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SOCIAL CAPITAL AND KNOWLEDGE SHARING IN GLOBAL VIRTUAL TEAMS

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ABSTRACT

Virtual collaborations gradually emerged with the development of information and communication technologies coupled with the invention of the internet. It became easier and more cost effective to bring the best talents together to work on common tasks and combine their expertise and knowledge regardless of their physical locations. The utilization of broader, richer and more diverse knowledge bases is the underlying argument for using global virtual teams as a new work arrangement. However, virtual settings present challenges for building social capital among team members which can consequently undermine interpersonal knowledge sharing.

This study addresses these interrelationships through two main research questions. The first question looks at the characteristics of global virtual teams that affect the development of social capital among virtual team members. The second research question aims to investigate the main factors of social capital that influence interpersonal knowledge sharing in global virtual teams.

The empirical study was conducted through qualitative research methods in the form of an in-depth case study of semi-structured personal and phone interviews. Ten interviews with representatives from five different countries were carried out to collect data for the research.

The role of geographical dispersions of team members, high reliance on information and communication technology, and cultural and language diversities in the development of social capital and knowledge sharing within global virtual teams was observed. Based on the collected data, the factors influencing the development of three dimensions of social capital and their impact on knowledge sharing in global virtual teams were identified. The results of the research show that technology alone does not ensure knowledge sharing. Building social capital helps mediate the communication challenges and breakdowns within global virtual teams and reduce associated losses. Teams that develop social capital are more responsive and attentive to other members´ communication, information, and knowledge needs.

KEYWORDS: Virtual Teams, Social Capital, Knowledge Sharing, Interpersonal Relationships

1. INTRODUCTION

1.1. Background of the study

In today´s economy it has become increasingly important for organizations to produce goods and provide services faster, respond to challenges and solve problems quicker, and all with better quality and lower costs. To remain competitive, organizations must adopt strategies that enable them to utilize their available expertise and skills to the fullest extent. The internet and continuous technological progress greatly impacted workplace collaborations and the way organizations address their goals. Modern technology has made it possible to connect people from different locations and bring them together to work on common tasks.

Technological advancements led to the emergence of virtual collaborations. Virtual teams where members are geographically dispersed and highly reliant on information communication technology (ICT) in their daily work became of interest to practitioners as well as researchers in the 1990s (Fulk & DeSanctics 1995; Cohen & Baily 1997; Jarvenpaa, Knoll & Leidner 1998) and continue to remain a relevant topic. Virtual teams allow companies to use skills and knowledge dispersed throughout different departments, business units, and even outside the company. This type of organization also reduces costs for travelling and makes it possible to work around the clock. Moreover, the collaborative efforts of global virtual team members are likely to result in innovative ideas and culturally adjusted solutions (Zakaria, Amelinckx & Wilemon 2004). The advantages of virtual teams contributed to their rising popularity and increased use (Maznevski & Chudoba 2000). Some researchers even argue that nowadays it is difficult to find teams which are not, at least to some extent, virtual (Kirkman & Mathieu 2005). A closer look at current work structures shows that no car can be built without virtual collaboration among engineers from different locations, no computer can be developed without bringing together the expertise from specialists residing in different places, and even no simple student project can be done without some reliance on ICT and virtual communication.

Virtual teams are widely used as a valuable tool for leveraging human capital through better access to experts and dispersed knowledge (Kirkman et al. 2002). Knowledge sharing, which includes the exchange of experiences, the sharing of new ideas, and the asking for and giving of work related advice, is one of the key elements in virtual teams. Technology facilitates knowledge sharing between team members. Therefore, virtual teams have received a lot of attention in information systems literature that concentrates on the creation of a technical environment for information exchange and knowledge sharing. The main focus of previous research has been the use of technology (Kotlarsky & Oshri 2005), media richness, and channels for coordination of tasks within the team (Belanger & Watson-Manheim 2006; Clear & MacDonell 2011; Kauppila, Rajala & Jyrämä 2011).

Nevertheless, creating a knowledge sharing environment requires more than just information and communication technology (Zakaria et al. 2004). It requires critical elements like trust, relational bonds, cultural awareness, and other interpersonal competences to foster a collaborative space where virtual team members are engaged in and encouraged to share knowledge (Zakaria et al. 2004; Kotlarsky & Oshri 2005). In other words, besides IT solutions for collaboration, building social capital in virtual teams is crucial for effective knowledge sharing. Collaboration technology is only effective when the people using it have established trust with one another (Huysman & Wulf 2006). However, virtual team members face many challenges when building relationships. The virtual environment has a great impact on social capital and, as a result, on knowledge sharing. Distance diminishes the frequency and quality of communication, inability to meet face-to-face affects interpersonal trust, lack of common physical presence leads to a decreased sense of group identity, and language and cultural differences risk misunderstandings and difficult to solve conflicts (Arling 2006).

Literature devoted particularly to the development of social capital and knowledge sharing in virtual teams is limited. Previous research mainly addressed the general performance of such teams (Prasad & Akhilesh 2002; Piccoli, Powell & Ives 2004; Beranek & Martz 2005; Horwitz, Bravington & Silvis 2006). However, it is necessary

to mention that the anticipated performance benefits of virtual teams depend on effective knowledge sharing. Certain aspects related to social capital and knowledge sharing such as communication (Daim et al. 2012), trust (Jarvenpaa & Leidner 1999; Staples & Webster 2008), team identity (Au & Marks 2012), leadership (Kayworth & Leidner 2002; Durkworth 2008), and culture (Anawati & Craig 2006) have been researched in some depth. Previous research regarding the virtual environment predominantly concentrated on isolated factors with regard to the cultural, technical, and communication issues emerging as barriers for knowledge sharing in virtual teams (Kotlarsky & Oshri 2005; Rosen, Furst & Blackburn 2007; Hong & Vai 2008; Behrend & Erwee 2009). However, a holistic understanding of this process is needed.

The current study examines the effect of the virtual setting on social capital and the consequences it has for knowledge sharing among virtual team members. The goal of this study is to create a comprehensive framework and analyze the impact of factors that influence the development of social capital and, consequently, the knowledge sharing process within global virtual teams. The importance of this topic should not be underestimated because one of the most valuable benefits of virtual teams is utilization of dispersed knowledge and expertise. Access to a broader, richer and more diverse knowledge base is the underlying argument for using virtual teams to complete challenging projects. Therefore, it is critical to understand what prevents people located in various places from sharing knowledge with each other. This study serves as a basis for future investigations into methods of increasing the effectiveness and improving the performance of virtual teams.

1.2. Research questions

The purpose of the study is to examine which characteristics of global virtual teams impact the development of social capital and how they influence knowledge sharing among virtual team members. This thesis intends to answer the following research questions:

1. What are the main characteristics of global virtual teams that affect the development of social capital among virtual team members?
2. What are the main factors of social capital in global virtual teams that influence the interpersonal knowledge sharing in such teams?

1.3. Objectives of the study

In order to answer the stated research questions, the researcher examines the specifics of a virtual work environment and peculiarities of virtual teams before reviewing existing literature concerning social capital theory as well as knowledge sharing concepts. These elements serve as a basis for building a theoretical framework that focuses on the relationship between global virtual team characteristics, social capital, and knowledge sharing. The theoretical framework is then tested on a real example of a global virtual team. The exploratory approach is used, so the research is not limited to characteristics identified from the literature and is open for new findings.

1.4. Delimitations and scope of the study

The focus of this research is knowledge sharing based on the development of social capital in the virtual environment. The main forms of communication are technology-based: e-mails, phone calls, and common web-based platforms. The description and analysis of non-face-to-face tools is not in the scope of this study. The focus is on identifying different factors that influence social capital and knowledge sharing in global virtual teams. It is necessary to note that even though virtual teams rely heavily on computer-mediated interaction, face-to-face communication is taken into account when it supports virtual communication.

The research is conducted in the organizational environment and is focused on global virtual teams that have existed for a considerably long time (more than 12 months). Many previous studies on virtual teams observed student groups, the bulk of which existed for only a week or month and included little interaction between team members

(Staples & Zhao 2006; Garrison et al. 2010). This difference might have a significant impact on the knowledge sharing process. Technology-based factors seem to be more important in the short-term perspective; whereas socio-psychological factors have a bigger impact in a long-term perspective. Moreover, existing literature suggests that virtual teams need more time to develop social capital and establish relationships among team members (Bosch-Sijtsema 2002) than traditional teams do. Only then can they be as effective as face-to-face teams and bring additional advantages to the organization by saving time and money, using diverse expertise, and offering culturally adjusted innovative solutions.

Due to time and cost constraints, the research focuses on one global virtual team in a multinational company. The representatives from Germany, the USA, Spain, the Netherlands, and Portugal were interviewed. Cultural diversity is an inherent characteristic of global virtual teams, so it is necessary to consider culture as one of the factors influencing social capital and knowledge sharing in such teams. However, the impact of specific cultures is omitted in the current research.

The main focus of this study is on the interpersonal level of knowledge sharing, so even though team members can be from different business units or even from different organizations, the current research does not consider organizational and inter-unit knowledge sharing. This study argues that human interactions are the primary source of knowledge and knowledge transfer, and interpersonal knowledge sharing requires building relationships between individuals to increase the willingness to provide useful knowledge.

1.5. Structure of the study

This thesis consists of five main chapters and their brief description is presented next.

Chapter 1 provides an introduction to the research topic. It discusses the background of the study and provides an understanding of the relevance and importance of knowledge

sharing in global virtual teams in today´s business world. It elaborates on the purpose of the research, presents the research questions, and outlines the general structure of the study.

Chapter 2 contains a comprehensive literature review in which main terms, processes, concepts, and theories are discussed. It examines the current state of the literature on virtual teams and then discusses knowledge sharing as well as social capital theories and their relevance to virtual collaborations. Finally, a conceptual framework of the study based on the literature review is presented.

Chapter 3 discusses the methodology of the research. It justifies choosing the qualitative approach, conducting the research as a case study, and examining the case through semi-structured interviews for the empirical part of the study. Furthermore, it explains data collection and analysis.

Chapter 4 presents the findings of the conducted study. Interview data is processed and structured into logical subcategories to answer the research questions.

Chapter 5 concludes the thesis with research results, limitations of the study, suggestions for future research on the topic, and managerial implications.

2. LITERATURE REVIEW

This chapter provides a comprehensive literature review that forms a theoretical background of the study. First of all, global virtual teams and previous research done on this topic is presented. Then, concept of knowledge sharing and its application to virtual teams is addressed. Next, social capital theory including the influence of virtual setting on its development is discussed. Finally, the theoretical framework of the study is created.

2.1. Global Virtual Teams

Nowadays companies face many challenges that they need to deal with every day in order to remain competitive and retain their market positions. Multinational corporations and small companies alike feel pressure to have global presence and coordinate their business activities in different locations.

Traditional co-located teams widely utilized in past decades have been an efficient organizational structure, but such teams have limitations. For instance, all team members have to be present in the same location meaning additional time and monetary expenses in case of international companies (Beranek & Martz 2005). These challenges forced companies to look for an alternative way of working.

Virtual teams have been cited as a new efficient and flexible work arrangement that allows teams staffed with the best people regardless of geographical locations to accomplish a wide range of tasks including innovating, decision making, and complex problem solving (Curseu, Schalk, & Wessel 2008; Chiravuri, Nazareth & Ramamurthy 2011). Modern technologies made it possible to work almost without boundaries. In their search for human resources companies are no longer limited by physical borders. Best talents can join the company remotely. Moreover, in order to retain the valuable employees, companies often need to provide alternative work arrangements such as

home working and telecommunicating which allow greater flexibility. It is especially important for female employees looking for work-family balance. (Au & Marks 2012)

Previous studies suggest that the use of traditional co-located teams has declined (Au & Marks 2012) while virtual teams are becoming more and more popular in global business environment. (Ratcheva 2008) However, the estimated "degree of popularity" of virtual teams varies in the literature. A research made by Gartner Group (Biggs 2000) reported that 60% of professional and management tasks at multinational companies are done via virtual teams (Zakaria et al. 2004). Maznevski & Chudoba (2000) claim that the use of virtual teams is expanding exponentially. Some researchers even argue that nowadays it is difficult to find teams which are not, at least to some extent, virtual (Kirkman & Mathieu 2005).

Even though the use of virtual teams in modern organizations indeed increases, such statements are questionable, because they are not based on the empirical data. The results of the empirical study conducted by Mihhailova (2007) suggest that only 5 per cent of employees in Estonian service companies are involved in the virtual team work. However, the results of this study could have been influenced by the sample of the study (industry it concentrates on) as well as by the choice of the country in focus. Moreover, it depends on what we mean by the term "virtual team". All people are involved in the computer-mediated communication, but that does not mean that they are working in virtual teams. Therefore, it is necessary to define "virtual team". This issue received a lot of attention in the literature. However, there is still no single clear definition of this concept.

2.1.1. Previous research on virtual teams

Virtual teams became a focus for researchers in the 1990s with the spread of communication technologies and the internet. The main difference between virtual teams and co-located teams is a high degree of reliance on ICT. Therefore, it is not a surprise that virtual teams receive a lot of attention in information systems literature with a focus on the use of technology and its ability to facilitate collaboration within

virtual teams (Kotlarsky & Oshri 2005). Previous studies mainly concentrated on media richness of the communication as well as on the channels for coordination of tasks within the team (Belanger & Watson-Manheim 2006; Clear & MacDonell 2011; Kauppila et al. 2011).

Even though ICT is essential for geographically dispersed employees and influences knowledge sharing (and consequently team performance), the technology is only as effective as the people using it (Zakaria et al. 2004). The human factor in the virtual environment is what determines the outcome of the teamwork. Highly sophisticated information and communication technologies are of little value if they are not utilized due to lack of technological expertise and absent relational bonds. The social aspect appears to limit the effectiveness of virtual teamwork (Kotlarsky & Oshri 2005). Research on social and human aspects of virtual teams has just started to emerge (Kauppila et al. 2011).

Virtual teams have been studied from many different perspectives. *Table 1* summarizes the main topics of general research on virtual teams. Many authors tried to compare virtual teams with traditional face-to-face teams (Curseu et al. 2008; Reed & Knight 2010) and described challenges virtual team members face (Berry 2011). Beranek & Martz (2005), Horwitz et al. (2006), and Maynard et al. (2012) examined factors influencing the success of virtual teams and their effectiveness. Certain aspects of virtual teams such as communication (Daim et al. 2012), trust (Jarvenpaa & Leidner 1999; Staples & Webster 2008), identity (Au & Marks 2012), leadership (Durkworth 2008), and culture (Anawati & Craig 2006) have been researched in some depth. Due to the fact that virtual teams are characterized by use of ICT, IT solutions and media selection received a lot of attention from researchers (Belanger & Watson-Manheim 2006; Shachaf & Hara 2007).

However, as argued previously, the importance of information and communication technology goes hand in hand with social and relational aspects. This study concentrates particularly on social capital and its influence on knowledge sharing in global virtual teams. Existing research in those fields with applications to the virtual setting is limited

and will be presented in the respective sections of this thesis. In the following subsections, the focus is on the characteristics, advantages and disadvantages of virtual collaboration in global virtual teams.

Topic(s)	Study	Key findings
Communication	Daim et. al. (2012)	Factors that significantly contribute to communication breakdown are trust, interpersonal relations, cultural differences, leadership and technology
	Curseu, Schalk & Wessel (2008)	VTs comparing to FTF teams have high team diversity and low status differences; lower levels of trust, team identity, cohesion, quality of communication and higher levels of conflict; lack of leadership and difficulties in developing procedural norms
Team effectiveness & Performance	Horwitz, Bravington & Silvis (2006)	Cross-cultural communication, managerial and leadership communication, goal and role communication, and relationship building are the most important for VT performance
	Berry (2011)	VTs require more complex skills than FTF teams; common technical support systems required to build competences and expertise in order to develop a team and facilitate knowledge sharing; communication and clear roles are highly important
	Reed & Knight (2010)	Significantly greater impact of risk factors (insufficient knowledge transfer, lack of project team cohesion, cultural or language differences, inadequate technical resources, inexperience with company and its resources, hidden agendas) in VTs when compared to traditional FTF teams.
	Maynard et al. (2012)	Preparation activities related significantly to effectiveness as mediated by TMS.
	Beranek & Martz (2005)	Teams receiving training showed more cohesiveness, perceptions of the process and satisfaction. These factors have been shown to increase team members' ability to exchange information and to positively affect the group's performance.
	Zakaria, Amelinckx & Wilemon (2004)	Key issues in GVTs: People (culture – national & organizational; language; IT proficiency); IT (accessibility, reliability and compatibility; appropriate technology use). More important - people (effective team leadership, conflict management, trust and relationship, understanding of cross-cultural differences, intercultural communication competence)

Topic(s)	Study	Key findings
Leadership	Duckworth (2008)	Four key strategies for developing and leading VTs: making members' competencies and commitments visible to each other; maintaining clear and consistent work practices; assuring clarity of communication; creating a team memory.
Technology & Media selection	Belanger & Watson-Manheim (2006)	Individuals strategically use multiple media to accomplish specific communication goals beyond simply transmitting the message, such as message acknowledgement, enhancement of mutual understanding, and participation in multiple communication interactions.
Technology & Media selection Identity	Shachaf & Hara (2007)	Media choice is a process of elimination, excluding channels and limiting channel repertoire to fit the particular situation. This process is affected by six contingencies: physical proximity, task at hand, social proximity, sender and receiver accessibility of a channel, individual preferences about a channel, and the initial channel.
	Shapiro et al. (2002)	Cultural value diversity, reliance on electronic communication, and lack of on-site monitoring reduce the salience of team identity and increase members´ propensity to withhold efforts.
Identity Culture	Au & Marks (2012)	Perceived differences in national cultures and the way people work within the cultures has a significant impact on identification in virtual teams.
	Anawati & Craig (2006)	Behavior adaptation required to deal with cultural differences. Important to: 1. avoid slang, jargon and acronyms. 2. confirm understanding. 3. get to know VT teammates on a social/personal level. 4. understand what silence means. 5. importance of using visuals to facilitate understanding. 6. praise, criticism and humor are interpreted differently. 7. corporate culture interpreted differently.
Trust	Staples & Webster (2008)	A strong positive relationship between trust and knowledge sharing for all types of teams. Trust is more critical in weak structural situations.
	Jarvenpaa & Leidner (1999)	Global virtual teams may experience a form of "swift" trust, but such trust appears to be fragile and temporary.

Table 1. Previous research on virtual teams.

2.1.2. Definition and main characteristics of global virtual teams

The literature on virtual teams provides heterogeneous definitions and concepts (Ratcheva 2008). However, it is very important to define what is meant by the term "virtual team" in order to derive the reliable findings of the study.

First of all, virtual teams inherit all the general characteristics of a team. The team usually has a limited and defined membership; team members function interdependently pursuing a common goal, share responsibility for outcomes, and collectively manage their relationship across organizational boundaries (Zakaria et al. 2004; Horwitz et al. 2006: 473; Berry 2011: 187-188).

Virtual teams also have characteristics that are specific for them. Virtual teams can be formed and disbanded quickly (Horwitz et al. 2006: 473). The members of a virtual team are usually geographically dispersed (Curseu et al. 2008; Ratcheva 2008; Berry 2011), and they heavily rely on information and communication technology (ICT) rather than on face-to-face interactions in order to complete their tasks (Maznevski & Chudoba 2000).

In current research, there is a distinction between virtual teams and global virtual teams with the focus on the latter. Global virtual teams are composed of members with diverse national, cultural and linguistic attributes (Zakaria et al. 2004; Curseu et al. 2008) and may include people working in different time zones.

Based on the characteristics discussed above, the current research adopts the following definition. ***A global virtual team*** is a team composed of people with different national and cultural backgrounds distributed across geographical boundaries, who have interdependent tasks and work on a common goal while using information and communication technologies as their primary means of collaboration and work structure (Zakaria et al. 2004; Curseu et al. 2008; Ratcheva 2008; Berry 2011). Based on this definition and characteristics of global virtual teams, the next two sections address

general advantages and disadvantages inherent to the global virtual team phenomenon. Advantages and disadvantages are summarized in *Table 2*.

Characteristics of Global Virtual Teams	Advantages	Disadvantages
Geographically dispersed members	- Communication and collaboration regardless time and space - Reduced travel costs - Work around the clock ("sun never sets")	- Time differences - Coordination difficulties - Lack of visibility - Loose team identity - Difficulties to build personal relationships
High degree of reliance on ICT	- High speed and agility of information transfer	- Lack of technology literacy - Incompatible hardware/software - Negative impact on relationships
Cultural and language differences	- Work outcomes are culturally adjusted - International interesting and challenging work environment	- Cultural challenges - Language barriers - Lack of common ground
Diverse expertise and knowledge	- Best talents, expertise, and knowledge - Diversity of ideas as a source of creativity and innovations	- Increased possibility of conflicts - Competing priorities and interests
Flexible work arrangements	- Opportunity to attract talents who prefer/require flexible work	- Coordination difficulties - Competing priorities/ multiple tasks

Table 2. General advantages and disadvantages of global virtual teams.

2.1.3. Advantages of global virtual teams

There are several reasons why virtual teams have remained a focus of researchers for many years and been a widely used practice in many companies.

The first and most obvious reason is the ***opportunity to overcome long distances and boundaries*** (Ratcheva 2008). Companies no longer have to send their employees to other locations in order to discuss business issues or receive expertise from other business units. It brings advantages not only to the company in the form of saved resources such as money and time spent for business trips, but also gives more flexibility and convenience for team members. They do not have to travel long distances, be absent from home for a long time, experience jet lags, etc. (Duckworth 2008: 7). Moreover, as Duckworth (2008: 7) noticed, virtual teamwork even leads to "environmental benefits for all of us." If support from a colleague who works in another country is needed, ICT facilitates such communications. ICT made the distribution and coordination of work much easier and faster (Kirkman et al. 2004; Hertel, Geister & Konradt 2005).

The second reason, which is closely linked to the first one, is the opportunity to take advantage of time differences while ***working from different locations***. The "sun never sets" (Duckworth 2008: 7) or "follow the sun" (Solomon 2001) concept allows human resources to be used more efficiently within the team and tasks to be completed faster. "As an example, at the end of their workday, U.S. team members can hand off their task to their counterparts in India, who, at the close of business there, will turn it over to European team members. The next morning, the U.S. members receive it back with 16 hours of value-added effort." (Duckworth 2008: 7)

Another important reason is the ***attraction of the best talent*** from around the globe (Rosen et al. 2007; Ratcheva 2008; Berry 2011). Team members who have different expertise, knowledge, skills, and competences can be easily brought together creating a synergy effect due to the ***diversity*** of opinions and perspectives which can be beneficial for the creation of new innovative solutions (Berry 2011: 186). This advantage becomes

more pronounced when global virtual teams are considered because occupational and cultural heterogeneity of team members contributes to the development of complex knowledge structures (Curseu et al. 2008). Additionally, virtual teams provide ***flexible work organization opportunities*** that help companies attract larger pools of qualified candidates or retain key employees that prefer or need such conditions (Duckworth 2008: 7).

Finally, through the use of virtual teams, companies do not need to create a solution for one location in Europe, then apply it to the US, and replicate it in Asia. A global team with members from each region can work "together apart" to develop and implement a ***global solution*** that takes into account peculiarities of each location (Duckworth 2008: 6). By doing this, companies save resources and receive a competitive advantage.

On the other hand, the discussed advantages of global virtual teams such as disregarding distance, maximizing diversity, and increasing flexibility also cause challenges for the management of virtual teams. Coordination and planning of team processes, development of trust, team identity, and cohesion as well as leadership roles differ from ones in traditional teams and are more complicated (Curseu et al. 2008).

2.1.4. Disadvantages of global virtual teams.

Despite the advantages of virtual teamwork, some studies suggest that many virtual teams fail to reach their goals and successfully accomplish tasks (Potter & Balthazard 2002). Such results may be an outcome of ineffective management of the challenges that team members face when working in the virtual environment (Rosen, Furst & Blackburn 2006). Every advantage of virtual teamwork has hidden pitfalls that management needs to consider.

The most attractive advantage - communication and collaboration regardless of time and space - possesses the biggest number of challenges for team processes and relationships within the team. Social dynamics concerned with building a team and sustaining

commitment suffer from a ***lack of frequent face-to-face communication*** (Horwitz et al. 2006: 474 – 475). Previous studies reveal that team members working in virtual environments tend to feel isolated. They do not associate themselves as a part of a team and perceive other colleagues as strangers. ***A lack of visibility*** when supervisors and colleagues do not see each other actually working on tasks adds complexity and results in the misperception that others do not provide any value for the common goal (Horwitz 2006: 473; Duckworth 2008: 7-9). Such attitudes prevent the building of trustworthy relationships which are of great importance for effective collaboration, information and knowledge sharing, and consequently, better performance.

Another pitfall of collaboration concerns the private life of individuals. For example, working on a global virtual team with colleagues in locations with 8-10 hour time differences forces people to stay late or come early to the office if they need to have a telephone conference. All these factors influence the satisfaction of employees.

Another advantage – the attraction of the best talents regardless of location – also has its drawbacks. Global virtual teams composed of culturally diverse experts usually ***do not share the same values and lack a "common ground"***. They interpret colleagues' behaviors from their own cultural perspectives. Often global team members apply stereotypes about a particular nationality while communicating which leads to incorrect assumptions (Au & Marks 2012). A related problem is ***language barriers***.

Flexible work arrangements are tempting for some employees, but not beneficial for others. There is a great tendency for undisciplined members to miss important deadlines for deliverables which can damage the work of others (Duckworth 2008). Team members can be discouraged by missed meetings, unanswered e-mails, and unreturned phone calls. Team members question the commitment of others to virtual projects and are concerned with the ***"free riding" problem*** even though such behavior could be due to local work priorities (Rosen et al. 2006). This leads to frustration and jeopardizes relationships among team members.

Finally, virtual teams cannot exist without ICT; however, communication facilitated by ICT bears many challenges for teamwork. These challenges include using different programs that are not compatible and the need for specific technological skills. In most of the cases, communication via ICT is asynchronous (in contrast to face-to-face teams). It offers efficient documentation and allows easy review of interactions that are archived electronically in e-mails, databases, or on shared drives. However, it also can cause delays as well as employee frustration (Berry 2011).

Characteristics of the virtual environment have both a positive and negative impact on the development of social capital, and consequently, on the knowledge sharing process as referenced later.

2.2. Knowledge Sharing

Knowledge and knowledge management have been increasingly cited as critical for organizations to succeed (Chiravuri et al. 2011). The knowledge-based view of a firm emerged from the resource-based view when researchers started to see the importance of knowledge as a key asset of organizations (Kogut & Zander 1992). Knowledge is considered to be a competitive advantage that allows firms to be flexible and react faster to environmental changes. In order to successfully compete, organizations need dynamic capabilities to create, acquire, integrate, and use knowledge from the minds of individuals (Grant 1996). Additionally, the movement of knowledge from one team member to another, or in other words, knowledge sharing is necessary for success. Due to the fact that knowledge is embedded in the minds of individuals, sharing knowledge is personal, and getting people to share is difficult (Staples & Webster 2008). Therefore, the creation of effective methods of knowledge sharing is a challenge that every organization needs to overcome in order to realize the full potential of its competitive advantage.

In the following sections definitions of knowledge and knowledge sharing are presented. The interpersonal level of knowledge sharing is underlined as being the focus of this study. Main findings of previous research concerning knowledge sharing in virtual teams are discussed.

2.2.1. Definition of knowledge

Although the concept of knowledge has been a focus of many studies in recent years, there is no unanimous definition of knowledge among researchers. Two different views on the concept of knowledge exist: knowledge as a collective asset and knowledge as an individual asset. Scholars who consider knowledge a collective asset argue that knowledge is an ongoing social accomplishment which is created, transferred, and utilized when actors engage in interactions (Brown & Duguid 1991; Orlikowski 2002). On the other hand, researchers who see knowledge as primarily an individual asset (Polanyi 1967, Tsoukas & Vladimirov 2001) state that knowledge is embedded in

individuals and represents “an individual capability to draw distinctions, within a domain of action, based on an appreciation of context or theory, or both” (Tsoukas & Vladimirov 2001: 983). In reality several levels of knowledge may exist simultaneously, including the individual, the group, the organizational, and the inter-organizational knowledge (Mäkelä 2006). However, for the interest of the current research, knowledge is defined as an individual asset - possession of facts, information, and skills - that is derived from previous experiences and relations and resides in the mind of the individual. This definition is the most applicable to this study which focuses on the knowledge sharing process as it takes place on the interpersonal level where predominantly individual knowledge is shared.

2.2.2. Characteristics of knowledge

To understand and analyze the process of knowledge sharing, characteristics of knowledge need to be taken into account. The tacit versus explicit classification is the most often cited and serves as a basis for most knowledge management research (Polanyi 1967; Grant 1996; Nonaka 1994). Explicit knowledge can be formalized, codified, documented, and easily communicated or transferred to other individuals. It takes the form of manuals, guidelines, process models, etc. Tacit knowledge is highly personal and context specific. It resides in a person’s mind and is connected with individual experiences and beliefs. Tacit knowledge is difficult to put into structured, documented forms.

De Long & Fahey (2000) distinguish three forms of knowledge: human, social, and structured. Human knowledge is embedded within individuals and represents what individuals know and how they perform tasks; it can be a combination of explicit and tacit knowledge. Social knowledge is part of relationships among individuals. However, it is more than the sum of the individual team members´ knowledge; social knowledge includes culture, norms, and routines of the team and is mainly tacit. Finally, structured knowledge is a result of organizational systems, processes and regulations. This knowledge is explicit and can exist independent of individuals.

The presented characteristics of knowledge – explicit and tacit; human, social and structured – are important elements when researching the knowledge sharing process as different types of knowledge require different approaches. Explicit and structured knowledge can be shared relatively easily, e.g. via documentation; whereas the sharing of tacit, human, and social capital is constrained by nature and requires significant effort.

2.2.3. Definition of knowledge sharing

The possession of individual knowledge within an organization is only the first step towards acquiring a competitive advantage. Knowledge brings little value if it is kept in the mind of the individual and not shared to increase organizational value. The target of knowledge management is to leverage the knowledge of individuals and teams so that this knowledge becomes an available resource for the whole organization and serves as a competitive advantage for the firm (Davenport & Prusak 1998). The creation, codification, sharing, and application of knowledge constitute the basic knowledge management cycle (Adhikari 2008). **Figure 1** shows the stages of the knowledge management life cycle.

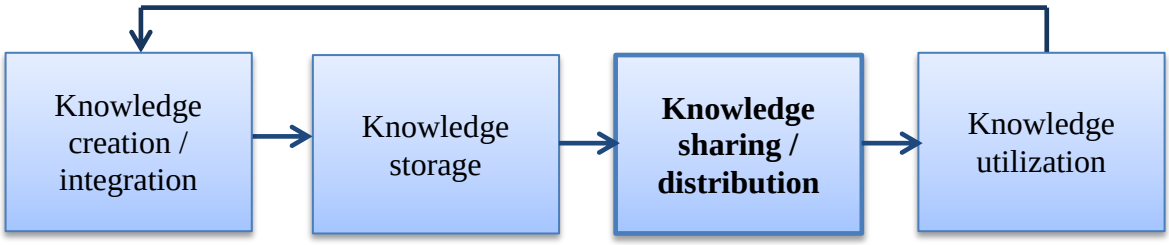

Figure 1. Knowledge management life cycle (adapted from Davenport & Prusak 1998)

First, knowledge appears as an idea in the head of an individual. It can be either tacit (abstract and not well thought trough) or explicit (clearly formed and transferred to paper or an electronic format). In the second stage, these ideas become more concrete and are codified to be stored in a repository (Birkinshaw & Sheehan 2002). Next, knowledge is shared among individuals in different ways. There are two strategies of

knowledge sharing: codification and personalization. The codification strategy is concerned with archiving, or in other words putting knowledge in a form that anybody can access, understand, and use it. The personalization strategy refers to direct communication among individuals; it is focused on linking people together to support effective tacit knowledge sharing (King 2006; Adhikari 2008). The last stage of the knowledge management life cycle is knowledge utilization. There is little value added if knowledge is created but not utilized and applied to increase the competitive advantage of an organization.

The focus of this research is on knowledge sharing and factors that influence it. However, before going into a detailed analysis, it is important to distinguish the difference between concepts that are often used interchangeably: knowledge exchange, knowledge transfer, and knowledge sharing. Knowledge exchange refers to how knowledge flows within different levels of organization; knowledge transfer is used in terms of how knowledge flows between groups or business units; and knowledge sharing takes place at the interpersonal level of interactions (Sniazhko 2011). Knowledge sharing occurs during every day work, within formal and informal face-to-face meetings, over the phone or via email, as well as in informal encounters (Mäkelä 2006). Therefore, in this study where ***knowledge sharing*** is under investigation, it is defined as the exchange of experience, either personal or learnt, the sharing of new ideas, and the asking for and giving of work related advice.

2.2.4. Knowledge sharing at the interpersonal level

To exploit the full potential of knowledge in an organization, it is necessary to ensure constant knowledge sharing and transfer. Previous research was conducted to examine the transfer or sharing of knowledge between organizations, between subsidiaries and headquarters, and between organizational units (Wang 2004; Kim & Lee 2006; Foss 2007), as well as some studies concerned with knowledge sharing within and among teams (Szulanski 1996; Kim & Lee 2006). Knowledge transfer and sharing occurs at four levels: international, organizational, interpersonal, and individual. *Table 3* presents the different levels of knowledge flow.

Level of Analysis	Key Findings	Example: Authors/Studies
International level	Expatriation has a sustained effect on knowledge sharing in multinational corporations across borders.	Mäkelä (2007), Nohria & Ghoshal (1997), Ruisala & Suutari (2004)
Organizational level	Knowledge sharing between units contributes significantly to the organizational performance of firms. Centralized organizational culture and organizational climate that emphasizes individual competition create a barrier to knowledge sharing, while cooperative team perception creates trust and conditions for knowledge sharing.	Argote et al. (2003), Foss (2007), Wang (2004), Willem & Scarbrough (2006), Kim & Lee (2006)
Relational level: 1. Inter-unit level	1. Team characteristics and processes influence knowledge sharing among team members. The longer a team has been formed and the higher the level of team cohesiveness the more likely team members are to share knowledge.	Ambos et al. (2006), Gupta & Govinradajan, (2000a), Szulanski (1996), Kim & Han (2006)
3. Interpersonal level	2. The level of human interactions is the primary source of knowledge and knowledge transfer. Interpersonal knowledge sharing and learning are more likely to occur in trusting relationships, since individuals are more willing to provide useful knowledge.	Foss (2007), Felin & Hesterly (2007), Mäkelä (2006), Brass et al. (2004), Argote & Ingram (2000), Dogson (1993)
Individual level	Individuals confident in their ability to share work related knowledge are more likely to express intention to share knowledge and higher level of engagement in knowledge sharing. Evaluation apprehension and anxiety based on fear of negative evaluations have negative effect to knowledge sharing.	Minbaeva (2005), Minbaeva et al. (2003), Cabrera et al. (2006), Lin (2007a,b)

Table 3. Levels of knowledge transfer and sharing (adapted from Sniazhko 2011).

The main focus of this thesis is on the interpersonal level of knowledge sharing. Nevertheless, it is important to mention that all levels of knowledge transfer and sharing are interconnected. All levels cover the interactions among individuals. International and organizational levels address the topic from a macro-perspective, whereas relational and individual levels adopt a micro-perspective on the issue. (Sniazhko 2011)

Since knowledge is tied to an individual who possesses that knowledge, interactions are needed for knowledge sharing to occur. Mäkelä & Brewster (2009) define interpersonal interactions as both formal and informal interfaces that include both non-face-to-face as well as face-to-face means of communication; whereas knowledge sharing is the exchange of business related knowledge between individuals through interpersonal interactions.

Even though some researchers still argue that face-to-face communication remains the most powerful way of interaction (Begley 2004), it is not possible to ignore the emergence of virtual teams and the scale of use of non-face-to-face tools in the daily work of an employee. Non-face-to-face tools enable people to overcome distance and time. However, it is true that such tools cannot motivate people to share knowledge, as well as cannot motivate them to do so the fact of physical proximity in face-to-face communication. Neither IT solutions nor face-to-face meetings can assure efficient knowledge sharing. It is argued by previous research that in comparison to face-to-face teams, relationships established via virtual communication are more hostile, divisive, and inhibited (Kiesler & Sproull 1992). However, given more time to develop relationships, virtual teams report levels of commitment and affiliation similar to traditional face-to-face teams (Bosch-Sijtsema 2002). Therefore, it is necessary to study the factors that influence communication and knowledge sharing in virtual teams in order to minimize the negative effects of computer mediated communication and maximize those that have a positive impact. In the next section, the existing literature concerning knowledge sharing in virtual teams is discussed.

2.2.5. Knowledge sharing in virtual teams

Knowledge sharing has been widely studied in the traditional face-to-face team context and acknowledged to be critical for team effectiveness (Powell, Picolli & Ives 2004; Staples & Webster 2008). Knowledge literature suggests that knowledge sharing requires personal interactions, especially for sharing tacit knowledge. However, in contrast to face-to-face teams, most interactions in virtual teams are done via ICT with little or no personal contact (Bosch-Sijtsema 2002). Therefore, knowledge sharing in the virtual environment faces additional challenges that need to be managed. The importance of knowledge sharing in virtual teams is significant because such teams are often created with an aim to allow people with different backgrounds, expertise, and perspectives to work on a complex problem. This diversity of knowledge has the potential to enhance the quality of outcomes. However, in order to realize that potential, sharing expertise and knowledge within the team is crucial (Staples & Webster 2008).

Existing literature specifically devoted to knowledge sharing in virtual teams is very limited. The main findings of the prior research on this subject are summarized in *Table 4* and are briefly presented in this section.

Rosen et al. (2007) in their study investigated barriers to knowledge sharing in virtual teams as well as looked at mechanisms to overcome those barriers and encourage the sharing of individual and collective knowledge. The researchers found that the key elements in knowledge sharing are not only technology and IT solutions, but also the ability and willingness of individuals to be actively involved in the knowledge sharing process. In line with the current study, Rosen et al. (2007: 261) state that "effective knowledge sharing in virtual teams requires both motivated team members and user-friendly knowledge dissemination mechanisms."

Topic(s)	Study	Key findings
Knowledge sharing	Rosen, Furst & Blackburn (2007)	Six common barriers to knowledge sharing in VTs: lack of trust; time constrains and competing deadlines; technology; team leadership; failure to develop TMS; culture
	Kotlarsky & Oshri (2005)	Human-related issues such as rapport and trust (social ties) as well as transactive memory and collective knowledge (knowledge sharing) are important for collaboration in VTs.
	Hong & Vai (2008)	Four knowledge sharing mechanisms: shared understanding, learning climate, job rotation and coaching.
	Behrend & Erwee (2009)	Network ties are useful predictors of how information and knowledge flows in virtual project teams and can be better indicators than formal project structures in assessment of participants' prestige, activity and influence and their generic formal team functions, thus leadership, member and support roles.
	Griffith, Sawyer & Neale (2003)	Unless managed, the combination of IT and virtual work may serve to change the distribution of different types of knowledge across individuals, teams, and organization.
	Bosch-Sijtsema (2002)	A longer duration of the project has a more positive effect on knowledge transfer. The higher the degree of "virtualness", the more difficult it becomes to transfer tacit knowledge. A virtual organization is not very suitable for transferring and storing organizational knowledge.

Table 4. Literature review on knowledge sharing in virtual teams.

Researchers have identified six common barriers to knowledge sharing in virtual teams. The first barrier is *a lack of trust*. It is argued that sharing knowledge or asking for information is risky because members may fear that asking for advice may be interpreted as an indicator of incompetence whereas sharing knowledge or providing information may be perceived as grandstanding. The second barrier is *time constraints and competing deadlines* because virtual team members often have to combine their participation in a virtual project with on-site responsibilities. The third major barrier is *technology*. This issue refers to the use of inadequate technology for archiving

documents as well as communicating and the failure to put new technology in use. The fourth barrier is *team leadership*. Leaders must find a way to articulate a vision of collaboration, explain how individuals can contribute to achieving the vision, and recognize and reward team members for sharing their knowledge. It is more challenging to perform the mentioned tasks in the virtual environment because the leader cannot constantly observe the team. The fifth barrier is a *failure to develop transactive memory systems (TMS).* TMS represent the collective team knowledge concerning "who knows what" that gives members the opportunity to access individual knowledge repositories held by others. Often virtual team members possess a wide range of expertise and networks which are not used to their full potential due to the inability to develop TMS in the virtual environment. Finally, the sixth barrier is *culture* that goes beyond simple misunderstandings to include cultural differences like the willingness to seek information from others, the ways to structure the problem, the meaning of a timely response to the requests of other team members, etc. All in all, Rosen et al. (2007) emphasize the challenge of knowledge sharing in virtual teams with a focus on social aspects that need to be managed.

Kotlarsky & Oshri (2005) conducted a study to look at the contribution of social ties and knowledge sharing to successful collaborations in distributed system development teams. The authors did not focus on knowledge sharing per se; however, the results of the research show the importance of knowledge sharing in virtual teams. It is stated that previous literature overestimated the contribution of collaborative tools and technical solutions to the flow of information and knowledge sharing. Human-related issues such as rapport and trust as well as transactive memory and collective knowledge are important for successful collaborations in virtual teams.

Hong & Vai (2008) acknowledge the unique characteristics of virtual teams that have an impact on the knowledge sharing among team members. Therefore, they address this issue in their exploratory research and examine the process of knowledge sharing. Their findings indicate four knowledge sharing mechanisms that are employed by the case company. The first mechanism is *shared understanding* about the common target, the way to achieve it, and what each team member can contribute. The second mechanism

is the *learning climate* which refers to the development of values and norms of knowledge sharing. The learning climate has to be constantly reinforced due to the diverse backgrounds of team members and frequent changes in team composition. The third mechanism is *job rotation* to improve both the individual's and the team's collective knowledge as well as to bring different perspectives on the same issues. Finally, the fourth mechanism is *coaching* as an informal arrangement for team members to cooperate. Team members should have a responsibility to ensure that others have necessary information and know-how to work efficiently.

Behrend & Erwee (2009) studied social networks within virtual teams with a focus on socio-cultural conditions and network-related processes that enable and support knowledge creation and exchange. The research issues included trust, shared language, informal networks, and risk associated with knowledge sharing in virtual teams. The researchers argue that knowledge sharing is "a function of the extent to which a person knows and values the expertise of another, the accessibility of this person and the potential cost incurred in seeking information or knowledge from this person" (Behrend & Erwee 2009: 102). The main finding of the study is that information and knowledge flow in virtual project teams depends on participants' prestige, activity, and influence and their generic formal team functions, thus leadership, member and support roles.

Griffith, Sawyer & Neale (2003) constructed a theoretical model of knowledge sharing within virtual teams that includes elements such as team characteristics (degree of "virtualness," task interdependence, media richness), individual knowledge types (explicit, implicit, tacit), social knowledge types (objectified, collective, shared understanding), individual moderators (absorptive capacity), team moderators (transactive memory, synergy), and knowledge utilization. The authors suggest that all of the listed factors influence knowledge sharing in virtual teams. Teams with a higher degree of "virtualness" rely more on documentation, use of emails, and different repositories, and therefore, such teams focus on and are able to share explicit rather than tacit knowledge. This may lead to a loss of available tacit knowledge in the team as well as an inability to convert individual knowledge into collective or organizational knowledge. Moreover, the researchers emphasize the need to consider socio-

psychological factors in the virtual environment. Even though technology provides an opportunity to share knowledge, it can simultaneously "hamper the ability of team members to create new, tacit knowledge through team interaction" (Griffith et al. 2003: 280). This means that after sharing knowledge the individual is no longer a valuable or unique contributor in the organization. When not managed properly, it may cause the intentional withholding of information and knowledge.

Bosch-Sijtsema (2002) also found that the degree of "virtualness" has an impact on knowledge transfer. The literature suggests that little personal interaction, geographical dispersion, and reliance on ICT create barriers to transferring and memorizing knowledge. The higher the degree of "virtualness", the more difficult it becomes to transfer tacit knowledge. However, the findings of the empirical study conducted by Bosch-Sijtsema (2002) showed that knowledge has in fact been transferred. According to his research "the focus of knowledge transfer in organizations with a virtual setting is more on interorganisational, interpartner and interproject knowledge transfer, than on organizational transfer of knowledge" (Bosch-Sijtsema 2002: 1). Therefore, a virtual organization is not suitable for transferring and storing organizational knowledge. Additionally, a longer duration for the project has a more positive effect on knowledge transfer.

Thus, knowledge and knowledge sharing have been acknowledged as enablers and facilitators of an organization's competitive advantage. They have been researched on the international and organizational levels, whereas research devoted to interpersonal knowledge sharing is still limited. Moreover, previous research regarding the virtual environment predominantly concentrated on isolated factors with regard to the cultural, technical, and communication issues emerging as barriers for knowledge sharing in virtual teams. A comprehensive understanding of this process is needed. The current research aims to develop and test a theoretical framework which covers various factors that impact the development of social capital and consequently influence knowledge sharing in global virtual teams. The social capital theory is discussed next.

2.3. Social Capital Theory

The social capital theory explains different social behaviors and is widely used for explaining interactions between individuals, groups, and organizations. Social capital considers social interactions not only as elements of social structures but also as resources for social exchange. In other words, social capital represents not only the network of actors' social relations but also provides access to the potential resources and knowledge embedded in it (Nahapiet & Ghoshal 1998, Reiche, Harzing & Kraimer 2009, Kase, Paauwe & Zupan 2009).

Social capital consists of two aspects. The first aspect is called "bridging" and refers to the establishment of external relationships. Individuals in the network are connected to each other either directly or indirectly. Bridging of the actors allows valuable information from outside the group to be obtained. (Mäkelä 2006) The second aspect is called "bonding" and describes the internal ties within a social network. Bonding concentrates on the collective actors' internal characteristics and relationships within the group. It contributes to the establishment of trust, facilitates cooperation, and increases cohesiveness (Mäkelä 2006).

The definition of social capital applied in this study is adopted from Nahapiet & Ghoshal (1998). Their definition is more constructive and includes both bridging and bonding elements. Based on the review of prior research, Nahapiet & Ghoshal (1998) integrated different aspects of social capital into their Three Dimensional Framework of Social Capital. The three dimensions of which are: structural, relational, and cognitive (**Figure 2**). These dimensions are discussed in more detail in the following sections.

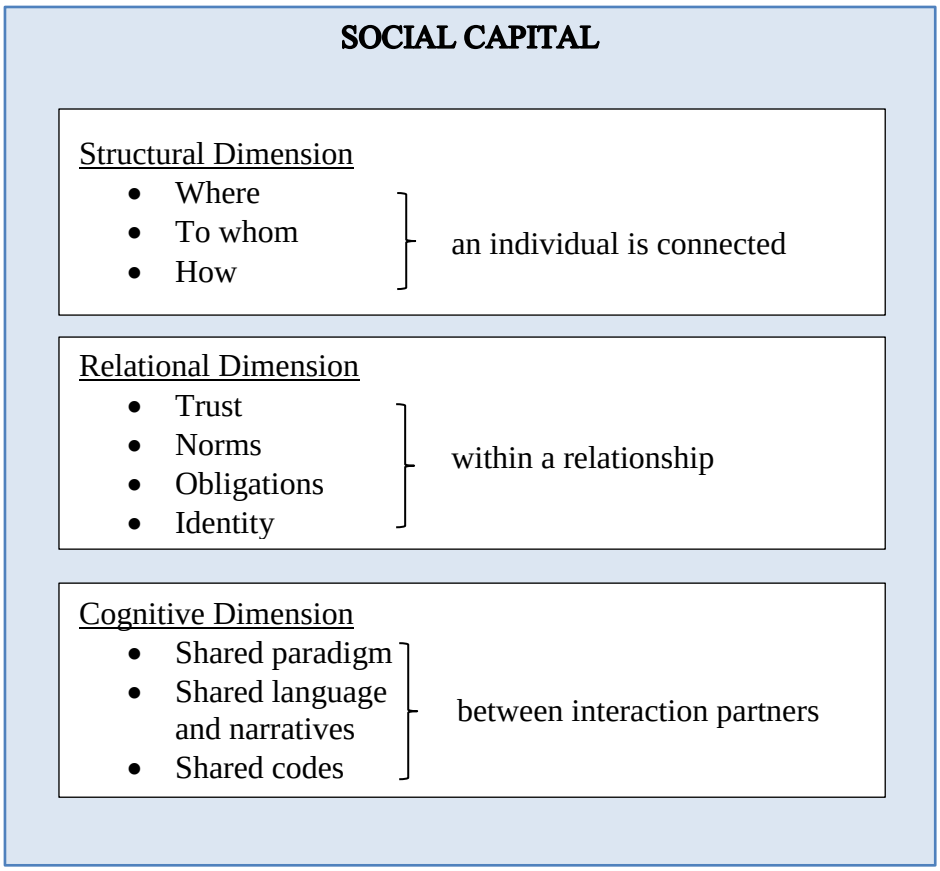

Figure 2. A Three Dimensional Framework of Social Capital (adapted from Mäkelä 2006).

2.3.1. Structural social capital

Structural dimension of social capital represents impersonal linkage between people or units; more specifically where, to whom, and how individuals are connected. Structural capital not only defines links that bind actors together, but also provides the potential channels for information sharing. It is mainly concerned with the existence of network ties and the pattern of those ties in terms of density, intensity, and connectivity.

Usually strong and weak ties are distinguished. Strong ties are characterized by multiple contacts between individuals on a regular basis, whereas weak ties are developed when contacts occur less frequently (Ghoshal, Korine & Szulanski 1994). On the other hand,

some researchers argue that the strength of ties depends also on the perception of closeness and emotional intensity (Fliaster & Spiess 2008) meaning that even a high number of contacts between individuals may not lead to the creation of strong ties if those contacts did not contribute to an emotional connection. The number of ties established between actors is called network density. It might determine the potential amount of information or knowledge shared between individuals. Intensity is the degree to which those ties are utilized by network members. Research has found that the greater the network intensity, the higher the social interaction which leads to an increased exchange of task related information (Baldwin, Bedell & Johnson 1997; Collins & Clark 2003).

2.3.2. Relational social capital

Relational social capital refers to the nature of the relationship between individuals. It addresses behavioral and motivational assets and obligations embedded in relationships. Relational dimension includes aspects such as trust, norms, obligations, and identity (Nahapiet & Ghoshal 1998).

2.3.2.1. Trust

Researchers seem to agree that trust is one of the most important factors influencing relationships between individuals, facilitating learning, and information sharing (Newell, Swan & Galliers 2000; Paul & McDaniel 2004; Renzl 2006). Trust is positively related to the willingness to cooperate with colleagues which results in higher levels of knowledge sharing and increased performance (Zaheer, McEvily & Perrone 1998; Renzl 2006; Harell & Daim 2009).

Trust impacts knowledge sharing is two ways. First, trust enables the exchange of information mainly because it serves as motivation to contribute to the success of the team. Trust reduces anxiety that individuals might have because they are not sure if their information will be viewed by others as relevant or disregarded as unimportant (Reinig & Shin 2002). Therefore, higher trust improves knowledge sharing by

increasing the amount, type, and quality of information exchanged (Davenport & Prusak 1998; Andrews & Delahaye 2000; Dirks & Ferrin 2002). Trust and knowledge sharing reinforce one another: the more team members trust each other, the more they share knowledge, and the more they share knowledge, the more they trust one another (Butler 1999).

Second, trust also influences the willingness to accept and use information provided by other team members (Wakso & Faroj 2005). Individuals are more open to receiving knowledge from someone they trust because they believe in their ability to provide valuable and verified information (Andrews & Delahaye 2000). All in all, trust influences the attitudes and behaviors of team members and facilitates knowledge sharing between them. In this study the interpersonal trust among virtual team members is the focus.

2.3.2.2. Norms

Team norms are rules, both explicit and implicit, that govern the behavior of team members (Adler & Kwon 2002). These rules include not only behaviors that are acceptable but also those that are unacceptable to the team. Norms regulate team collaboration by both encouraging as well as restricting certain actions and activities. Moreover, norms provide structure concerning how to engage in team tasks. Information sharing norms create a cooperative environment that encourages participation and promotes tolerance of mistakes (Adler & Kwon 2002). Such norms impact attitudes towards contribution to the team success and motivate team members to engage in knowledge sharing with one another. As a result, the presence of strong team norms positively impacts knowledge sharing.

2.3.2.3. Obligations

Team obligations are feelings of responsibility that lead team members to exchange actions in return for past or future actions (Nahapiet & Ghoshal 1998). In other words, when an individual makes a contribution to a team, he or she expects other team

members to provide their input to the team's common result. The stronger the degree of mutual obligation within a team, the higher the participation and collaboration in the team.

Obligations influence motivation for sharing knowledge between individuals. Nahapiet & Ghoshal (1998) argue that teams with high mutual obligations will be more committed to sharing all available information in order to achieve their targets and will be less likely purposefully withhold information from the team. This also promotes active involvement in teamwork and decreases the likelihood of free riding. Additionally, obligations impact the willingness of individuals to accept information and knowledge from other team members. As a result, mutual obligations contribute to more efficient knowledge sharing.

2.3.2.4. Team identification

Team identification refers to the extent to which individuals feel they are part of a group. Team identification is not an interpersonal attachment to other team members; it is impersonal bonds to the group as a social category (Brewer & Gardner 1996; Scott 1997). If individuals have a strong identification with a team, then they perceive the team's success as their success and see a connection between their contribution and the overall result of the team (Alles & Datar 2002). Therefore, team identification has a positive effect on the motivation of team members to engage in team tasks. Strong team identification increases the amount of communication, information exchange, and knowledge sharing between team members (Towry 2003). Previous research has shown that individuals who share a common team identity not only feel more open to share knowledge with team members but also accept knowledge from others more easily (Kane, Argote & Levine 2005).

2.3.3. Cognitive social capital

Cognitive social capital refers to shared paradigms, understanding and interpretations; shared language, narratives, and shared codes (Nahapiet & Ghoshal 1998). Shared context between individuals is an important element of information and knowledge sharing. It forms a similar intuitive perception of how to interact within a team (Inkpen & Tsang 2005). Shared cognitive ground serves as a frame of reference for common knowledge between team members (Nonaka & Takeuchi 1995). Individuals interpret and understand received information based on their experience and knowledge. Lack of a common ground and mutual understanding can hinder the communication, whereas the development of cognitive social capital enables teams to rapidly process information into meaningful structures, which increases the effectiveness of information and knowledge sharing (Marks et al. 2002). Shared cognitive ground allows team members to identify the information needed to be exchanged, when, and with whom. It facilitates the exchange of meaningful information and aids knowledge sharing.

2.3.4. Social capital in global virtual teams

The virtual communication environment moderates the development of social capital in global virtual teams. The virtual setting is different from traditional face-to-face setting in terms of geographical distance between team members and the high reliance on information communication technology.

Distance is a determinant for the mode of communication in the team. It increases the number and variety of contacts within a virtual team and impacts who gets contacted. Network ties among virtual team members are mostly weak due to the separation of team members and the reduced opportunity for frequent face-to-face contacts, which are usually perceived as a driving force behind mutual collaboration. Personal contacts are essential for the sharing of tacit knowledge (Nonaka & Takeuchi 1995). Davenport & Prusak (1998) noticed that most knowledge is transferred in the coffee room or at water coolers. The virtual environment does not allow such methods of interaction; this lowers the frequency of informal knowledge sharing (Bosch-Sijtsema 2002). Berry (2011)

found that virtual team members tend to initially share less information than members of face-to-face teams. This also may negatively influence the understanding of common goals, work progress, and affect the outcomes (Berry 2011).

The absence of face-to-face interactions generally diminishes trust and cohesion among team members (Malhotra, Majchrzak & Rosen 2007; Jarvenpaa & Majchrzak 2008; Kauppila et al. 2011; Sarker 2011). Even though it is difficult to develop trust without direct interaction, the literature acknowledges the existence of an impersonal form of trust in virtual teams, in addition to an interpersonal form, which is based on the perception that everything is in proper order rather than on emotional bonds or the history of interactions (Ratcheva 2008). Meyerson et al. (1994) developed the concept of "swift" trust to explain how temporary teams can reach high levels of trust without sharing any past affiliation. The concept of "swift" trust suggests that "unless one trusts quickly, one may never trust at all" (Ratcheva 2008: 60). Virtual teams are created for a certain period of time, and there is not sufficient time to develop trust through interpersonal means. Therefore, team members develop trust based on their local organizational environment, practices, or role-based stereotypes. As a result, positive expectations of trust motivate members to proactively participate in the team (Ratcheva 2008). If a virtual team member is perceived as active, it builds confidence among the other team members, which leads to trust, strengthens the relationships, and improves knowledge sharing among team members (Jarvenpaa & Leidner 1999).

An additional challenge to the creation of strong relational social capital in virtual teams is the development of a team identity. Global virtual teams include more individuals than face-to-face teams do; there are competing local tasks and far less frequent communication. All these negatively affect the potential for a team identity. People in different locations are less likely to perceive themselves as a part of the same team. Team members find it much more difficult to identify distant colleagues with necessary expertise and to communicate effectively with them. It undermines relationships within the team and affects knowledge sharing (Herbsleb & Mockus 2003).

In turn, computer mediated communication is more restrictive than face-to-face communication. Research has found that a significant amount of information an individual receives is derived from body language, facial expressions, and voice intonations (Bazerman & Curhan 2000). Therefore, it is easy to presume that a part of the message is lost in virtual communications. The virtual environment can also hinder the sharing of sensitive and confidential knowledge between team members, potentially because of a lack of trust in the technology as an appropriate medium for sensitive knowledge sharing (Breu & Hemingway 2004), so a large amount of knowledge being shared may be of lower quality and less sensitive than in face-to-face teams which can undermine the team performance and outcome (Staples & Webster 2008).

All in all, the geographical dispersion of individuals and high reliance on information and communication technologies in global virtual teams possess challenges for the development of social capital and as a consequence, negatively affects the interpersonal knowledge sharing process. The identification and awareness of factors that influence different dimensions of social capital in global virtual teams help to facilitate its development and foster knowledge sharing among virtual team members.

2.5. Framework of the study

In this section the theoretical framework for examining the research problem is developed. The research question of the study consists of two sub questions. First, the impact of the global virtual team environment and its characteristics on social capital will be explored. Second, the influence on knowledge sharing by social capital in the virtual setting is researched. The theoretical framework of the study focuses on specific characteristics of global virtual teams and factors that are relevant for social capital and knowledge sharing among virtual team members. Therefore, three dimensions of social capital theory (structural, relational, cognitive) as well as interpersonal knowledge sharing concepts are included in the framework presented in **Figure 3**. Additionally, the impediments to the development of social capital and consequently to knowledge sharing in global virtual teams are investigated.

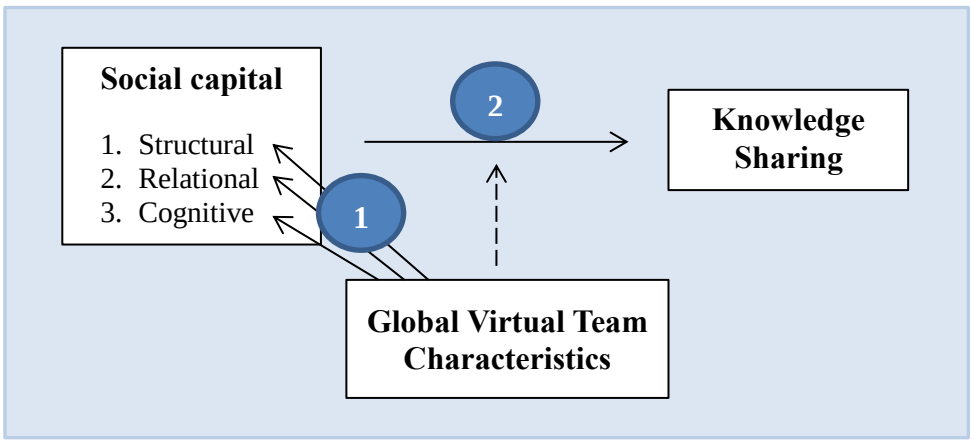

Figure 3. Theoretical framework of the study.

2.6. Summary of literature review

Nowadays there is almost no need to spend time and money gathering the individuals with necessary expertise in one place. Collaboration and teamwork are possible regardless of physical distances between people. The best talents can be easily brought together to combine their expertise and knowledge regardless of time and space with minimum costs. Technological progress made it possible to create global virtual teams. Emergence of global virtual teams is a result of companies' wish to enjoy the benefits that such teams provide. Besides time and monetary savings, diverse ideas of global virtual team members serve as the source of creativity and innovation, whereas the diverse cultural backgrounds lead to culturally adjusted solutions ready to be implemented in different locations.

A global virtual team inherits all the characteristics of a traditional team where individuals have interdependent tasks and work on a common goal. However, in a global virtual team individuals are geographically dispersed and use information and communication technologies as their primary means of collaboration and work structure. Thus, virtual work environment accentuates challenges that traditional collocated team members face and adds specific communication and collaboration barriers. The coordination of global virtual teams is difficult due to time differences, competing priorities, and lack of face-to-face contact. Moreover, effective collaboration and communication can be undermined by cultural differences, language barriers and a lack of common ground as well as the inability to build strong, trustful relationships. Global virtual teams can be an effective and efficient work arrangement if challenges inherent to the virtual setting are carefully managed.

The main underlying reason for using global virtual teams is access to broader, richer and more diverse knowledge. Previous research approached this issue from the technical perspective. It was mainly focused on designing systems of knowledge capture, storage, distribution, and exploitation. Media richness, various communication channels and tools' functionality have been widely studied. However, researchers tend to overestimate the importance of information and communication technologies.

Undoubtedly technology is vital to global virtual teams; without the internet, phone connection, and other tools, global virtual teams would not exist. On the other hand, without building trustful relationship, engaging, and motivating individuals to contribute, ICT brings a little value. In contrast to the predominant existing literature, this research focuses not on technological, but on relational aspects of global virtual teams. It looks at already developed and broadly studied social capital theory and knowledge sharing concepts in a new setting – the virtual work environment. The current research aims to investigate how virtual context influences the development of social capital, which in turn, has an impact on the knowledge sharing process.

According to the knowledge-based view of the firm, knowledge provides a competitive advantage for an organization. Organizations are encouraged to exploit learning opportunities and make better use of what they know. In order to successfully compete in the market, organizations need dynamic capabilities to create, acquire, integrate, and use knowledge that resides in minds of individuals. Facilitating the movement of knowledge from one team member to another, or in other words, knowledge sharing, is important. However, due to the fact that knowledge is embedded in minds of individuals, sharing knowledge is personal and getting people to share is difficult. It is becoming even more challenging to share knowledge amongst the dispersed individuals in global virtual teams. The current research examines the knowledge sharing process supported not by the technical infrastructure but by the development of social capital.

Social capital has been shown to be an important contributor to exchanging information and sharing knowledge. Social capital refers to the bonds and ties between individuals. This study adopts the three dimensional framework of social capital developed by Nahapiet & Ghoshal (1998). They distinguish structural, relational, and cognitive social capital. Structural dimension describes where, to whom, and how an individual is connected. It defines links that bind actors together as well as provides channels for knowledge sharing. Relational dimension refers to behavioral and motivational issues and include aspects such as trust, norms, obligations, and identity. Finally, cognitive dimension is related to shared paradigms, shared understanding and interpretations, shared language, and codes. Shared cognitive ground serves as a reference for common

knowledge within a team. Dimensions of social capital theory - structural, relational and cognitive - support the structuring of this study.

Social capital facilitates collaboration and knowledge sharing. It is especially important in weak structures such as global virtual teams where members are geographically dispersed and predominantly rely on ICT for their daily work. Building social capital helps to mediate communication challenges and breakdowns. Teams with developed social capital are more responsive and attentive to other members, and participation in group discussions increases which has a positive influence on information and knowledge flow.

The research to date regarding collaborations in the virtual setting predominantly concentrated on isolated factors with regard to the cultural, technical, and communication issues emerging as barriers for the development of social capital and knowledge sharing in a distributed environment. However, a comprehensive understanding of these processes requires a holistic view of the interactions rather than a fragmented perspective. Therefore, the current research aims at developing and testing a theoretical framework which covers various factors that impact the development of social capital and consequently influences knowledge sharing in global virtual teams.

3. METHODOLOGY

This chapter describes the methods used to conduct the research. First, a justification of the method is presented. Explanation of data collection and analysis are provided next. They are followed by discussion on validity and reliability of the study.

3.1. Research approach

Virtual collaborations gradually emerged with the development of information and communication technologies coupled with the invention of the internet. It became easier and more cost effective to bring the best talents together to work on common tasks and combine their expertise and knowledge regardless of their physical locations. Although global virtual teams are usually created for a more efficient utilization of knowledge, the virtual setting inherits some challenges for building social capital among team members which can consequently undermine interpersonal knowledge sharing. These interrelationships are addressed in this study through two main research questions. The first research question aims to identify the characteristics of global virtual teams that affect the development of social capital among virtual team members. The second research question examines the main factors of social capital in global virtual teams and their influence on interpersonal knowledge sharing.

To answer the research questions a combination approach using explanatory and exploratory case studies was used for this study (Eisenhardt 1989). The explanatory research design can be undertaken in mature research fields in an effort to explain a course of events and relate how the concepts and processes happened (Yin 2003). This thesis uses the thoroughly developed social capital theory as well as the widely researched concept of knowledge sharing and tests both in the environment of virtual teams. The exploratory type of research is applied when a topic is relatively new and few previous studies exist. Exploratory studies aim to identify ideas and phenomena that can be tested and will provide a basis for future research (Collis & Hussey 2003). In terms of this study, the main focus is on the influence that the virtual setting has on the

development of social capital, and consequently, how it impacts knowledge sharing in global virtual teams.

The choice of the most suitable research strategy was influenced by the mainly explorative nature of this research. Considering the research problem, the research questions, and the limited number of previous studies on the topic, an in-depth case study was selected as the most appropriate research strategy. A case study is "an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident" (Yin 1994: 14). Case studies are considered highly useful when a phenomenon is complex and cannot be examined outside the context in which it occurs (Benbasat, Goldstein & Mead 1987). The case study research method is particularly suitable to the present study on virtual teams because an in-depth case study investigation allows for a better understanding of complex interactions between people, technology, and organizational contexts (Dube & Pare 2003).

Moreover, the case study enables researcher to obtain richer and more focused data. Through case studies, it is possible to acquire more informative descriptions of the case at hand, and in relation to the subject of this thesis, the case study is more effective in giving a holistic understanding of the relationship between virtual environment, social capital, and knowledge sharing (Tellis 1997). In addition, the case study has a distinct advantage over many other methods when 'how' questions need to be answered (Yin 2003), such as in the current research.

This research could be considered as a mixed form of inductive and deductive approaches. Deductive studies are based on existing theoretical frameworks and aim to test hypotheses with cause-effect linkages. Induction, however, starts with the data collection and pattern analysis to build a theory upon findings (Bryman and Bell 2003). Since there has been limited research done on social capital in virtual teams and its impact on knowledge sharing within those teams, this study attempts to build a theory to be tested in future research. The inductive part of this study attempts to identify patterns in knowledge sharing in virtual teams and generalize them as a conceptual framework

(Maylor & Blackmon 2005). Therefore, the part of the research that is determined to find out what and how virtual teams´ characteristics influence social capital and consequently knowledge sharing will follow the inductive approach. To explore the relationship between social capital and knowledge sharing though, the deductive approach is used and respective theories are applied. The combination of the two approaches is appropriate in this case as the study cannot be measured without theory or without empirical testing (Yin 1994).

3.2. Research method

This study seeks to discover how social capital in virtual teams differs from social capital in face-to-face teams, what characteristics of virtual environment influence the social capital the most, and how they impact knowledge sharing in virtual teams. All stated "how" and "what" questions can be addressed by conducting qualitative research. Qualitative research allows a better understanding of the phenomena; it is better for examining and articulating processes (Saunders, Lewis & Thornhill 2007; Pratt 2009). Social capital, regardless of the environment, face-to-face or virtual, is highly related to people, their feelings, attitudes, perceptions, and behaviors. The research that addresses this topic needs to be focused on discovering meanings rather than measurements. Therefore, the qualitative research method is more suitable.

Semi-structured interviews with open-ended questions serve as the main method for data collection. Semi-structured interviews allow a large amount of information to be received in a relatively short period of time (Marshall & Rossman 1999:108). Semi-structured interviews provide a certain freedom to both researcher and respondent in getting deeper insights into the subject. The open-ended questions do not limit the respondent with the number of answers; additionally, clarifications or explorations can be given to diminish the possibility of misunderstandings (Marshall & Rossman 1999:110). Such an approach provides rich data (Fontana & Frey 2000) but requires caution in the analysis of transcripts to avoid misinterpretations of the interview context.

3.3. Data collection

The data collection for the qualitative analysis was done among managers who meet the following requirements: have experience of working in global virtual projects with a minimum duration of 12 months, have access to a variety of tools to interact virtually, are willing to participate in the research, and are available for the interview. In addition to the listed requirements, the interviewees were selected based on cultural background. Representatives from five different countries were selected: Germany, the USA, Spain, the Netherlands, and Portugal. All interviews were scheduled in advance and the explanation of the study as well as core topics of the intended interviews were provided to interviewees, but the exact questions were not disclosed prior the interview. Informing the interviewees of the research topic beforehand contributed to a better flow of conversation because interviewees were aware of the main subject and had time to think about examples illustrating their virtual team work. The semi-structured interview questions were divided into subsections to answer both research questions. These subsections were formed based on the literature review of virtual teams, social capital, and knowledge sharing. The interview questions were used only as a guide, and additional questions or comments were made if necessary. The semi-structured interview questions and guide can be found in Appendix 1.

In total ten interviews were conducted with durations from 40 to 60 minutes. All interviews were done one-to-one. Face-to-face interviews were conducted in Germany, and phone interviews were conducted with managers from the other four countries. Even though there was no personal contact with some respondents, it did not affect the collected data. This study is focused on virtual teams, and virtual communication is usual for all respondents. The language of the interviews was English because English was the only common language between the researcher and all the other interviewees. All respondents had a very good command of English due to their broad international experience and communication with foreign counterparts as English is the official language of the case company.

The first interview was a test that allowed the adjustment of the wording and order of the questions based on feedback as well as the researcher's own perceptions. *Table 5*, below, is a summary of the ten respondents´ profiles, including the first test interview. To avoid possible sources of bias in the interviewing process, the interviewees were guaranteed anonymity in the study. The researcher asked the interviewees' permission before recording the interviews to simplify the transcribing process after the interview. Additionally, notes were taken during the process to better justify the interviews. The interview transcriptions and the researcher's notes are the main sources for analysis. Moreover, the additional sources - intranet, emails, internal documentation, and reports - were used to support the facts shared by respondents.

No	Position	Gender	Experience (years)	Country
1.	Project Manager	m	13	Germany
2.	Project Manager	m	22	Portugal
3.	Project Manager	m	15	Germany
4.	Quality Manager	f	13	Spain
5.	Senior Manager	m	24	Germany
6.	Senior Manager	f	15	Germany
7.	Financial Manager	m	6	Germany
8.	Financial Manager	f	12	Spain
9.	Senior Manager	m	17	Netherlands
10.	Project Manager	m	14	USA

Table 5. Respondents´ profiles.

3.3.1. Background information of the case study company

A multinational company headquartered in Germany and operating in the automobile industry has been chosen for the current research. The company sells its vehicles and services in nearly all the countries of the world and has production facilities on five

continents. In 2012 the company sold over 2 million vehicles and employed a workforce of 275,000 people. The company´s annual report (2012) shows total revenue of €114.3 billion, and only 39.4 came from Europe, thereof 19.7 from Germany. (Company website 2013)

The company is investing in innovation, research and development, and targeting new markets. A large number of projects is constantly initiated. Taking into account the multinational nature of the company, a big part of those projects has an international scope, and projects are done partly or fully in a form of virtual collaboration. As it is stated by Yin (2003) the in-depth case study has to be done in a typical representative case, and the chosen company is an example of one. This particular company meets all the requirements for the case company defined during the research design: global presence, reliance on geographically dispersed workforce, investment in and use of ICTs, and management of international projects in virtual environment.

3.4. Data analysis

Data analysis was performed after each interview separately as well as upon the completion of data collection as a whole. After conducting each interview, the researcher transcribed it within 24 hours to minimize potential information loss. Comments and notes made during the interviews or during the transcription process were carefully documented and used later to enhance data analysis. After all ten interviews were transcribed, resulting in 60 pages overall of transcribed English text, the gathered material was reread several times to become familiar with the content and identify repeated patterns in the responses. For example, the most mentioned characteristic of global virtual teams that has the biggest impact on the collaboration and knowledge sharing was “dispersed relationship.” These patterns were chosen based on the frequency of mention in defined categories, and then highlighted for further analysis (*Table 6*, *Table 7*).

The data analysis was based on the development of a case description, which later served as a basis for building a framework for the study. No formal prior coding procedure was applied besides the direct interpretation of the research material (Stake 1995). This means that categories and patterns found in the collected data were used for the analysis and discussion of the findings rather than those in the pre-defined theoretical framework. However, existing theories and concepts were used to describe and analyze the empirical data and meanings embedded in it.

3.5. Reliability and validity of the study

The three aspects of validity namely construct validity, internal validity, and external validity as well as reliability of the study (Bryman & Bell 2003, Yin 2003) are discussed in this section. Validity measures the accuracy of the research conducted (Maylor & Blackmon 2005) and is concerned with the question whether the study measures what it is intended to measure; whereas reliability refers to whether the results of the study are repeatable (Bryman & Bell 2003).

3.5.1. Validity of the study

Validity refers to how accurately the research has been conducted (Maylor & Blackmon 2005). To check the validity of the current research, the following two questions need to be asked:

- Did the research indeed study the social capital in global virtual teams and how it impacts interpersonal knowledge sharing?
- Did the research have enough responses to justify its findings?

Validity characterizes the accuracy of conclusions and explanations of what happened. To be able to say the research findings are valid is to say that they are true and certain, meaning that findings are accurately represented and based on evidence (Eriksson & Kovalainen 2008). Three aspects of validity should be considered: construct validity, internal validity, and external validity.

Construct validity can be defined as "the question of whether a measure that is devised of a concept really does reflect the concept that it is supposed to be denoting" (Bryman & Bell 2003:33). To ensure construct validity the researcher has to establish suitable operational measures for the concepts under investigation (Yin, 2003a). In the current study, operational measures are Nahapiet & Ghoshal´s (1998) three dimensional framework of social capital and characteristics of global virtual teams derived from the existing research. To check that the correct and most suitable operational measures were chosen, a pilot interview was done before proceeding with the study. The pilot interview contributed to the validity of the research as it allowed the researcher to adjust the interview questions and techniques. Additionally, a chain of evidence was established that included recorded interviews following an interview guide, internal and public documents as well as internet and intranet data.

Internal validity is concerned with the issue of causality; whether certain conditions lead to other conditions (Bryman & Bell 2003). Internal validity is not applicable for an exploratory study. However, taking into account that the current study can be seen as a mix of exploratory and explanatory research, internal validity is considered to a certain extent. Questions as to whether the identified characteristics of global virtual teams indeed have an impact on the development of social capital and how it influences the knowledge sharing process were constantly asked during the data analysis. Internal validity also refers to the validity of interpretation (Mason 2002). Therefore, data collected from interviews was carefully re-read, clarified if needed, coded, and categorized (Maylor & Blackmon 2005). Then a systematic comparison of patterns found in the empirical data and theoretical explanations was included (Pauwels & Matthyssen 2004, Mäkelä 2006). New findings that go beyond the existing theories are presented and discussed separately.

External validity in turn refers to the extent to which the findings of the study can be generalized (Yin 2003). In this study theoretical, rather than statistical, generalization was applied based on the qualitative evidence. According to Ritchie & Lewis (2003) "generalizations in qualitative research should be seen as working propositions, or extrapolations, on the applicability of the findings under similar but not identical

conditions". The goal of data analysis in this research is to generalize the findings of a global virtual team's characteristics and development of social capital with regards to knowledge sharing in the context of the created theoretical framework. The theoretical framework was tested on the in-depth case study. To ensure the representativeness of the case in question, certain requirements were defined; they are global presence, reliance on geographically dispersed workforce, investment in and use of ICTs, and management of international projects in a virtual environment. The subjects of the research were examined on the example of one typical global virtual team of the case company that met the stated requirements. Therefore, the findings of the study can be generalized and are applicable to the similar setting of global virtual teams operating across borders and cultures. Moreover, to avoid subjective generalization based on the perspective of one culture the representatives of five different cultures were interviewed. The diversity of respondents increases the extent of generalization for the findings.

3.5.2. Reliability of the study

Reliability refers to the repeatability of the results of the study. Reliability ensures that if another researcher were to repeat the study, he or she would get the same or similar findings (Maylor & Blackmon 2005). Therefore, reliability is concerned with issues related to the stability of the investigation and the internal consistency of the measures (Bryman & Bell 2003). In the case of a qualitative study, it is a very sensitive topic as the sample is very small and often context specific. However, careful research design, detailed description of the research process, and structured documentation increases reliability. In the current study the reliability of the findings was ensured by the selection of the case organization and interviewees based on a set of criteria, prior planning of the fieldwork, and design and testing of the interview guide to ensure that all the relevant subjects were covered. Data collection through semi-structured interviews might lead to human bias and errors because simple changes could elicit different responses from interviewees since questions can be personal, especially when asking about opinions. Although some subjectivity is inevitable in the research process and evaluation due to the selected method, the researcher took all necessary measures to

ensure that the instructions were followed accurately and the respondents had clear understandings of the questions. When needed, additional explanations were provided and responses were rephrased and repeated to avoid misunderstandings and misinterpretations. The interviews were recorded and transcribed soon after every interview was conducted. Similarly, the main relevant ideas were identified and reflected after each interview. Therefore, all necessary actions to achieve stability of the research and maximize the internal consistency of the measures were taken.

4. FINDINGS

This chapter presents the results of the conducted research. It examines specific characteristics of global virtual teams that have an impact on the development of social capital and factors that consequently influence the knowledge sharing process in global virtual teams. The data representation is structured as follows. First, general characteristics of global virtual teams are discussed. Second, factors influencing social capital and knowledge sharing in virtual environment are addressed. Dimensions of social capital theory - structural, relational and cognitive - support the structuring of the collected data. Even though all three dimensions are interdependent, they will be presented separately to improve readability.

4.1. Characteristics of global virtual teams

The three main characteristics of global virtual teams were identified: reliance on technology, dispersion of team members and cultural and language differences. During the interviews the respondents have been asked to rank those characteristics based on the importance and role they play in virtual environment for efficient collaboration. Results of the ranking are presented in *Table 6*.

Characteristics of Global Virtual Teams	Ranked #1	Ranked #2	Ranked #3
Technology	n=3	n=2	n=5
Dispersed Relationship	n=7	n=2	n=1
Culture, language etc.	n=0	n=6	n=4

*Table 6.*Importance of global virtual teams' characteristics for collaboration.

The majority of respondents (n=7) ranked the ***dispersion of team members and distant relationship*** first. Interviewees mentioned that it might be more difficult to develop relationships at a distance; however, no one said that it is impossible. Findings show that relationships facilitate communication and determine the collaboration of individuals in the team. Relationships are especially important when complex tasks are carried out by the virtual team. By building strong, trusting relationships, people tend to overcome communication challenges caused by the distance.

"it is rather not that easy to just quickly go to the next room and discuss topics on a short notice. Especially in my point of view socializing topics and social aspects are very important, you have to get to know each other… only if you get to know the other person well, I think it is easier to open up and it is easier to work with that person. And that is more difficult for virtual teams that are working across borders." [Financial manager, Germany]

"I think to some extent you have to build relationships to discuss difficult things" [Project manager, Germany]

"For me relationship is a number one." [Senior manager, Netherlands]

"Relationship is always the most important part for me. It is very important to get this trustful relationship, otherwise it is difficult" [Project manager, Germany]

"Relationship - it is definitely a must. When you know who is doing what and who has which skills; who is responsible for certain topics… That is a number one" [Quality manager, Spain]

Second place was given to ***cultural and language differences*** (n=6). Although all respondents were fluent in the English language, which is the language of the company and their daily work, they reported the language aspect as crucial to global virtual teams. Two main issues are connected with the language. First, all team members have to feel confident speaking the language used in the team to be able to express their ideas and actively participate in discussions. Second, individuals need to be aware that some team members are not native speakers. This means carefully choosing words and expressions, avoiding difficult to understand idioms, rephrasing to make sure that the point made was understood. In turn, cultural differences, which are easy to recognize in

face-to-face communication, are not explicitly seen in a virtual setting due to the distance between individuals. However, cultural differences do exist among virtual team members, and they might be even more important in the virtual setting than in face-to-face communication where they are expected. The probability of misunderstandings and conflicts in the virtual work environment increases drastically if people are not prepared for handling cultural and language difference. Therefore, these aspects must be taken into account and managed properly.

"The issue here is that when you communicate face-to-face you already have some cultural differences, meaning that you have language that is not your native language, so you have language challenge or issue, you translate your language from your native speaking, and that can be restrictive for the other party… Things might be understood in a totally different way than they were meant. It is definitely more difficult in global virtual teams." [Senior manager, Netherlands]

"You know cultural differences are a little bit minor. From the language … it is very important in a virtual team to remember that not everybody is a native speaker. […] it's easy to fix if everybody slows down" [Project manager, USA]

"So, relationships, then cultural differences and language, and then technology. But I think you cannot build relationship without speaking the same language, without having a feeling of another country" [Senior manager, Germany]

"for me, one of the most relevant things is the language, it is also like a basis. Second is cultural differences" [Quality manager, Spain]

Finally, ***technology*** was placed on the third position. Nevertheless, it is necessary to mention that all respondents see it as a basis for virtual teams to exist. Technology provides a common platform for collaboration, sharing documents, information, and knowledge, and it has to work. It also plays an important role in building relationships among virtual team members. Findings suggest that the type of technology used is important. Interviewees report a need for videoconferencing and other technology which will approximate the virtual setting to the face-to-face environment. These technologies help in overcoming previously reported challenges of distant communications and hidden cultural cues. The ability to see each other during the meetings contributes to efficient collaboration in the virtual team and decreases

misunderstandings. It also helps to prevent many conflicts or interruptions in the project when communication problems are seen and recognized in their early stages.

"technology is the third one, but at the same time technology for me is a prerequisite, it has to work" [Project manager, Germany]

"Technology is also very important. It makes a big difference if you can see someone you are talking to. E.g. you make a proposal… and even if he says that yes, it is a very good proposal, but you can see that he sounds not convinced, if you just have a phone call, or mail, there are totally no emotions anymore. […] without technology you cannot work in a virtual team, it would be just impossible. Technology it also helps to build relationship. The newest technology is as nearly good as face-to-face communication. Technology is not only for building up relationship, but also for sharing information, data, a common platform for working together." [Project manager, Germany]

"Technology for sure is the most important one, it is really a key factor that everybody has relevant information available, but to get a compromise between this and somehow establish personal relations at least with key members it is very very important." [Project manager, Portugal]

Although technology is an essential element of the virtual setting, it can only be as efficient as the people using it. It has been found that when team members have built strong relationship, they do not necessarily need the latest technology to get their work done. Established relationships and working modes among virtual team members drive them to find a way to share information and knowledge regardless of the availability of certain tools.

"And the third is technology. It is all important, but I think if, imagine we have problems with a Sametime or with a telco [telephone conference], if you are quite practical you always find a way, you can send documentation, you can call a direct phone, you call mobile phone. You always find a way. So technology helps a lot, but there are also different ways to solve the issues." [Quality manager, Spain]

All in all, the virtual setting influences communication and collaboration among individuals. The findings suggest that dispersion of team members and distant relationships have the biggest impact on virtual team's work. The second ranked aspect is cultural and language differences. Finally, technology placed third. Nevertheless, it is

important to mention that all three characteristics of global virtual teams are interdependent and need to be taken into account. Improvements in technology support distant relationships and decrease misunderstandings due to language and cultural differences; whereas strong trustful relationships, in turn, help to overcome challenges related to access and availability of technology as well as tend to minimize cultural and language difficulties.

4.2. Factors influencing development of social capital and knowledge sharing in global virtual teams

The data collected from the interviews suggests that the virtual environment influences the development of social capital and consequently knowledge sharing among global virtual team members. Therefore, in the following sections, the identified factors are presented. Findings are structured according to the three dimensional social capital framework.

4.2.1. Structural social capital

The structural dimension of social capital is concerned with such issues as where, to whom, and how individuals are connected. Structural capital not only defines links that bind actors together but also provides the potential channels for knowledge sharing. Based on the collected data it is possible to identify the following factors that impact structural social capital in global virtual teams: *technology and tools*, *opportunity to meet face-to-face*, *time differences*, *role definition* and *coordination*.

4.2.1.1. Technology and tools

First of all, to be able to build any social capital in global virtual teams, it is necessary to connect people to each other. Almost all interviewees emphasized the importance of technology, however, the minority ranked it as the most important factor in developing social capital among virtual team members. ICT is necessary for the existence of virtual

teams. There are four technology related aspects that have been identified from the collected data. The first aspect refers to *connectivity, compatibility and access*. Technology and provided tools have to work. Different releases of software have to be compatible. People need to have an access to the tools used in the virtual team simply to be able to work together. Technology is an important layer that provides the platform for collaboration and knowledge sharing.

"You really need people who can fix connectivity issues between all the participants. Otherwise, it works in Stuttgart but it does not work in Portland. So in virtual team you do need an extra layer of IT to take care that everybody can be connected all the time." [Project manager, USA]

"Technology is 90% of the efficiency. However training how to use these tools and the functionality of the tools are important. I always say that it can be even more effective than face-to-face communication." [Project manager, Germany]

"Technology also helps to build relationship. The newest technology is as nearly good as face-to-face communication. Technology is not only for building up relationship, but also for sharing information, data, a common platform for working together." [Project manager, Germany]

The second aspect is related to *type of technology and its functionality*. The majority of interviewees admitted that depending on available tools the collaboration in global virtual teams varies. It has been reported that reliance only on emails and phone calls has a hazard of misunderstandings that undermines the efficiency of the work. The lack of nonverbal cues prevents the building of strong ties between individuals. The wish to have and use more often the tools where you can see the other person (e.g. videoconferencing) was clearly stated during the interviews.

"Imagine now we are seeing each other, and I see your face, your reactions, if you are paying attention or not. I think this would help, and this is a small step ahead in technology." [Quality manager, Spain]

"It makes a big difference if you can see someone you are talking to. E.g. you make a proposal… and even if he says that yes, it is a very good proposal, but you can see that he sounds not convinced, if you just have a phone call, or mail, there are totally no emotions anymore." [Project manager, Germany]

However, not only the connectivity and availability of tools are important. Team members need to know how to use those tools. Therefore, the third aspect is *knowledge of how to use the technology and tools*. Some interviewees also mentioned a need for training to be more efficient in completing tasks. The findings show that even though there is an opportunity to use video conferencing at the company, it is used only in exceptional cases. There are two major reasons for that: first, a lack of awareness of the availability of tools, and second, inexperienced users who prefer to rely on already known technology. Lack of knowledge on how to use the available tools and lack of training jeopardize the effectiveness of virtual collaboration in the team.

"on a different occasions it is feasible that people are not used to this virtual technology e.g. videoconferences, Sametime sessions or Netviewer. So I think certain training is necessary." [Senior manager, Germany]

"maybe they tried once, it didn't work, they spent too much time on it, they got frustrated, and then they use only telephone conference because they know how it works." [Project manager, Germany]

Finally, even when all tools are available and individuals know how to use them, team members need to be aware of the *appropriateness of a particular tool* and its fit to the information and knowledge it is meant to transfer. Respondents report an extremely high level of email usage. However, depending on the situation different tools should be utilized. Emails are necessary for documentation purposes, however they do not ensure that the topic was understood correctly by the receiver or properly taken care of. Sometimes a phone call should follow an email to clarify difficult issues. Additionally, the majority of interviewees said that they usually reply using the same media via which they were contacted, even if they think that this tool was not the most appropriate one. Therefore, the awareness of tool appropriateness and rules for different tool usages impact structural social capital and consequently, knowledge sharing in the global virtual team.

"We use always an e-mail, explaining everything. Nowadays we are also having so many e-mails that maybe this topic can be lost. " [Quality manager, Spain]

"I know that it doesn't make any sense to send an email to some people, because they have too many things at the same time. And this is really a disadvantage of emails etc. it needs a new way of working, I think. Nowadays it is like ok I've send an email to my superior and now he knows it, I'm out of my responsibility. It's a matter of own security, I told him, he is aware of this, although he has never read it, but I told him and that's wrong." [Project manager, Germany]

Thus, connectivity, compatibility and access; type of technology and its functionality; knowledge how to use the technology and necessary training; and appropriate use of the technology are the factors that influence development of structural social capital and knowledge sharing among global virtual team members.

4.2.1.2. Opportunity to meet face-to-face

It has been found that the collaboration in global virtual teams can be increased if team members have an opportunity to meet face-to-face. Initially social ties are weak in virtual teams. High reliance on ICT and great distances between individuals hinder the development of structural social capital; whereas the opportunity to meet face-to-face at the beginning of the project helps to create stronger social ties and maintain them during the project. Personal contact is important for team members to get to know each other as well as become familiar with the role, responsibilities, and skills of those involved in the project. All these make it easier to find the right contact when an individual faces a problem or needs advice later on. The opportunity to meet face-to-face also determines who gets contacted in the team. Initially there is a risk that team members who have the same cultural background, speak the same language, or are in the same location will share more information and contact each other more often. Personal contact with other virtual team members fosters more effective collaboration based on functional responsibilities, and contributes to knowledge sharing within the whole team.

"In the ideal world it would be good if virtual team members could also meet in person, they don't have to meet in person always but at least at kick off or at some important milestones. Because then the certain social interconnection improves project performance." [Financial manager, Germany]

"I think it is very important especially at the beginning that people meet not virtually but they come together" [Project manager, Germany]

"at the beginning it is very important to get physical appearance, physical contact with them, because it makes things easier. For example, the contact with Chinese center was much better after my first visit in Beijing 2 years ago" [Senior manager, Germany]

"Especially at the beginning this physical approach is important, to create some confidence in the team. When you got this confidence, this working atmosphere is done, prepared then in these virtual teams you can treat every issue." [Senior manager, Germany]

4.2.1.3. Time differences

In virtual teams not only social ties influence who gets contacted and how, but also when they get contacted due to the role of time zones. Time differences impact structural social capital in two ways. First, virtual team members need to adjust their schedules accordingly to be able to contact those individuals they need to. It may affect one's personal life when working with countries that have an eight hour time difference or more. It is necessary to take into consideration not only time zones, but also cultural differences such as lunch time in different countries. For example, Spanish team members pointed out that their German colleagues always invite them for meetings from 2pm to 3pm. This time slot is convenient for German team members who just had a lunch break, whereas Spanish team members usually have lunch later. Secondly, time differences influence the choice of communication. If the time difference is eight hours or more, it is easier to write an email than schedule a conference call. Therefore, different time zones also restrict the choice of communication tools which influences the knowledge sharing process. For example, emails are suitable for sharing explicit knowledge but limit the sharing of tacit knowledge.

"Difference in time zones influences private life, especially when you have this kind of global project with different time zones. In the morning you speak with Asian guys and in the late evening you speak with American guys, and it is nearly not compatible with normal time schedule 8h or 10h a day. So therefore you have to organize this communication well." [Senior manager, Germany]

"we have to consider time differences e.g. colleagues from the Philippines are going to set up a conference call, they would consider our timing, or if the lunch time in Stuttgart is at 12, and here it is at 14, we consider it. At least we try to, sometime it is not possible" [Financial manager, Spain]

4.2.1.4. Role definition

The collected data shows that in global virtual teams strong ties are not as important as in traditional collocated teams. Contact to another person is not based on the existence or absence of a strong relationship but on the defined roles within the team. The majority of interviewees stated that whether they know the team member personally, speak the same language, or had an experience working together usually does not influence the choice of the person to be contacted. Assigned functional responsibilities are the main basis for contacting a colleague in order to discuss business issues, share information, or ask for advice. Therefore, clearly defined roles and responsibilities for each virtual team member are the bases for structural social capital and crucial for knowledge sharing.

"It's important to have a clear role definition. If people are specifically part of a team because of a certain role, then I think it is rather easy to contact a person, who has a certain role. But if the role definitions are not really clear, and if e.g. there are overlapping roles then it might be difficult to contact the right person." [Financial manager, Germany]

"But for me what is important is to have clear defined competences in each location, what are the responsibilities in each location, once this is clear I think that it should be performed by the team." [Financial manager, Spain]

"Ok, first of all you have to have some kind of organization chart I guess, so you know who to ask this question to, who can answer it correctly. Seek out a right person it might take a little bit of time in a large virtual team." [Project manager, USA]

4.2.1.5. Coordination

The collected data shows that coordination difficulties caused by the virtual nature of communication are considered as one of the most important factors influencing structural social capital.

"So in virtual teams you have to ask more questions and have to get more weekly reporting otherwise you find out that you are way behind schedule and this is going on for a month or two and you didn't know it. Problems and obstacles aren't as immediately known by the group as it would otherwise." [Project manager, USA]

Based on the experience of managing global virtual teams, almost all interviewees stressed the need for clear rules concerning collaboration, usage of tools, templates, file storage, setup of conference calls and meetings, etc. It has been found that in global virtual teams structure is important. Structural social capital, in other words where, to whom, and how individuals are connected, can be designed and influenced by project managers. Moreover, in large global virtual teams it is desirable that people get clear instructions regarding communication and knowledge sharing.

"But with a virtual team it is more like once a week you are adjusting the steering wheel and it is a little bit you know there is a lot more reliance on structure and rules, naming convention on files, backups on forms, you first of all you think it is a waste of time but after a while you see that this is the only way you can operate in a virtual team you have to have a little bit more structure." [Project manager, USA]

"In fact SharePoint is a good tool and has some intelligence inside [..]. But the rules where to store something are not in the project set up. […] I see that every person interpret differently where to store something and how to do that. I think that the project manager should not only explain SharePoint, but to explain how to make something and where to store which documents." [Quality manager, Spain]

"There was a big learning lesson for me, all those templates seemed to be too much work, but 3 months later I thought aha, now I see why we did that, because we have 2 years to go, 100 people, 5000-6000 files to save on the server, you have to have rules, clear rules how things have to be stored, deleted and so on." [Project manager, USA]

"For me it is the most important that at the beginning we say this is how we are going to work together, we need to have an agenda, we will use Netviewer, documents should be sent in advance." [Project manager, Germany]

4.2.2. Relational social capital

Within the relational dimension *nonverbal communication*, *lack of common work experience*, and *performance monitoring* were three constantly mentioned aspects in the interviews.

4.2.2.1. Nonverbal communication

Nonverbal communication and the ability to see the counterpart facilitates the interaction and contributes to building trust. Interviewees declare that using tools that do not provide the opportunity for team members to see each other often leads to misunderstandings and misinterpretations.

"It is very important that you see someone's emotions, with a telco [telephone conference] e.g. you cannot see that, and then you see always a lot of misunderstandings, miscommunication, because it is going only via words, and yeah… you can express yourself by raising your voice e.g. but the real emotions are not coming through" [Senior manager, Netherlands]

Additionally, due to the physical distances between individuals and reliance on ICT, conflicts might be difficult to notice and even more difficult to solve in a virtual setting. It is especially important in global virtual teams that include people from different cultures. Depending on cultural background, certain behaviors, such as direct or indirect communication, are considered inappropriate and might offend an individual. The virtual setting in this case adds complexity because not only can cultural differences not be seen explicitly but also nonverbal cues are missing. Therefore, it is necessary to be careful when raising sensitive topics and making jokes because people might not perceive it as it was intended due to absence of nonverbal signs such as a smile or body posture. Once there is a conflict in a virtual team, it is very difficult to solve it. First, a person might be not aware they hurt colleague´s feelings. Then, the lack of personal

contact makes it challenging to repair the relationships. As a result, communication and collaboration breakdowns can easily be caused unintentionally, and it highly affects knowledge sharing in the team.

"In a virtual team you have to be aware that people don't see that you are smiling and joking, all they can do is hear the words. Once you get some friction between the people it is harder to fix it in a virtual team. […] It is more important in VT, because once you embarrassed somebody, they can get angry and this is very difficult to repair it in a VT. Here in a collocated team we can go and have a cup of coffee, talk about it and it's gone. But in a VT it's a little more difficult. You have to trust people more, you have to verify on the early stages the information, and be a little bit more careful about how you treat people in a VT." [Project manager, USA]

4.2.2.2. Lack of common work experience

Almost all interviewees would rather describe their relationships with colleagues as trustworthy. Only one interviewee was skeptical regarding the opportunity to build trust in a global virtual team. Others reported positive experiences with dispersed colleagues in terms of trust and relationship. However, due to a lack of previous common work experience, the majority of respondents mentioned that at the beginning of the cooperation they checked the provided information to show that they were serious about their tasks. If a colleague provides the correct information on time and is perceived as active, then it builds confidence among team members, which leads to trust, stronger relationships, and improved knowledge sharing among team members.

"Yes, usually you can rely on the information. I think that in virtual team you do double check the first few times to make sure that the person on the other side of the ocean understands that you are taking it seriously and you are checking." [Project manager, USA]

"If you think about Philippines project I have a very direct connection with a project manager there. I had to develop personal relationship with this guy in order to make everything easier. And if we are talking about trust I think that it is working very good, because I know what kind of information I have to get from him, and I have to share with him, but I also trust that he knows what he has to do." [Project manager, Portugal]

"Yes, absolutely, I trust my team members. […] in the end it really depends too much on the targets that you have in the team. If targets are oriented to the same aim, then there is no reason not to" [Financial manager, Spain]

"You need more experience before you can rely on that information. […] in the virtual team you need to learn what people know, and what the expectations are." [Project manager, Germany*]*

"Well, first of all I think you need an open mindset, to be open for different cultures, as well as for very different cultures. And if you do not have this openness, you will not accept other people, you will not trust other people with who you are working together with. I believe this is not the same for everybody. There are people who have rather difficulties trusting foreign cultures." [Senior manager, Germany]

"I am talking quite often with some of the people from the Philippines. We have never met face-to-face, but in my calls I think they are openly speaking, and myself too. I think there is already a trust in the relationship without knowing each other." [Quality manager, Spain]

4.2.2.3. Performance monitoring

It has been found that relationships between managers and team members in terms of performance monitoring are affected by the virtual setting in two ways. First, managers perceive it *difficult to evaluate the performance* of their team from a distance. Team members' daily activities, whether they are working or not, and their dedication to the tasks of the project are not clearly seen in the virtual environment. It might be especially challenging for those managers who are used to working in a traditional face-to-face setting. Second, the virtual environment makes it *difficult to motivate team members* by acknowledging their achievements as well as giving them guidance. If the activities of team members are not explicitly seen, they also cannot be acknowledged by the manager. It can lower the commitment of team members if their contribution is not appreciated.

"you do not have physical direct approach to people, it is difficult to judge over their performance for instance. If you see them maybe 2-3 times a year, and during the daily work only via phone or video conference. I think you can make your opinion regarding their personal performance if you have them in your area and see them every day." [Senior manager, Germany]

"with my collocated team I can every day give in 30 seconds a little bit of guidance to my staff, which is very encouraging for them I have to say. Hey, you did an excellent job analyzing this customer so quickly for that sales meeting yesterday. And that makes them feel good and that let them know that they are doing the right thing. With virtual teams it's very difficult to do that." [Project manager, USA]

4.2.3. Cognitive social capital

Cognitive social capital refers to a shared paradigm, shared language, shared narrative, and shared code, which were examined in this research. The collected data suggests three main factors influencing the development of cognitive social capital in a global virtual team: *language*, *cultural diversity*, and *common goals.*

4.2.3.1. Common language

The common language used in global virtual teams is usually English, and for most of the team members it is not their mother tongue. It has been found that for non-native speakers it can create certain challenges and lead to misunderstandings. However, a native speaker reported that it was also not easy for him to adjust his language, avoid complicated expressions, speak slowly, and be constantly aware that others might not speak English as well as he does. Even though all interviewees mentioned the language issue, nobody ranked it as the most important factor in building social capital or knowledge sharing.

"Using the third language always appears to be a risk that something is not really correctly understood. So it is important to create requests or state information really clearly, that there is no miscommunication or misunderstanding." [Financial manager, Germany]

"Sometimes it is difficult, but it also has a positive site – usually we are much more concrete in a foreign language than in a mother tongue." [Quality manager, Spain]

"what is very important in a virtual team is to remember that not everybody is a native speaker. So I learnt right away to slow down because the person maybe knows five languages but maybe doesn't know English so well. Nobody likes to say sorry I don't understand could you please repeat it? So in a virtual team everybody needs to slow

down and speak more clearly. So yes language problems can be a minor but it's easy to fix if everybody slows down." [Project manager, USA]

"I would say that language is important, because if you are not sure in a language when you are talking, it would not be really an open discussion. If you don't feel comfortable then you never participate in the discussion. It is so even in the face-to-face communication, and in a virtual team it is clear that there are people who really do not contribute anything. If you want to say something but you don't know how, you are not a part of it. It is not possible at all in a virtual group." [Project manager, Germany]

"There are some misunderstandings sometimes, and the level of English knowledge is not equal in the teams" [Senior manager, Germany]

4.2.3.2. Cultural diversity

Foreign language proficiency is complicated by cultural diversity, shared narratives, beliefs, and codes. It was found that cultural issues are not very visible in global virtual teams and therefore do not get enough attention when creating such teams. When people work face-to-face, it is easier to notice cultural differences in behavior, manner of working, and communication with others. Due to the fact that most of the interactions are done via email or phone, the potential issues are underestimated. However, the collected data suggests the importance of involving different cultures in the team and emphasizes a need to create awareness of cultural differences. Diverse cultures bring new perspectives on the common task and enhance the benefits of knowledge sharing.

"I think it is easier to feel the cultural differences face-to-face, I think also to some extent you have to build relationships to discuss difficult things, you can´t do that on the phone." [Project manager, Germany]

"So, people in general have to be open for working in a virtual team, and it's demanding quiet a lot from the team members, especially if project members are working across borders and they are not from the same cultural region, and there is one the language difficulty, and the other point is the social, intercultural differences. So it makes difficult or challenging working in virtual teams" [Financial manager, Germany]

"I try to the best of my knowledge to rather let myself into that person way of thinking, so e.g. if I have to write something to Japan, I rather start an email with something general, maybe the weather, easy stuff and then I go on with the topic, because it is not

polite for the Japanese if somebody is starting directly with the content, it's not a big deal, but still it makes the harmony…" [Financial manager, Germany]

"In virtual teams it is even more complicated because you don't see the reaction of the other party, if you explain something to somebody from the culture who would not say that he didn't understand it, therefore it is difficult to get a reaction. In normal communication you should go back and ask questions to see if the person has understood it or not. In face-to-face communication you see if they have a clue what you are talking about and it helps." [Project manager, Germany]

"One advantage is the input of different cultures, and ways of thinking. This is as well interesting to put in a decision making process. Because you see there different aspects you would not recognize otherwise." [Senior manager, Germany]

"*They [cultural differences] are less seen and it could affect the end result. We are used to communicate quite directly in the Netherlands, but when you do this communication towards e.g. our Spanish colleagues, it does not work. They feel offended."* [Senior manager, Netherlands]

"For me there was a lesson learned in China… although we had onsite meetings, we were not able to get them working on something, because we said this is the concept, we went through the concept, then asked if they understood, the answer was yes, and maybe you know that in China and other Asian countries they have 4 different kinds of yes, the last one is yes I do that, the first one is I understand what you say, but you have to reach the fourth level. By phone it is almost impossible, it is quite hard if you see them" [Project manager, Germany]

4.2.3.3. Common goals

Finally, the findings suggest that common goal is important in building social capital and knowledge sharing. Respondents report that when their counterparts demonstrate the will to contribute to the common result, it creates trust and increases the efficiency of collaborations. However, reaching a high level of commitment to the common goal is challenging in global virtual teams. Team members are dispersed and usually have competing priorities at their work places.

"when the project starts and you deal with virtual team, you need to build trustful relationship and assure that everybody has the same goal" [Project manager, Germany]

"in virtual team everyone stays at his own environment, is influenced by the target of his own environment, so you have a weaker influence on the project itself potentially the person pays less attention than to his own organization or where he is located, his environment. And if they are spread all over the world and are usually in their own working environment, it's difficult to have the same target." [Project manager, Germany]

"If targets are oriented to the same aim, then there is no reason not to trust" [Financial manager, Spain]

All in all, based on the collected data the factors influencing the development of the three dimensions of social capital and their impact on knowledge sharing in global virtual teams were identified. Structural social capital is influenced by technology and tools, opportunity to meet face-to-face, time differences, role definition, and coordination. The development of relational social capital is determined by nonverbal communication, previous common work experience, and performance monitoring. Finally, cognitive social capital is affected by language, cultural diversity, and common goals. The findings are presented in *Table 7.*

Factors influencing Social Capital in GVTs	Level of Importance	Impact on Knowledge Sharing in GVTs
Structural Capital:		
- Technology and tools • Connectivity, compatibility and access • Type of technology and its functionality • Necessary knowledge to use / training • Appropriate use	n=7	Platform for sharing knowledge, means to connect people, more oriented on explicit knowledge, media richness affects the amount and quality of knowledge shared
- Opportunity to meet face-to-face	n=6	Facilitates building trust and tacit knowledge sharing
- Time differences • Time zones • Culturally driven time differences (e.g. lunch time)	n=5	Determines who gets contacted and how, decreases knowledge sharing
- Role definition	n=6	Basis for knowledge sharing according to assigned roles and responsibilities
- Coordination	n=5	Clear rules for formal knowledge transfer and collaboration are needed
Relational Capital:		
- Nonverbal communication	n=6	Opportunity to see the counterparty decreases misunderstandings, increases quality of knowledge sharing
- Common work experience	n=8	Facilitates explicit and especially tacit knowledge sharing, determines participation in discussions
- Performance monitoring • Performance evaluation • Motivation of team members	n=4	Difficulties to observe who is doing what, contribution is less seen by others, acknowledgement of knowledge sharing is difficult, creates false motives
Cognitive Capital:		
- Common language	n=8	Fluency in language increases participation, expressions of opinions and knowledge sharing
- Cultural diversity	n=6	Diversity increases possibility of conflicts, lack of shared narratives and codes negatively affect knowledge sharing, increases misunderstandings
- Common goals	n=4	Pursuing a common goal increases motivation for knowledge sharing and facilitates trust

Table 7. Factors influencing social capital and knowledge sharing in global virtual teams.

5. DISCUSSION AND CONCLUSIONS

This chapter is devoted to an analysis of the research findings, with respect to the theoretical framework, and drawing final conclusions. Additionally, limitations of the conducted study, theoretical and managerial implications, as well as directions for further research will be presented.

5.1. Summary and Discussion

The theoretical framework of this study was focused on two main research questions: 1) *"What are the main characteristics of global virtual teams that affect the development of social capital among virtual team members?"* and 2) *What are the main factors of social capital in global virtual teams that influence the interpersonal knowledge sharing in such teams?* This section is aimed to present a final picture of the findings and analyze them according to the theoretical framework and stated research questions. First of all, global virtual team´s characteristics will be shortly presented. Second, the factors influencing development of social capital and knowledge sharing in global virtual teams will be discussed.

5.1.1. Characteristics of global virtual teams

In the study the role of three global virtual teams´ characteristics – geographical dispersion of team members, high reliance on information and communication technology, cultural and language diversity - in the development of social capital and knowledge sharing was observed. These characteristics are discussed next.

5.1.1.1. Geographical dispersion of team members

First of all, the geographical dispersion of team members has a strong impact on the development of social capital. It affects all three dimensions of social capital. Due to a

lack of frequent face-to-face contact, strong ties, which according to previous research serve as a basis for structural capital and knowledge sharing (Ghoshal, Korine & Szulanski 1994), are difficult to develop. Who gets contacted and how is often predetermined by role definition and assigned responsibilities. The interviewees reported that even though the opportunity to meet face-to-face is always helpful and facilitates efficient collaboration, the team member they usually contact and ask for advice is the person responsible for that particular topic, regardless of whether they have met or know each other personally or not. It has been found that prior contact does not play as important a role in global virtual teams as it has been reported by the research in traditional co-located teams (Kiesler & Sproull 1992). Structural dimension in the virtual environment can be developed based on weak ties.

Distances between individuals in global virtual teams also affect relational capital. Respondents report difficulties developing and maintaining strong relationships without seeing each other. The topic of performance monitoring was specifically mentioned by interviewed managers. They state that it is difficult to evaluate whether team members contribute to the project, to assess their commitment and motivation, etc. Finally, one of the most frequently mentioned aspects was the issue of trust. Previous research has acknowledged trust as an essential part of building relationship and an enabler of knowledge sharing (Newell, Swan & Galliers 2000; Paul & McDaniel 2004; Renzl 2006). This study complies with this statement. However, that does not mean that developing trust is only possible by having personal contact. The empirical data supports the concept of “swift trust” developed by Meyerson et al. (1996). This concept explains how temporary teams can reach high levels of trust without sharing any past affiliations and applies the approach that "unless one trusts quickly, one may never trust at all" (Ratcheva 2008: 60). The phenomenon of swift trust has been observed in the case study. All respondents would describe their relationships with colleague in global virtual teams as trustful if there is no negative repetitive past experience of providing wrong information or not sharing information.

Cognitive capital, in turn, is affected by the dispersion of team members in terms of difficulty to create the same understanding and perception of a common goal. Moreover, competing local priorities decreases the commitment of team members.

5.1.1.2. High reliance on information and communication technologies

Structural capital refers to linking individuals in the team. Therefore, reliance on ICTs impacts structural capital the most. All interviewees mentioned the availability of tools as a prerequisite for collaboration in global virtual teams. Without tools, communication platforms, and the internet, global virtual teams would not be possible. It corresponds to the literature devoted to technological aspects in virtual collaboration (Kotlarsky & Oshri 2005). In addition to the availability of and access to different tools, some interviewees mentioned the necessity of certain skills to use the technology. It was found that if people were not introduced to the tool and they do not know how to use it, those tools become lost investments for the organization. Thus, the technology is not efficient if it is not used properly and if it is not supported by relational factors. Even though ICT has a significant impact on social capital and structural dimension in particular, no respondent ranked technology and tools as the most important factor in development of social capital.

Considering relational capital and high reliance on ICTs, it has been found that the biggest impact on collaboration and communication is an absence of nonverbal communication. This aspect refers to day-to-day collaborations via phone and email. Previous research suggest that significant amount of information that individual receives is derived from body language, facial expressions and voice intonations (Bazerman & Curhan 2000). Virtual setting is more restrictive. Team members do not always feel comfortable explaining something and not seeing the reaction of the person, whether the counterpart is listening, whether he or she understands, etc. Nonverbal communication and cues are missing. This increases uncertainty, misunderstandings, and undermines relationships. The usage of tools such as videoconferencing could solve this problem. However, in the case study company these tools are not commonly

used. Respondents expressed the wish to have not only meeting rooms with equipment for videoconferencing, but also individual cameras installed in every laptop.

Reliance on ICTs affects cognitive capital the least. It mainly refers to the ability of team members to commit to the common goal. If team members have the same understanding of goals, are fluent and confident in the language, and are aware of cultural differences, then cognitive social capital can be developed regardless of broad usage of ICTs. Nevertheless, it impacts knowledge sharing in global virtual teams. ICTs make it challenging to transfer information about context as well as to share any tacit or sensitive information (Breu & Hemingway 2004). Reliance on communication tools reduces the amount of information and knowledge shared.

5.1.1.3. Cultural and language diversity

Considering structural social capital, cultural and language diversity may influence who gets contacted based on the cultural background and common language (Staples & Webster 2008). However, the results of the study suggest that the opportunity to meet face-to-face at the beginning of the project helps to prevent these imbalanced contacts within a virtual team and support the knowledge sharing process. Personal contacts make people aware of the roles, responsibilities, and skills of the other team members and contribute to building social ties. These social ties do not necessarily need to be strong. Weak ties in global virtual teams facilitate communication and knowledge sharing based on functional responsibilities.

Cultural and language diversity also has an impact on relational social capital. Cultural diversity is an inherent element of global virtual teams and can have both positive and negative influences on collaborations. Cultural differences are not explicitly seen in the virtual setting and therefore need to be managed carefully. Lack of cultural sensitivity may lead to increased conflicts which are difficult to repair. Depending on the culture, different perspectives on the importance of relationships exist. For collectivistic cultures that consider relationships within a group very important, it might be more challenging to work in a virtual environment; whereas individualistic cultures may adjust to the

virtual environment easier. However, a detailed investigation of cultural aspects was not the focus of this study. These aspects are recommended to be examined in further research. Language, in turn, makes it difficult to communicate and build relationships if it is not spoken fluently. A lack of confidence in using a foreign language undermines relationships and negatively affects knowledge sharing.

Cognitive social capital refers to shared paradigm and shared codes, and is affected the most by cultural and language differences. People with different cultural backgrounds have different values, beliefs, and perceptions (Shachaf 2008). Communication styles and acceptable behaviors vary by culture. Therefore, cultural diversity leads to decreased shared codes and increases misunderstandings. Language, in turn, adds more complexity. Not all team members have the same level of the foreign language. Even a good command of a foreign language does not always allow the expression of all thoughts and ideas. However, the language issue does not apply only to non-native speakers. Native speakers often forget that others might not speak as well as they do. Native speakers need to be especially careful with their usages of idioms, specific wording, slang, and they need to speak slowly and clearly. Moreover, same words can have different meanings in different cultures. It is important to ensure that the message is understood correctly by rephrasing and asking questions.

Thus, based on the collected data the discussed characteristics of global virtual teams were ranked based on their influences of the development of social capital as follows: first - geographical dispersion of team members, second - cultural and language diversity, and third - high reliance on information and communication technology. An overview of these characteristics and their influences on social capital and knowledge sharing is presented in *Table 8*.

Characteristics of GVTs	Social Capital and Influence on Knowledge Sharing		
	Structural	**Relational**	**Cognitive**
Geographically dispersed members	• Distance is a determinant of communication mode who gets contacted • Distance diminishes frequency of communication • Harder contact initiation, search of the right person to contact based on functional responsibility • Difficulties in information coordination	• Increased diversity in contacts and locations may decrease trust, shared norms and cooperation • Time and number of collocated team members may influence trust and cooperation • Not signaled commitment to relationship, performance monitoring difficulties • Decreased interpersonal bonding, sense of group identity and interpersonal trust • Decreased exchange of relational information	• Lack of shared physical location and lower shared context • Decreased mutual understandings • Difficult repair of misunderstandings and conflicts
High degree of reliance on ICT	• Increased number and variety of contacts • Facilitated exchange of information without direct connection to others • Limited access to medium can decrease information dissemination • Harder communication about tangible things that are difficult to represent electronically • Decreased spontaneous communication (frequency)	• Reduced cues can be related to attributes of similarity, leading to trust • Increased anonymity may increase tension • Ability to exchange high socio-emotional content • Increased negative comments may increase relational conflict	• Decreased ability to transfer information about context • Decrease in shared information among group members
Cultural and language differences	• May influence who gets contacted based on the cultural background and common language	• Different perspectives on importance of relationship • Increased conflicts difficult to repair	• Lack of common ground • Decreased shared codes and increased misunderstandings

Table 8. Social capital and knowledge sharing in virtual teams.

5.1.2. Social capital and knowledge sharing in global virtual teams

Building social capital can mediate virtual teams' communication challenges and breakdowns and reduce associated losses. Teams with developed social capital are more responsive and attentive to other members' communication, information and knowledge needs, and all team members participate in discussions, share knowledge, and express their opinions regardless of status. In the following sections the results of the current research regarding impact of virtual environment on structural, relational, and cognitive social capital will be discussed with a consideration of linked impact on interpersonal knowledge sharing.

5.1.2.1. Structural social capital

Structural social capital is about connections between team members. In virtual teams individuals are geographically dispersed and need to collaborate with each other from a distance. Distance diminishes the frequency of communication and knowledge sharing is done without direct connection to others. Knowledge sharing is mainly facilitated by advanced communication networks and groupware systems (Staples & Webster 2008; Kauppila et al. 2011). Computer mediated communication is more restricted than face-to-face communication. The results of the current study are in line with the previous research which suggests that a significant amount of information that an individual receives is derived from body language, facial expressions, and voice intonations (Bazerman & Curhan 2000). Therefore, in a virtual setting a part of the message could be lost if tools do not allow these cues to be observed. This has a certain negative impact on social group dynamics and knowledge sharing.

Depending on the type of medium, synchronous or asynchronous, different coordination challenges arise. Use of asynchronous tools such as email, when there is a time lag between a request and a response, increases the time needed to communicate (Cramton 2001). Competing priorities at work may lead to delays in replying, and due to physical distance, team members are usually not aware of each other's tasks besides the project. Therefore, team members might perceive such delays as a lack of commitment from a

colleague. Decreased spontaneous communication and frequency can be related to higher conflict and can undermine the process of knowledge sharing.

Coordination becomes even more problematic when synchronous tools such as chats are used. In this case all team members can communicate at will, similar to face-to-face. However, unlike face-to-face, synchronous virtual communication allows individuals to easily ignore other team members or at least makes it much more difficult for team members to get the attention of other members. This could, in part, be due to the fact that when some members are posting others are typing. As a result, team members may not be able to break into team discussions to ask for more information which undermines the knowledge sharing process. In addition, there is a problem of side conversations in the virtual environment that cannot be noticed by others but can prevent efficient knowledge sharing. The virtual environment makes it difficult to coordinate the communication and bring team members back into the team discussion.

Regardless of the medium type, access to tools is crucial in a virtual environment. Weak internet connection, problems with computers, no telephone signal, etc. all jeopardize successful collaboration in the team. Limited access to medium can decrease information dissemination and knowledge sharing. Additionally, the virtual environment can hinder the sharing of sensitive and confidential knowledge between team members, potentially because of a lack of trust in the technology as an appropriate medium for sensitive knowledge sharing (Breu & Hemingway 2004). Therefore, a higher amount of knowledge being shared may be of lower quality and less sensitive than in face-to-face teams, which can undermine the team performance and outcome. (Staples & Webster 2008)

All in all, virtual settings affect the development of structural social capital and knowledge sharing. Distance is a determinant of method of communication within the team. It increases the number and variety of contacts within a team and impacts who gets contacted. However, network ties among virtual team members are mostly weak which might negatively affect the knowledge sharing process.

5.1.2.2. Relational social capital

The biggest difference between global virtual teams and traditional face-to-face teams is geographical dispersion of team members, which also raises most of the challenges in building relational social capital as well as sharing knowledge. Although electronic communication tools can be effective for sharing explicit knowledge (Staples & Webster 2008), it is argued that reliance on information technology alone cannot substitute the social dynamics underlying the knowledge-sharing in virtual teams (Robey et al. 2000; Storck & Hill 2000; Hong & Vai 2008). The separation of team members in different locations reduces the opportunity for having frequent face-to-face contacts which are usually perceived as the driver of knowledge sharing and are essential especially for sharing of tacit knowledge (Nonaka & Takeuchi 1995). However, findings show that personal contact at the beginning of cooperation can facilitate knowledge sharing during the whole project. There is no need for virtual team members to meet often. Although collected data provides proof of Berry's (2011) findings that virtual team members tend to initially share less information than members of face-to-face teams, virtual team members seem to adapt to the setting they are working in and after certain time knowledge sharing occurs without strong ties between actors and is mainly based on functional responsibilities.

The absence of face-to-face interactions generally diminishes trust and cohesion among team members and thus compromises knowledge sharing (Malhotra, Majchrzak & Rosen 2007; Jarvenpaa & Majchrzak 2008; Kauppila et al. 2011). The willingness of team members to share knowledge depends on trusting relationships. Research shows a strong, positive relationship between trust and knowledge sharing for all types of teams (Staples & Webster 2008). However, in weak structures such as global virtual teams, where control and coordination mechanisms are difficult to apply, trust is crucial. It helps to avoid geographical and organizational distances of team members becoming a barrier for collaboration (Jarvenpaa and Stamps 1997; Ratcheva 2008; Staples & Webster 2008).

Despite barriers for developing trust at a distance being reported in the literature, the results of the research prove the existence of an impersonal form of trust in virtual teams, in addition to this interpersonal form, which is based on the perception that everything is in the proper order rather than on emotional bonds or the history of interactions (Ratcheva 2008; Luhmann 1979). The concept of "swift" trust developed by Meyerson et al. (1994) was supported by findings of this study. Virtual team members develop trust based on their local organizational environment, practices, or role-based stereotypes. As a result, positive expectations of trust motivate members to proactively participate in the team. If a virtual team member is perceived as active, it builds confidence among other team members, which leads to trust, stronger relationships, and improved knowledge sharing among team members (Jarvenpaa & Leidner 1999).

Another issue is related to diversity in global virtual teams. It is necessary to mention that even though the knowledge from experts around the globe is a valuable asset and might lead to innovations and creative ideas (Chiravuri et al. 2011), such diversity is likely to generate inconsistent knowledge for a given task or problem. Therefore, there is a need to generate consensus, promote norms of collaboration and resolve conflicts that may occur among experts during the process of knowledge sharing. This is more challenging when dealing with virtual teams.

Thus, building strong relational capital can help to diminish the negative impacts on knowledge sharing of technology use and distance in virtual teams. Trust facilitates knowledge sharing between team members who communicate via media and what is more ensures the sharing of valuable information (Levin & Cross 2004). Team norms that promote knowledge sharing and collaboration provide a structure to team cooperation which supports the coordination within the team. Teams with a high sense of team identity and a sense of team obligation are usually more motivated and committed to interact, share knowledge, and gather as much information as possible to reach a common target.

5.1.2.3. Cognitive social capital

Cognitive capital, the similarity in team members' mental models, is more important to knowledge integration when communication is problematic and restrictive (Mathieu, Goodwin, Heffner, Salas & Cannon-Bowers 2000). Lack of common background and experiences is a constant challenge to maintain the commitment, coherence and continuity of work routines among the virtual team members (Shachaf 2008). Distance, in turn, inhibits the transfer of information about context and causes misunderstandings. Moreover, having different backgrounds and unequal distributions of prior knowledge concerning common tasks undermines the ability of virtual team experts to cooperate interdependently and contribute to the on-going knowledge sharing processes (Staples & Webster 2008).

By developing cognitive social capital, team members not only establish a common ground and shared understanding of team goals but also clarify the relationship between the pieces of information. This allows virtual team members to anticipate what information is important to others. It reduces the length and complexity of messages (Cohen et al. 1996; Mazneski & Chuboda 2000), both of which are more important when teams are communicating in a virtual environment.

Cognitive capital, and shared understanding in particular, helps to compensate for the lost portion of a message's meaning that derives from facial and vocal cues. Moreover, shared understanding reduces the need for frequent communication and increases the efficiency and effectiveness of the communication process in virtual teams by minimizing losses not associated with face-to-face communication.

All in all, the geographical dispersion of individuals, high reliance on information and communication technologies, and cultural and language differences in global virtual teams possess challenges for the development of social capital and as a consequence affect interpersonal knowledge sharing process. The empirical framework of the study results included the global virtual teams´ characteristics as well as all identified factors influencing social capital and knowledge sharing and is presented in **Figure 4**.

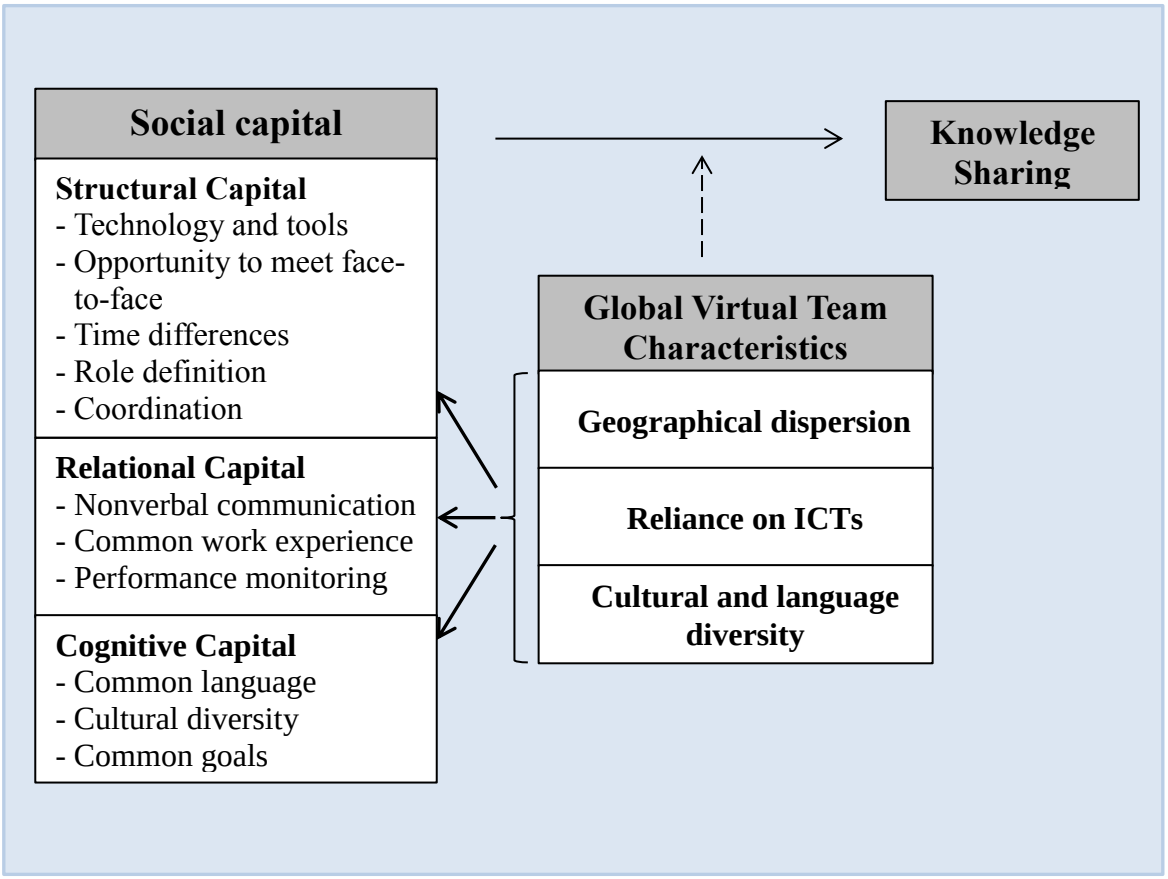

Figure 4. Empirical framework of the study results

5.2. Limitations of the research

The study has certain limitations associated with different external and internal factors of the research. Two types of research limitations can be taken into account: theoretical limitations that refer to the literature review part of the thesis and methodological limitations that apply to the empirical part of the study.

Theoretical limitations of the current research are concerned with the social capital theory. It has been criticized for mixing many different concepts in one while being vague and arguable (Adhikari 2008). However, this study is focused only on those parts of social capital theory that facilitate knowledge sharing. The negative aspects of social capital theory were omitted.

In terms of methodological limitations, the data was collected from a single in-depth case study. Ten semi-structured interviews were conducted and carefully analyzed. Even though the collected data was rich to draw certain conclusions, the unique context of the case organization might have had an influence on the results. Multiple case studies would provide a more multifaceted picture.

Moreover, the data was collected from project managers with different cultural backgrounds. On the one hand, it has been done on purpose because cultural diversity is an inherent characteristic of global virtual teams. On the other hand, due to time and resource restrictions the cultures of respondents were not taken into account during the analysis of the data. However, culture might have an influence on building social capital and knowledge sharing in global virtual teams.

Finally, non-face-to-face communication tools, their characteristics and impact on collaboration in global virtual teams, including building social capital and knowledge sharing, were not considered in this research. The availability of certain tools and choice of media might have an impact on processes in focus.

5.3. Theoretical contribution

The current study contributes to the emerging research on global virtual teams. In contrast to the predominant existing literature, this research focuses not on technological, but on relational aspects of global virtual teams. It looks at already developed and broadly studied social capital theory and knowledge sharing concepts in a new setting – the virtual work environment.

The majority of previous studies observed student groups created for a short period of time, whereas this research examines long-term global virtual teams in the organizational context. It has been found that global virtual teams usually need time to be able to function efficiently. Therefore, teams created for a short time might be not

representative. Thus, the design of this study makes it possible to collect more reliable data and draw conclusions with a higher degree of generalization.

Finally, the developed theoretical framework describes a complex interrelationship between the virtual setting, social capital, and interpersonal knowledge sharing. The identified factors that influence this interrelationship provide insights into the complexity of virtual collaboration. The challenges of working in diverse teams attracted a lot of attention from researchers in last decade. However, in this research those challenges are supplemented and complicated by specific characteristics of the virtual setting. The findings of this study contribute not only to the development of the theory and open up a fruitful area of further research, but also to the management practices that are discussed in the next section.

5.4. Managerial implications

Regardless of additional challenges such as cultural differences, language barriers, and coordination difficulties, virtual teams bring many advantages to organizations in terms of cost and time savings, access to talents around the world, and a diversity of ideas which often results in innovative solutions. Nowadays global virtual teams have become a more and more common work arrangement. Therefore, managers need to learn about the virtual work environment and be aware of challenges that might not be obvious at first glance.

It is important to remember that usually the main reason for creating global virtual teams is getting access to dispersed knowledge and expertise. Knowledge provides a competitive advantage for an organization. ICTs make it possible to connect people to each other, but unfortunately communication technology cannot guarantee information and knowledge sharing. This process is highly dependent on the relationship between individuals. The conducted research contains the information for managers regarding factors influencing social capital development and knowledge sharing in global virtual teams.

To manage global virtual team every manager should to be aware of those factors and steer the team accordingly. First of all, a face-to-face meeting is highly advisable at the beginning of the project and at the important milestones. Second, global virtual teams need clear structure and rules of cooperation. It is the task of a manager to ensure that dispersed team members know who is responsible for what, what is the process of sharing documents, information and knowledge, deadlines, etc. Coordination is challenging but essential when working in global virtual teams. Third, cultural differences need to be taken into account even though they are not seen in computer-mediated collaboration. Fourth, relationships are difficult to build in global virtual teams, but it is even more difficult to cure them once they are damaged. Mangers need to mitigate the risk of conflicts among team members. Finally, ICT tools are the basis for collaboration in a global virtual team. Team members need to have access to the tools and what is more important they need to know how to use them.

5.5. Directions and suggestions for further research

This research was focused on global virtual teams created for long term projects. However, the longitudinal study was not possible due to time restrictions. Therefore, future studies could look at the gradual development of social capital and knowledge sharing in global virtual teams, taking into account that previous literature suggests that these processes require more time in such teams.

The conducted study did not examine influence of cultures on working in global virtual teams. The topic of whether people from some cultures feel more comfortable working in global virtual teams, building relationships and collaborating could be a fruitful area of further research.

More research can be done on non-face-to-face tools and their roles in the development of social capital and knowledge sharing. However, it is important to avoid focusing too much on the technological aspect of non-face-to-face tools. ICT tools are only as

effective as people using them. Therefore, social and relational issues need to be studied further.

Another possible direction for future research could be to study knowledge sharing at different levels. The current research focused on interpersonal level of knowledge sharing. It would be interesting to look at the team, organizational, or international level.

Finally, it would be recommended for further empirical studies to suggest mechanisms minimizing negative impacts of factors identified in this research. More insights are needed to provide managers with useful tools that will help them improve collaborations and knowledge sharing in global virtual teams.

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APPENDIX

Semi-Structured Interview Guide

Date and time:
Place:
Name of the interviewee:
Job position:
Experience:

Dear Interviewee,

The topic of my research is ***Knowledge Sharing in Global Virtual Teams***. Global Virtual Team (GVT) is a team composed of people with different national and cultural backgrounds distributed across geographical boundaries, have interdependent tasks and work on the common goal while using information and communication technologies as their primary mean of collaboration and work structure. I am interested in how you interact with your colleagues in such a virtual environment. More particularly, I am focused on how you share knowledge with your colleagues within a global virtual team. By knowledge sharing I mean exchange of the experience, either personal or learnt, sharing of ideas, asking for and giving a work related advices. Please, use practical examples from your experience. Please, try to be honest while answering the questions, the information on your identity will be kept confidential.

Thank you!

Kind regards,
Elena Sapegina

Interview questions

1. Basic information about the interviewee/work experience.

- Could you, please, shortly describe your work experience?
- How long have you been working for this company?
- What is your position and how long have you been working in this position?

2. Work, communication in Global Virtual Teams (GVT).

- Do you have experience working in global virtual teams? Do you have experience working in traditional/co-located teams? If you compare work in traditional/collocated team and GVT, which specific characteristics can you identify?
- Do you think all tasks can be done in virtual teams? Why? Please, provide examples.
- What additional skills and competences are needed to be efficient in GVT?
- Please, rank the following groups of factors influencing collaboration in GVT. Which are the most important and why?
  - Technology (availability of technology, necessary skills and knowledge how to use it)
  - Relationship among team members (networking, trust)
  - Others (cultural differences, language, time zones etc.)

3. Knowledge sharing in Global Virtual Teams.

- What different tools do you use to communicate and share knowledge with your colleagues while working in a global virtual team?
  - How often you use them? Why those?
  - What are the different situations when you use them?
- How usage of communication technologies affects your work and knowledge sharing?
- Do you usually know whom you can address if you have a particular task/problem/need an advise?

- Do you think that team you are currently working in has a good “map” of each other’s talents and skills? Do people in your team know what each other knows?

- Do you understand the professional language your colleagues use?

4. Questions to the interviewee as a ‘knowledge seeker’.

- If you need work-related advice, what do you do? Please, describe steps how you proceed.

- If you need work-related advice, whom do ask it from? Why? How do you initiate a contact with that person?

- Can you rely on the information provided by your colleagues? Why?

- What other sources of the information do you refer to while searching for solution/advice?

5. Questions to the interviewee as a ‘knowledge giver’.

- Have you ever been asked about a particular work-related advice or help by colleagues in your team? Why? (Please, provide example)

- Do you receive requests for information, knowledge & experience sharing that goes beyond your field of expertise? How often? What do you do? (Please, provide example)

- If you have an interesting work-related idea, would you share it? With whom? Why?

- What motivates you **not** to share your knowledge/ ideas/advice/experience with your colleague?