams, was to focus on crossing boundaries (e.g. geographical, time or organizational) with the use of technology-mediated communication forms (e.g. Bell & Kozlowski, 2002; Lipnack & Stamps, 1999, as cited in Martins et al., 2004). Furthermore, virtual teams have been viewed as having more fluid memberships, meaning that members can be exchanged when tasks and needs change (e.g. Alge, Wiethoff & Klein, 2003; Kirkman, Rosen Tesluk & Gibson, 2004, as cited in Martins et al., 2004). Some researchers have also mentioned that virtual teams tend to have shorter life cycles than traditional face-to-face teams (Jarvenpaa & Leidner, 1999, as cited in Martins et al., 2004).

By looking at such characteristics, it can be difficult to establish a "cut off point" for where a traditional team ends and the virtual team begins. One can for example ask how much electronic communication is needed for a team to be considered virtual - is a team considered virtual if team members in the same office send emails to each other? This challenge has been addressed by some of the newer definitions of virtual teams, where some degree of virtualness is expected in most teams, and the focus is instead on the extent of it (Martins et al., 2004). Martins et al. (2004) presents the following definition of a virtual team: "teams whose members use technology to varying degrees in working across locational, temporal, and relational boundaries to accomplish an interdependent task" (p. 808). This approach includes both the traditional and newer definitions, and view virtualness as a team characteristic.

As stated in the definition, technology and communication tools are one of the characteristics of a virtual team. Such tools may include e-mail, document collaboration (e.g. GoogleDocs), video conferencing (e.g. Skype), shared cloud storage (e.g. Dropbox) or code hosting services (e.g. Github). In addition, Jones

(2016) highlights the use of other real-time interaction media, such as 3D virtual environments and social media. The aim of these tools is to replace or supplement the face-to-face contact which is crucial in traditional teams (Bell & Kozlowski, 2002).

In regards to reasons for choosing virtual teamwork, Pangil and Chan (2014) highlighted three reasons: to be able to include the best team members regardless of location, to increase the global workday from 8 to 24 hours and to provide flexibility in order to become more competitive and responsive to changes in the marketplace.

Knowledge

Knowledge can be seen as a critical organizational resource that provides a sustainable competitive advantage for the organization (Wang & Noe, 2010). However, there is no widely accepted definition of the concept. One definition of knowledge is "the ability to discriminate within and across contexts" (Swan, 2008, as cited in Newell, Robertson, Scarbrough, & Swan, 2009, p. 5). This definition includes both the aspect of knowledge as an individual cognitive element, as well as a social construct. Knowledge has also been viewed in different ways, where two ideas have been predominant. One of which is the epistemology of *practice*, which views knowledge as something that is performed by individuals. In contrast, the epistemology of *possession* refers to knowledge as something an individual has (Newell et al., 2009).

In addition to diverse opinions on how to define knowledge, there are also varied perspectives on whether to distinguish between knowledge and information (Wang & Noe, 2010). Newell et al. (2009) describe information as data that is organized in some way to provide meaning, whilst knowledge is seen as a result of an individual's ability to transform data and information to something meaningful by drawing on own subjective experiences, perceptions, and previous understandings. Transforming information into knowledge involves identifying relationships and interfering consequences, and comparing and contrasting information and knowledge (Tidd & Bessant, 2013). This thesis will regard knowledge as information processed by individuals, in terms of their ideas, facts, expertise, and judgments relevant for the performance of individuals, teams, and the organization as a whole (Wang & Noe, 2010). This assumption of knowledge

and information is in line with perceiving knowledge from the epistemology of *possession* viewpoint. In this regard, knowledge throughout this paper will be viewed as both social interactions, and individual possession and interpretations.

Types of Knowledge

One perspective of knowledge is the *structural perspective*, which mainly draw from the epistemology of possession, and focus on identifying different types of knowledge individuals have (Newell et al., 2009). This will be the basis for our theoretical foundation. It is possible to distinguish between two types of knowledge, specifically *explicit* and *tacit* knowledge (Filstad & Blåka, 2007; Newell et al., 2009). The differentiation was first introduced by Polanyi (1966), who considered *tacit knowledge* as something not formally taught, and which cannot always be explained through language. Furthermore, Nonaka (1991) characterizes tacit knowledge as something highly personal and deeply rooted in actions and context. It is often referred to as know-how, meaning it resides in our heads as practical actions and skills, and is more than we can articulate (Newell et al., 2009). As tacit knowledge is not fully encoded, it is not easily copied by competitors. However, due to this same reason it may not be visible to all members of an organization. In turn, this can lead to participants not being aware as to where this knowledge can be applied (Tidd & Bessant, 2013). Thus, the tacit knowledge within the organization might not obtain its full potential.

On the other hand, *explicit knowledge* can easily be shared and expressed through language, it can be written down, communicated and explained. As it is easy to formally express through e.g. technical specifications, 'recipes' and product designs, it is easy to share both within the organization and externally (Filstad & Blåka, 2007). Tacit knowledge can be similar to explicit knowledge in the sense that it can be highly technical. However, tacit knowledge is the result of experience and often acquired through learning by doing, and not simply read from a manual. The two types of knowledge can be viewed as complimentary, as tacit knowledge provides meaning to explicit knowledge (Maznevski & Athanassiou, 2003).

Nonaka and Takeuchi (1995b) argue that the transformation of tacit to explicit knowledge is a critical tool in the essential relation between individual and organizational knowledge. They argue that all new knowledge originates

within individuals. However, through a process of discussion, dialogue, sharing experiences and observation, the tacit knowledge is made visible and intensified at group and organizational levels (Tidd & Bessant, 2013). This transformation process will be further elaborated below when we present Nonaka and Takeuchi's SECI-model.

Furthermore, Blackler (1995) has developed a typology that enlightens knowledge even further. This consists of five types of knowledge; embrained, embodied, encultured, embedded, and encoded knowledge. For this thesis, we want to highlight encultured knowledge as particularly relevant. Encultured knowledge refers to the process of gaining a shared understanding and meaning. This is constructed by social factors, and is open to negotiation by participants, and the process involves acculturation and socialization (Tidd & Bessant, 2013). This presupposes social relations and ties between participants, in order to land on a shared meaning. As virtual teams exclude the face-to-face social interaction, one might argue that creating encultured knowledge might be difficult and that different methods may be required when doing so in virtual teams, as opposed to traditional teams.

Knowledge Creation

Nonaka (1991) presented four patterns for how knowledge is created in organizations. These are further elaborated in newer articles (see e.g. Nonaka & Takeuchi, 1995b), and is commonly referred to as the SECI-model. This consists of four modes (or patterns) describing the mobilization and conversion of tacit and explicit knowledge, and works as an iterative process. The different modes are socialization, externalization, combination, and internalization.

Socialization is the process where individuals share their tacit knowledge. This can be done through simply sharing experiences (Filstad & Blåka, 2007), or by observing and imitating a "master" (Nonaka, 1991). This form of knowledge sharing happens between individuals who interact, and the knowledge will thus

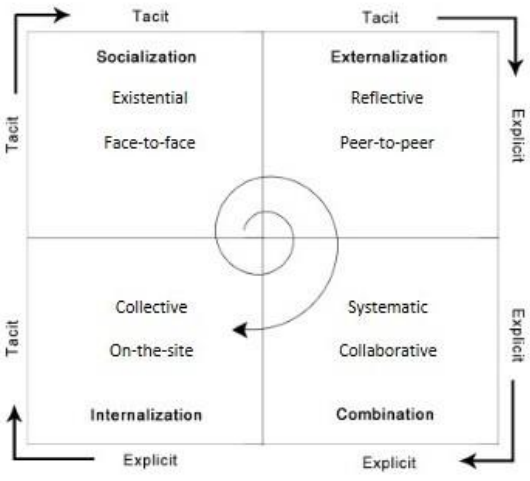

Figure 1: The SECI-model (Nonaka, 1991).

not become explicit, and cannot easily be exploited by the organization as a whole (Nonaka, 1991). This process can be linked to Blackler (1995) theory on encultured knowledge, which involves socialization in order to gain shared understandings and meanings among individuals.

Externalization is the process where tacit knowledge becomes explicit. For this step to be successful, the tacit knowledge needs to be articulated and translated into forms understandable to others (Filstad & Blåka, 2007). This is the key mode in relation to knowledge creation, as new explicit concepts are created on the foundation of the tacit knowledge (Nonaka & Takeuchi, 1995b).

Combination is the mode where new explicit knowledge is created. By combining fragmentary pieces of explicit knowledge, one can create a more complex picture. This process involves sorting and categorizing existing knowledge, and combining elements (Nonaka & Takeuchi, 1995).

Internalization is the mode where the newly created explicit knowledge becomes tacit. The knowledge accumulated through the other three modes are added into employees' "tacit knowledge bases", and thus the knowledge takes the form of shared mental models or technical know-how (Nonaka & Takeuchi, 1995b).

As previously mentioned, tacit and explicit knowledge can be viewed as complementary (Maznevski & Athanassiou, 2003), as emphasized by the SECI-model. Nevertheless, as they are two different types, tacit knowledge cannot be communicated in the same manner as explicit knowledge. Thus, the methods for sharing tacit knowledge will be different than when sharing explicit knowledge, and the two forms represent different challenges related to effective knowledge transfer (Filstad, 2010).

Knowledge Sharing

Gibbert and Krause define knowledge sharing as "the willingness of individuals in an organization to share with others the knowledge they have acquired" (2002, as cited in Rutten, Blaas-Franken, & Martin, 2016, p. 200). This view emphasizes that individuals must *willingly* share their knowledge, as organizational knowledge is partly perceived to only exist within people's minds. As highlighted with the externalization step in the SECI-model, the organization might initiate efforts to integrate knowledge into systems and documents.

However, much of the knowledge is tacit, and thus cannot be transferred and codified by using such methods (Rutten et al., 2016). Moreover, knowledge sharing refers to facilitating for sharing task information and know-how to help others, to collaborate with others to solve problems, develop new ideas, or implement policies or procedures. This can for instance occur through written correspondence or face-to-face communication with others (Wang & Noe, 2010).

Knowledge sharing can be viewed differently than knowledge transfer. Knowledge transfer involves both the sharing of knowledge by the knowledge source and the acquisition and application of knowledge by the individual receiving knowledge. This term has usually been used to describe the movement of knowledge between different organizations, divisions, or units as opposed to individuals (Wang & Noe, 2010). The present research questions focus on identifying enablers and barriers for whether team members share their tacit knowledge, and this thesis will not be focusing on the acquisition and application of received knowledge. In the following, the focus will thus be on knowledge sharing, not knowledge transfer.

The process of knowledge sharing can be described as either push or pull (Frost, 2013). Knowledge push refers to when knowledge is shared with others, whereas knowledge pull is when a knowledge worker actively seeks knowledge sources to gain insight, for example by collaborations with colleagues. The knowledge sharing will depend upon the organization's routines and inclination of workers to search for and/or be responsive to the knowledge sources. Thus, it is important that the organization facilitates for knowledge sharing, for instance in their organizational culture (Frost, 2013). Furthermore, it has been argued that knowledge sharing can only be encouraged and facilitated for by the organization, that it cannot be forced (Gibbert & Krause, 2002, as cited in Rutten et al., 2016). Many organizations have systems that enable retrieving, storing, and sharing of knowledge. However, such systems are often limited to explicit knowledge, rather than more tacit. As a result, groups can possess knowledge that can be of value in multiple places of the organizations, however, they may not be aware of where this knowledge can be applied, which in turn inhibits knowledge sharing (Tidd & Bessant, 2013).

Many ways have been identified to convert and connect knowledge from different parts of the organization (Tidd & Bessant, 2013). One central to the

present research questions is the process of converting individual knowledge into group knowledge. This entails that sharing individual knowledge requires a supportive culture, and appropriate technologies and incentives (Tidd & Bessant, 2013). The requirements of a supportive culture throughout the organization and appropriate technologies to implement and share personal knowledge, can be argued as important elements when it comes to sharing tacit knowledge in virtual teams.

Furthermore, the process of connecting people to one another will also be of relevance to the sharing of tacit knowledge. This includes creating expert and interest directories and networks, mapping out who knows what as well as who knows who (Tidd & Bessant, 2013). The processes of conversion and connections is emphasized by communities of practice, which refers to a group of people connected by a shared task, process or the need to solve a problem. Within communities of practice, people share tacit knowledge and learn through experimentation. Therefore, the formation and maintenance of such communities represents an important link between individual and organizational learning (Tidd & Bessant, 2013). As experimentation is a means to share tacit knowledge, this might be considered as more problematic when people are participating in virtual teams, as opposed to traditional teams.

According to Mooradian, Renzl, and Matzler (2006), various factors may influence knowledge sharing. One of which is *properties of the knowledge itself,* where explicit knowledge is viewed as easier to communicate and share than tacit knowledge. A second factor is *properties of management and managerial actions,* and include different ways managers use to facilitate for knowledge sharing through various means, such as rewards, incentives, and coordination. Furthermore, another factor considers the environment of the organization, including shared language, its culture, shared vision, and relations between members of the organization. The last factor Mooradian et al. (2006) focus on is *properties of the individual*. This includes trust, motives, and attitudes that influence knowledge sharing (Mooradian et al., 2006). In relation to the present research questions, the influencing factors can be seen as barriers and/or enablers which either inhibit or promote knowledge sharing within virtual teams.

Furthermore, two types of strategies can be applied to enable knowledge sharing processes; *codification* and *personalization* (Hansen, Nohria, & Tierney,

2000). Whereas *personalization* strategies aim to facilitate for knowledge sharing through indirect or direct contact, *codification* strategies are implemented to capture knowledge by identifying, storing and codifying it. As these are two differing strategies, they present different requirements. Personalization requires an interpersonal relation between participants, whilst codification might require a database, often practiced by virtual teams (Bordia, Irmer, & Abusah, 2006). Personalization strategies can be argued to be associated with the sharing of tacit knowledge, whereas codification strategies can be seen as linked to explicit knowledge sharing.

Knowledge Sharing in Virtual Teams

Effective knowledge sharing is influenced by many factors (Pardalis & Xygkogianni, 2014). As globalized competition between organizations is growing, many choose virtual teams as a component to operate internationally. In turn, this might influence what enables and inhibits participants to share knowledge (Pardalis & Xygkogianni, 2014). Ardichvili (2008) argues that knowledge sharing can be promoted not only by removing barriers, but also by creating a number of enablers. Therefore, this chapter will examine some of the known barriers and enablers of knowledge sharing. This thesis view virtual teams as fundamentally similar to traditional teams, however, with some variances. Due to this, many of the enablers and barriers are found to affect both traditional and virtual teams.

Enablers of Knowledge Sharing

Jones (2016) performed a literature review on tacit knowledge in virtual teams. She found several enablers for both effective performance and effective knowledge transfer. Even though the present research questions focus on knowledge sharing, the factors identified by Jones (2016) regarding knowledge transfer is still relevant. The factors identified by this literature review are: *trust and relationships*, *appropriate media* and *use of appropriate knowledge sharing strategies.* In the following these factors will be elaborated on.

Trust

Ardichvili (2008) states that one of the most important enablers for knowledge sharing is *organizational culture*. He argues that several studies have

found a direct relationship between a supportive organizational culture and successful knowledge sharing Ardichvili (2008). One important part of the organizational culture is *trust*, which has been described by various researchers as the key factor when promoting participation (Ardichvili, 2008). Trusting other members of an organization might enhance the willingness to share knowledge (Naicker & Benjamin, 2014), and thereby a large component of the essence of the knowledge sharing.

In virtual teams, two types of trust have been found to be of importance; personal knowledge-based trust, and institution-based trust. *Personal knowledge-based trust* is developed on the basis of frequent social interactions between two parties. This type of trust is established when participants get to know each other and are able to predict what to expect of each other, and how the other party will act in certain situations (Tschannen-Moran & Hoy, 2001, as cited in Ardichvili, 2008). However, not all trust is based on first-hand knowledge of specific individuals. *Institution-based trust* is based on the view that organizational structures and procedures will ensure trustworthy behavior of participants, and protect participants from negative consequences of mistakes caused by administration and procedures (Ardichvili, 2008). For instance, it has been found that members of virtual communities of practices are less reluctant to publish information on the given forums (e.g. GoogleDocs) if they believe that organizational control mechanisms are present to prevent others from misusing the knowledge (Ardichvili, 2003, as cited in Ardichvili, 2008).

Furthermore, there is an increased risk for possible misunderstandings and mistrust within virtual teams, as the trust in virtual teams is fragile and temporal (Pardalis & Xygkogianni, 2014). On the other hand, effective communication will positively influence trust and performance in virtual teams, which, in turn, has a positive impact on knowledge sharing (Palvia & Pinjani, 2013, as cited in Pardalis & Xygkogianni, 2014).

Technology

Additionally, Ardichvili (2008) states that *supporting tools* (or media) is an important enabler of knowledge sharing in virtual teams. Community interaction and evolution of a practice creates tacit knowledge that is often overlooked, as it is socially distributed between individuals, rules and conventions of practice, and

tools used in practice. Hence, technology that is used in virtual teams should be not just treated as a tool, but also as an important influence on a community's character, identity, and patterns of behavior (Ardichvili, 2008).

According to Cantoni, Bello, and Frigerio (2001) face-to-face interactions are the best way to share knowledge. However, as a large number of companies' knowledge have to reach global extents and are physically separated, this action may not always be possible. Nevertheless, *technology* can aid the gaps between organizations to some extent, for instance by allowing virtual replication of existing practices, and thereby work as an enabler for knowledge sharing (Cantoni et al., 2001). This is supported by Jones (2016), who state that the use of rich media (e.g. Skype), to some degree can compensate for the lack of face-to-face interactions.

Barriers of Knowledge Sharing

Through analysis of previous research and literature, Disterer (2001) recognizes several barriers that inhibit people from sharing their knowledge. He separates between individual and social barriers to knowledge sharing (Disterer, 2001). As with enablers, these barriers can be present in both traditional teams and virtual teams. However, the available research on barriers are mainly focused on traditional teams, and more research on barriers of tacit knowledge sharing in virtual teams are needed (Jones, 2016).

Individual barriers

An individual barrier highlighted is *loss of power* (Disterer, 2001). An individual who shares knowledge with a colleague may experience a drop in his or her individual power, because he is no longer being the only one with a specific knowledge. Thereby the exclusiveness of expertise of knowledge on an area may lead to hoarding of knowledge, instead of sharing (Disterer, 2001). Because knowledge is considered a source of power, organizations or individuals may be motivated to hide it from other parties, both externally and internally in the organization, in order to maintain their competitive edge (Zhang & Dawes, 2006).

Another individual barrier is *uncertainty* (Filstad & Blåka, 2007). The distinction between what should be considered important or not is sometimes ambiguous. It can be difficult to distinguish if the knowledge one has can be

considered as too general or too specific for others, or if the knowledge is even relevant or useful in other situations (Disterer, 2001). This uncertainty can also be seen in relation to the push/pull-view of knowledge presented earlier. Furthermore, uncertainty can influence the willingness of participants to share one's knowledge, depending on the perceived risk in doing so. This will further be related to *trust*, as a lack of trust might reduce contributions of knowledge sharing from individual participants (Naicker & Benjamin, 2014).

The last individual barrier recognized by Disterer (2001) is *motivation*, which might be one explanation to why individuals do not share their knowledge. Knowledge sharing might be experienced as additional work, and employees may not observe or experience the benefits from this action (Disterer, 2001). Motivation can apply to both individuals as well as organizations. This might be due to perceived conflicts of self-interest and priorities.

Social barriers

One of the social barriers identified by Disterer (2001) is *language*. The reason for this being a barrier is because companies may lack a legitimate language that is known and accepted by everyone involved, and that might include personal knowledge. Different languages may hinder effective knowledge transfer, and this challenge is likely to be exacerbated by the use of virtual media (Klitmøller & Lauring, 2013, as cited in Jones, 2016). Organizations have a need for a common language to communicate knowledge. This must also be present to communicate special language features as metaphors and analogies in order to make visible the tacit knowledge hidden in e.g. individual mental models and viewpoints (Disterer, 2001).

With regards to virtual teams, how open individuals are to share their knowledge on virtual platforms will vary from country to country (Ardichvili, 2008). Thereby, knowledge sharing across *cultural boundaries* has shown to create challenges and is perceived as a boundary for collaborative learning. This can be influenced by an "in-group/out-group" orientation (Ardichvili, 2008). In-group oriented participants may not be willing to share knowledge with someone who is not considered a member of the specific in-group (Ardichvili, 2008). As previously mentioned, a supportive organizational culture can work as an enabler for knowledge sharing. Contrastingly, an organizational culture emphasizing

knowledge hoarding is viewed as a considerable barrier to share knowledge (Ardichvili, 2008).

Practical barriers

It has been argued that *time difficulties* are one of the most common barrier faced by virtual teams operating across national boundaries, due to working in different time zones. Another common barrier is lack of *communication* (Alsharo, 2013, as cited in Pardalis & Xygkogianni, 2014). Even though virtual teams are perceived as more flexible than traditional teams, managing communication within such teams has proven more difficult. This is, for instance, caused by misunderstandings when using media such as e-mails instead of face-to-face interactions (Klitmøller & Lauring, 2013, as cited in Pardalis & Xygkogianni, 2014). Nonverbal communication plays a major part in effective communication, which can lead to misunderstandings. However, it has been stated that other types of media that allows for more interacting communication (e.g. video conferences) may help some of these problems (Klitmøller & Laurig, 2013 as cited in Pardalis & Xygkogianni, 2014).

Another recognized barrier is *technology*. Organizations need infrastructures compatible with their needs, as well as consistent data definitions and standards to permit knowledge sharing and provide greater advantages of knowledge that has been shared (Dawes, 1996, as cited in Zhang & Dawes, 2006). Locally developed personal data, and private hardware and software may represent challenges for sharing knowledge more openly (Landsbergen & Wolken, 1998; Murphy & Daley, 1999, as cited in Zhang & Dawes, 2006).

Methodology

The aim of empirical studies is to provide new knowledge within their field of research (Jacobsen, 2005). The aim of this study is determined by the research question; to provide new insights on factors which can enable or hinder the sharing of tacit knowledge in a virtual team. Furthermore, the research question serves as the foundation for the methodological choices (Jacobsen, 2005). To best answer the research question, we want to take an inductive approach where qualitative data serve as the foundation for theory creation (Bryman & Bell, 2011).

Research design

For this study to provide meaningful results, there is a need for in depth and nuanced data. Furthermore, the research questions require a design which is sensitive to unexpected information and contextual factors, because the nature of the study is exploratory. These are all characteristics of an intensive (as opposed to extensive) design (Jacobsen, 2005). More specifically, we find that a single case-study design will be fitting for our study. The unit of analysis will be one specific virtual project team within an organization. This fulfills the requirement presented by e.g. Jacobsen (2005) that a case-study always have to be delimited within time and space.

The *internal validity* is one of the biggest strengths of a case-study design. Due to the in depth and detailed information, it is often a good match between the data and the theoretical ideas developed based on the data (Bryman & Bell, 2011). Due to the aim of this study being theory creation, it is important to use a research design with high internal validity. However, there are two important weaknesses to this design which are relevant to highlight; external reliability (replication) and external validity (generalizability). The *external reliability* is a problem in all qualitative research, because it is nearly impossible to perform the same study in an identical setting (Bryman & Bell, 2011). It is also claimed that the *external validity* of case-studies is low. However, this may not be fully accurate, as Jacobsen (2005) describes two forms of generalizability: statistical and theoretical. Statistical generalization occurs when findings can be applied beyond the particular context to a larger selection (Bryman & Bell, 2011). This is likely to be inexpedient for the findings in this study, because they are based on one

specific case with a low number of studied units (Jacobsen, 2005). However, the findings can be suited for theoretical generalization, as this occur when the data forms the foundation for new and more general theories which can lead to further research on the topic (Jacobsen, 2005). This is in line with the aim of the study, where we seek to obtain new information to help find enablers and barriers for tacit knowledge sharing in virtual teams.

For the time aspect of our study, we have chosen a *cross-sectional study*. This is first and foremost because this approach is suited for answering the research questions, as it allows us to describe the potential enablers and barriers described by the informants at a given point in time. Furthermore, we chose this due to practical issues related to time constraints and available resources.

Data collection

The optimal qualitative study draws upon several methods of data collection to create a more accurate description of reality. By using different techniques to gather data, we hope to see different aspects of a phenomenon (Jacobsen, 2005), which in this thesis is tacit knowledge sharing. We aim to study this by using individual interviews with team members and then follow up with a group interview with the same participants. Furthermore, if the organization has any written guidelines or procedures for working in virtual teams, this material can help shed light onto the context in which our unit of analysis is operating.

We find that *individual interviews* with team members is one of the best ways to learn how they experience tacit knowledge sharing in their virtual team. The interviews should be conducted in a fairly unstructured way, but with an interview guide to make sure all important topics are covered. The interviews ought to be recorded to help the process of analyzing the data and to make sure the interview is not disrupted by extensive note taking (Jacobsen, 2005).

To supplement the individual interviews, we also want to do one *focus group interview* with all the participants we have previously interviewed separately. The aim for the group interview is to allow the participants to reflect and discuss tacit knowledge sharing in their team. Because this is a topic which can be hard for the informants to explain, discussing it with other team members may help the group to better understand and put into words the processes which normally happen more hidden and subconscious (Jacobsen, 2005). This is why

group interviews are seen as a good method when looking into a narrow and specific topic, and when developing new theories, which is the case in the present study.

Ethical considerations

According to Jacobsen (2005), there are three important ethical issues which needs to be addressed in order to conduct research in Norway today. These are the obligation to obtain informed consent, the right to privacy and the right to be cited correctly.

The Personal Data Act sets out the obligation to obtain *consent* when processing personal data. The consent must be *given freely*, which means that the participant must not feel pressured into taking part in the research. The consent must be *informed*, which require the researcher to provide the participant with information regarding e.g. the research, its purpose, who will have access to the information, use of the results and consequences of participating in the study (The Norwegian National Research Ethics Committees, 2016). Finally, the consent must be given in an *explicit form.* This means that the participant must clearly state that they understand what participating means. The preferred way of doing this is by giving the participant the information in writing, and have him/her sign that the information is understood. Furthermore, the participant must have actual opportunities to refrain from taking part or withdrawing from the study at any time (The Norwegian National Research Ethics Committees, 2016).

In regards to the *right to privacy*, the first consideration is how sensitive the processed data will be. It is unlikely that the personal data collected in this present study will be covered by The Personal Data Act's definition of sensitive personal data as described in § 2 item 8. Our data will be focusing on a work-related topic, which for most people are placed more in the public sphere than in their private sphere (Jacobsen, 2005). Another issue to consider is whether it is possible for others to *identify* specific participants. This is a more pressing issue in this study, due to the low number of participants. To prevent this from happening, we can leave out information which makes the participant identifiable (e.g. age or gender), or present data with few details (e.g. by stating that the informant is an engineer, but not specify what kind) (Jacobsen, 2005). One final consideration regarding privacy, is that confidentiality should be ensured throughout the

research process. This means to guarantee that even though it is technically possible to connect the participant's identity to his/hers data, this will not be done (Jacobsen, 2005).

One final consideration is the right to be *cited correctly*, which can be an issue when quotes are given new meaning when placed in another context. It is, of course, impossible to present the entire set of transcribed raw data, but we should always aim to present the data as complete as possible where this is important for the results. Furthermore, data or results should never be *faked*, either through intentionally leaving out results or "tweaking" the results to make them fit the study better.

In addition to the preceding ethical considerations, we also want to refer to the other guidelines presented by The Norwegian National Research Ethics Committees (2016), which are relevant within our field of study.

Plan for thesis progress

The plan for the thesis progress is presented in figure 2. So far in the process, we have gotten the thesis registration form approved, and during the fall of 2016 we worked on the main theoretical concepts, such as knowledge sharing, tacit and explicit knowledge and the virtual characteristics of teams. For this report, we have also written about methodology. The aim is to finish both the part about theory and methodology in January this year. However, we are aware that the thesis work is an ongoing process which might lead to changes, and that both these chapters may need revision and adjustment as the thesis work advances.

By mid-February we want to have an interview guide ready, in order to conduct pilot interviews. This is crucial for our further work, because we hope these interviews will allow us to assume whether our research questions are testable. This is of great importance because it might be difficult for our informants to talk about how they share tacit knowledge, and if this proves to be true we may need to adjust our research questions into something more testable. If we need to make changes, we will spend the remaining part of February to do so.

We aim to conduct our informant interviews in the beginning of March. The next step is to transcribe and analyze the data. This work should be finished by the end of April. By this time, we also need to finalize potential follow-up contact with the informants. Based on the analyzed data, we will write the results- and discussion chapters in April and May. This work will allow us to identify and discuss limitations in our study, and write our conclusions. These two chapters are scheduled to be written in the end of May. Our aim is to have a first draft of the thesis ready by the beginning of June. Between June and September 1st, we revise and do the needed finishing touches.

	May 2016	Fall 2016	Jan 2017	Feb 2017	Mar 2017	April 2017	May 2017	June 2017	July 2017	Aug 2017	Sept 2017
Thesis registration form											
Work on theoretical concepts											
Write chapter methodology											
Preliminary thesis report											
Write chapter theory											
Develop interview guide											
Pilot interviews											
Conduct interviews											
Data analyis											
Write chapter results + discussion											
Write chapter limitations + conclusion											
First complete draft											
Revision											
Thesis hand in											

Figure 2: Visualization of plan for thesis progress

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