Tampere University

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# THE PRESENT STATE OF KNOWLEDGE SHARING IN KNOWLEDGE INTENSIVE BUSINESS SERVICE

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# ABSTRACT

Joni Kontturi: The present state of knowledge sharing in knowledge intensive business service

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Knowledge management (KM) has become one of the cornerstones in recent management literature. It is known to positively effect firm performance and innovation. Global market environment has created a new interest in knowledge as a resource especially in internal processes of an organization. Studies have concluded knowledge sharing to be the most important process of knowledge management. This supports the selection of knowledge sharing as the KM process to study.

The target of the study is a single case organization. The study is motivated by the strategy change inside the case organization which included enhancement of knowledge sharing tools and practices. The theory framework consists of widely used KM concept: knowledge types explained with the DIKW-hierarchy and knowledge dimensions with the SECI-model. KM in both small and medium sized firms (SMEs) and KIBS are included in theory. The present state of knowledge sharing is studied in four different levels: individual, technological, organizational and other. The categories are based on Riege's framework on knowledge sharing barriers with an added other level. The other level included barriers which could not be categorized in the three earlier levels. Both positive and negative aspects called enablers and barriers of knowledge sharing are included in the study.

The study is conducted with a mixed strategy involving two strategies: a single case research and action research. A multimethod sequential analysis is used in the primary data gathered with interview and survey. Interviews from management team and a survey to middle management are analysed to present the state of knowledge sharing. The study includes also the past state analysing to compare how the organizational strategy change has affected the knowledge sharing. It was concluded that it affected positively but there were still problems carried from past state to present state. The main problem carried was creating well-established organizational changes. It is suggested to create better practices for change to overcome this problem.

The findings are aligned with the relevant literature about KM. The KM strategy concluded is the personalization strategy with some practices from codification. As the personalization strategy featured more tacit knowledge, the sharing problems were found out to be linked to explicit knowledge sharing. Especially the SECI-model process of combination was found to be problematic. The present state enablers and barriers were identified from the present state. Six enablers were found with three of them in organizational and one in every other category. Technological tools were concluded to be the biggest sole enabler in the case organization. There were seventeen barriers which of five were identified as major barriers and twelve as minor. The two biggest barriers were lack of time and organizational culture for knowledge sharing.

The sequential analysis method provided validity for the findings with triangulation. The findings were also aligned with recent literature about KM in SMEs and KIBS. In conclusion it is suggested that managers of SMEs and KIBS pay more attention to KM and create a systematic strategy as early as possible. The KM strategy should include a responsible that supervises its effectiveness.

Keywords: knowledge management, knowledge sharing barriers, knowledge intensive business service, KIBS, SME

# TIIVISTELMÄ

Joni Kontturi: Tiedon jakamisen nykytilan selvittäminen tietointensiivisessä palvelutoiminnassa

Diplomityö

Tampereen yliopisto

Tietojohtaminen

Elokuu 2019

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Tietojohtaminen on noussut yhdeksi kulmakiveksi johtamisen tutkimuskirjallisuudessa. Sen tiedetään positiivisesti vaikuttavan yrityksen tehokkuuteen ja innovointiin. Markkinoiden globaali ympäristö on luonut kiinnostuksen tietoon resurssina yrityksen sisäisissä prosesseissa. Tutkimukset ovat osoittaneet, että tiedon jakaminen on tärkein prosessi tietojohtamisessa. Tästä syystä tiedon jakaminen valittiin tietojohtamisen prosesseista tutkimuksen aiheeksi.

Tutkimuksen kohteena on yksi organisaatio. Tutkimuksen tekemistä edesauttoi organisaatiossa tapahtunut strategiamuutos, jonka yhtenä keskeisenä osa-alueena oli tiedon jakamisen työkalujen ja toimintatapojen parantaminen. Tutkimuksen teoria pohjaa tunnettuihin tietämyksen hallinnan käsitteisiin tiedon tyypeistä DIKW-hierarkian ja tiedon dimensioihin SECI-mallin avulla. Tietojohtamista tutkitaan pienien ja keksisuurten yrityksien sekä tietointensiivisten palvelutoiminnan yrityksien näkökulmasta. Tiedon jakamisen nykytilaa tutkitaan neljällä eri tasolla: yksilö, teknologinen, organisaatiollinen ja muut. Pohja kategorioille tulee Riegen mallista tiedon jakamisen esteistä, johon on lisätty muut taso. Sillä tasolla on esteet, jotka eivät sopineet kolmeen muuhun tasoon. Tutkimuksen tarkoituksena on tutkia niin positiivisia kuin negatiivisia vaikuttajia eli mahdollistajia ja esteitä tiedon jakamiselle.

Tutkimus on suoritettu käyttäen toiminta- ja tapaustutkimusstrategiaa. Analyysimenetelmänä tutkimus käyttää peräkkäistä monimenetelmällistä analysointia haastatteluista ja kyselystä kerättyyn dataan. Dataa tiedon jakamisen nykytilan selvittämiseen hankittiin haastattelemalla johtoryhmän jäseniä sekä kyselyllä keskijohdolta. Tarkastelun kohteena oli myös tapausorganisaation aiempi tila ennen organisaatiomuutosta. Yksi keskeinen ongelma aiemmassa tilassa oli organisaation muutosten vienti alusta loppuun tunnollisesti. Se oli ainut vanhasta organisaatiosta uuteen siirtynyt ongelma. Parannusehdotuksena on luoda parempia menetelmiä muutoksille, jotta kyseinen ongelma saadaan ratkaistua.

Löydökset nykytilasta ovat linjassa aiemman tutkimuskirjallisuuden kanssa. Tietämyksenhallinnan strategiana oli personalisaatio, josta löytyi myös muutamia koodifikaation piirteitä. Koska personalisaation strategia sisältää paljon hiljaista tietoa, huomattiin eksplisiittisen tiedon jakamisessa olevan ongelmia. Erityisesti ongelmat keskittyivät SECI-mallin kombinaatio -prosessiin. Nykytilasta tunnistettiin mahdollistajia ja esteitä, joista mahdollistaja löydettiin yhteensä kuusi. Eniten mahdollistajia oli organisaatiollisessa tasossa, ja suurin yksittäinen mahdollistaja oli teknologiset apuvälineet. Esteitä tiedon jakamiselle löydettiin yhteensä 17, joista viisi oli merkittäviä esteitä ja 12 pienempiä esteitä. Kaksi suurinta estettä olivat ajan puute ja yrityskulttuurin sallivuus tiedon jakamiselle.

Löydösten validiteettia vahvisti peräkkäin suoritettava analyysimenetelmä, jossa hyödynnettiin kolmikanta-ajattelua. Löydökset olivat linjassa viimeaikaisten akateemisten tutkimustulosten kanssa tietojohtamisesta Pk-yritysten ja tietointensiivisen palvelutoiminnan saralla. Johtopäätöksenä suositellaan Pk-yritysten ja tietointensiivisen palvelutoiminnan johdon kiinnittävän enemmän huomiota tietojohtamiselle. Lisäksi suositellaan kehitettäväksi strategia sen systemaattiseen hyödyntämiseen mahdollisimman aikaisin yrityksen kasvun vaiheessa. Strategialla olisi hyvä olla vastuutaho, joka valvoo strategian toimivuuden tehokkuutta.

Avainsanat: tietämyksenhallinta, tiedon jakamisen esteet, tietointensiivinen palvelutoiminta, Pk-yritys

# PREFACE

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I have learned a lot with the study and I believe this was just the start. This study is the biggest piece of work I have completed and could not have been possible without the support from everyone. Thank you!

Tampere, 18.08.2019

Joni Kontturi

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# LIST OF SYMBOLS AND ABBREVIATIONS

| | |
|---|---|
| B2B | Business to Business |
| CEO | Chief Executive Officer |
| DevOps | Development and Operations |
| DIKW | Data-Information-Knowledge-Wisdom |
| ICT | Information and Communications Technology |
| IT | Information Technology |
| KIBS | Knowledge Intensive Business Service |
| KM | Knowledge Management |
| SMEs | Small and Medium size businesses |
| UI | User Interface |

# 1. INTRODUCTION

Data, information, knowledge and wisdom are considered as the information hierarchy (Rowley 2007). They have become one of the main resources in the knowledge intensive world we live in today (Visvalingam & Manjit 2011; Shujahat et al. 2017; Garg et al. 2018). These knowledge types also differ from other resources (Holsapple & Joshi 2001). For example, with time it is relatively easy to measure the value but for knowledge it is almost impossible. Knowledge has also other properties that makes it abstract by nature. For example, the most recent information and knowledge constitute the keys for the corporate success and competitive advantage (Kanellos & Papadimitriou 2013), which means that the most recent knowledge is more valuable than the older counterpart. Also, other special features of knowledge include that knowledge can be copied infinitely and combined with another knowledge piece creating more valuable knowledge. In this research the focus is on knowledge and its sharing.

Knowledge management (KM) in this study is defined as a systematic process, where an organization gathers, organizes, analyses and shares knowledge in its operations (Mazorodze and Buckley 2019). KM has become a popular subject in strategy literature and in the past years managing knowledge has become an important part of value creation in organizations (Mazorodze & Buckley 2019). In the year 1993 Peter Drucker already had predicted that knowledge would become one of the main competitive advantages for organizations (Drucker 1993). KM has played a critical role in global economy both in large and small and medium sized (SMEs) companies (Cerchione et al. 2016). This has resulted in more theoretical ways to assess and improve the knowledge sharing and KM in organizations (Cerchione et al. 2016).

Organizations have also seen knowledge sharing as important strategic factor and have been concentrating more on it (Sousa & Rocha 2019). Especially it can be seen in globally distributed organizations where one essential factor of a well working organization is the free-flowing information between offices, cities and countries (Cerchione et al. 2016). Different approaches have been used to identify problems in information sharing, for example in supply chains (Gour et al. 2013; Kembro & Selviaridis 2015; Shang et al. 2016), knowledge intensive business services (KIBS) (Mazorodze & Buckley 2019) and software companies (Kukko & Helander 2012; Kukko 2013). This

research focuses on finding barriers that restrict the information sharing in knowledge intensive business service company working in software industry. At the same time, also good practices are highlighted to achieve better understanding of KM especially in information sharing perspective.

Introduction chapter introduces next the research objectives and the scope. The main objective of the study is to present the state of knowledge sharing in the case organization. The case organization is a KIBS and has recently grown out of the SME status and is thus now categorized as a large company. The second part of introduction includes the motivation of the research. Main motivation is the lack of information about the subject in the case organization as there has either been no time or motivation to study the subject. In scientific perspective the motivation is to compare and validate the results of earlier research done on the subject and fill the research gap in KM between SMEs and large global enterprises by offering a view on the case organization. The third part defines the background of the case company. The fourth and last part of introduction outlines the structure of this research document.

## 1.1 Research Objectives and Scope

Knowledge management has become a widely studied field in the global environment. Studies have been focusing on KM-strategies (Hansen et al. 1999; Cerchione et al. 2015; Cerchione & Esposito 2017), methods (Snyder & Eng Lee-Partridge 2013; Centobelli et al. 2018), processes (Nonaka 1994; Nonaka & Konno 1998; Husted & Michailova 2002), enablers (Anwar et al. 2019) and problems (Riege 2005; Kukko & Helander 2012; Kukko 2013; Vuori et al. 2018; Anwar et al. 2019). Some have joined two themes inside one research, but none have integrated more approaches into one extensive study. This study features a single case study researching from bottom up the methods, processes and examines the KM-strategy of a single case organization. The study highlights the enablers and barriers of the case organization and fills the research gap presented.

The study is relevant and significant as KIBS are changing fast with their environment (Muller & Doloreux 2009), thus also the KM processes and methods are changing rapidly. The study offers an extensive view on the present KM processes and methods in KIBS. The other significant part is the case organization size. Most KM literature is focused on large global enterprises but in the recent years also KM in SMEs has got attention (Massaro et al. 2016). This leaves out the large enterprises that have recently grown out of SME status and are not yet global or otherwise very large in size.

Research questions reveal the objectives of the study and steers the research process into appropriate direction. Usually the main research question focuses on the more general level of the research and supportive questions define the scope for the whole research (Saunders et al. 2007, pp. 31-35). The main research question in this study is:

***What is the present state of knowledge sharing in the case organization?***

And the supporting questions are:

*How has the strategic change affected knowledge sharing?*

*What enablers are identified in knowledge sharing?*

*What barriers are identified in knowledge sharing?*

The main research question starts the scope defining from the timeframe. Mainly the goal is to study the present state of the organization. Though one suggestion from the case organization was to study also the changes that had happened during the strategic change and this created the first supporting research question. The first supportive research question defined that also past state must be evaluated. The past state is important in the study to define the starting point of KM which gives the opportunity to make comparison to the present state. This also presents the opportunity to learn from past mistakes and thus help to create better KM processes during and after the strategic change.

Knowledge management includes many aspects inside of it. The main research question defined the scope to include the knowledge sharing aspect of KM. Thus, the practices and processes that affect knowledge sharing are inside the scope. These include both the positive and negative aspects of knowledge sharing which are named as barriers and enablers in this research. The identifying of enablers and barriers are the second and third supportive question.

The last part of the main research question defines the target for the study. This study is done with one case organization. Having one target organization offers the study to become an extensive and in-depth in the subject. This also proposes the problem of generalization which is relieved by using a survey that can be compared and generalized in scientific research perspective.

This leaves the main objective to answer the research questions with both primary and secondary data. The primary data includes limited amount of answers from interviews and surveys. Peer reviewed scientific journal articles are preferred as the secondary data. Other data is checked for validity and used with caution. The other objective is to

present suggestions for improvements and thus help organizations to overcome the problems perceived.

## 1.2 Motivation

The objective of this part is to discuss the motivation behind the study from both the strategic perspective of the case organization and the scientific perspective of the university. This part also includes the motivation of selecting the knowledge sharing process from the KM processes. The motivation from both sides are discussed with academic literature and also from interviews conducted in the case organization.

The main motivation of the study comes from the case organization. The case organization had an ongoing process that included improving the internal knowledge sharing. The motivation to improve knowledge sharing came from the internal views of the case organization which showed that it needs enhancing. The strategy change presented an opportunity to study the processes and methods in a systematic and extensive way. KM and knowledge sharing had not been widely studied internally in the case organization as there has been no time or motivation for improving knowledge sharing. The study thus gives the case organization more knowledge on their current KM and knowledge sharing status.

Durst and Edvardsson (2012) also promotes a point of motivation in their extensive literature review: KM enhances productivity and sales, reduces costs and increases innovation and quality. Many other researchers have also established that KM creates clear business value in different ways, for example growth, innovation productivity, efficiency, customer relationships, employee learning, employee satisfaction, employee retention and management decision making (Arias Aranda & Molina-Fernández 2002; Baptista Nunes et al. 2006; Wang & Wang 2012; Kanellos & Papadimitriou 2013). The clear business value with KM provides motivation from the organizational side to research the subject.

Motivation to study the subject in organizational perspective was the strategic change that included improving knowledge sharing. This gave the first idea to study the knowledge sharing part of KM. Choosing knowledge sharing is also supported by literature (Wang & Wang 2012; Cerchione et al. 2016; Mazorodze & Buckley 2019). The researches have discussed that knowledge sharing is the most important part of knowledge management processes as seen in *Figure 1* from the study by Mazorodze and Buckley (2019).

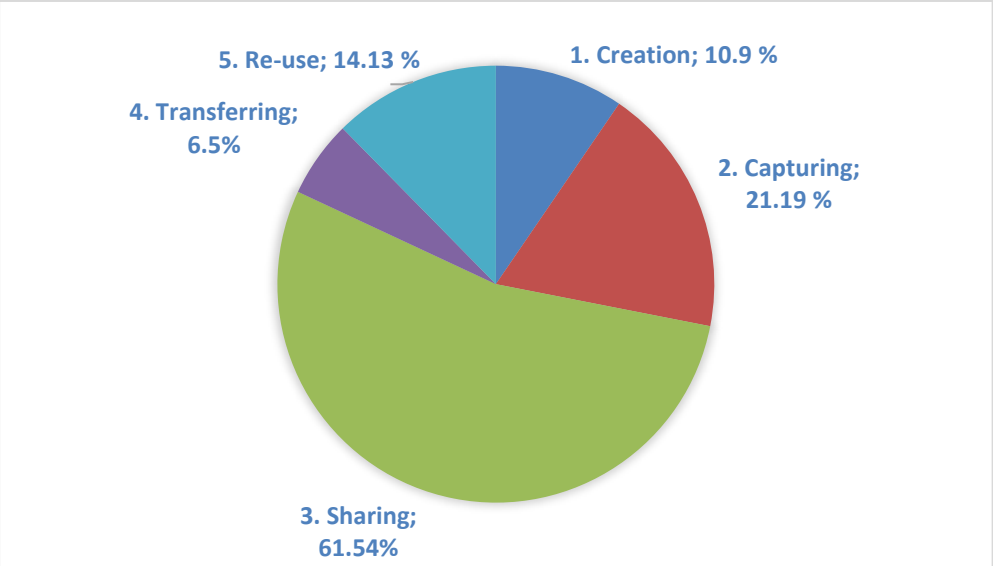


***Figure 1.*** *The importance of knowledge management processes (Mazorodze & Buckley 2019)*

In recent research knowledge sharing has been determined to be one of the most important part of KM processes (Cerchione et al. 2016; Mazorodze & Buckley 2019). In *Figure 1* it is seen that over half of the respondents in KIBS rank the knowledge sharing as the most important process. In their studies Cerchione et al. (2016) is focused on SMEs and Mazorodze and Buckley (2019) more focused on KIBS which both also fit the research environment. Kukko (2013) says that in software companies barriers to knowledge sharing of a are likely to offer the biggest potential to growth. These views promote the motivation to study especially knowledge sharing and its barriers in this context.

The earlier part presented the scientific motivation behind the study. As knowledge sharing has been studied widely in either one theme or two themes of KM, this study offers an extensive study of knowledge sharing including bottom up research process developing from the strategy to the present state of knowledge sharing. The research also fills the earlier presented research gap between SMEs and very large global enterprises.

The primary data is partly gathered with interviews. The personal interviews provided also good motivation during the study and showed the significance to study the subject. In all the case interviews conducted knowledge sharing and knowledge as a resource were seen important. In four interviews were also said that information sharing is or has been always a problem or that it has been a difficult subject to approach in the case organization. This study offers completely new approach to the subject for the case

organization with more extensive research than done before. Two quotes from the interviews show the motivation regarding to study are in *Table 1*.

***Table 1.*** *Points of motivation from interviews conducted.*

| Quote | Transalation | Interview |
|---|---|---|
| ”Ei ole löytynyt tietojohtajaa, joka hoitaa asiaa” | We have not found a person from information management to deal with this thing. | (Personal Interview 7) |
| “Haastattelu oli hyvä idea” | The interview was a great idea. | (Personal Interview 5) |

The first quote reflects that the organization had been tackling the problem for a longer time, but not with a clear and systematic objective in mind. The second one reflects that the interviews provided new perspective to the subjects in knowledge sharing that was not thought before. The research itself will provide much more in depth view of the information sharing processes than the organization had before conducted. This presents clear motivation from organizational perspective to study the subject further.

## 1.3 Case Background

The case background is introduced in this part. This part is divided into three different sub-parts. The first part introduces the past organization, the second part the process and goals of strategic change and third part the change itself and the present state of the organization. An extensive case background is given in this part to offer the reader a perspective to the subject. The case organization is also brought up in the theory section in some parts to give more information on case background regarding to theory.

The research target organization is a knowledge intensive business service (KIBS) company that started a strategy change two years ago. The case company works in information and communications technology (ICT) industry and provides a large category of digitalization and technology-oriented services to SMEs and large companies. In the present state year 2019 the case organization employs few hundred employees and is growing steadily with tens of employees per year.

The case organization has been steadily growing but the organizational structure was still the same it had been for a long time. This meant that parts that were managed by single manager in old days were not controllable anymore by them. The case organization itself sees the steady growing as a benefit for the company, but tackling problems caused by the growth had not been as fast as wanted. This started a company-

wide strategy change that included creating new business strategy, vision and organizational structure. This study focuses on the organizational strategy change.

Next three sub-parts lay the background for the study both before the strategy change and after the change from an organizational structure perspective. Parts are discussed with the information retrieved from the case interviews or information given to researcher by the case organization. This part does not offer any theoretical framework for the decisions company has made if it was not mentioned explicitly in the interview or by the case organization. First sub-part introduces the past organization and then second the process of the change and last the organization after the change.

### 1.3.1 Past Organization

The past organizational structure had been created after there were too many teams for only the chief executive officer (CEO) to handle almost ten years ago. At that time the organization introduced business segments and segment steering groups. Segment managers were responsible for their segments and segment steering groups worked as the advisor group for the segment manager. (Personal Interview 4)

Segments developed their strategy and goals with the steering group. The objectives of steering groups were to include the key members of the segment to provide help to steer the segment into right direction. This meant both technological advances as well as industries. The basic organizational structure in the past state is presented in *Figure 2*.

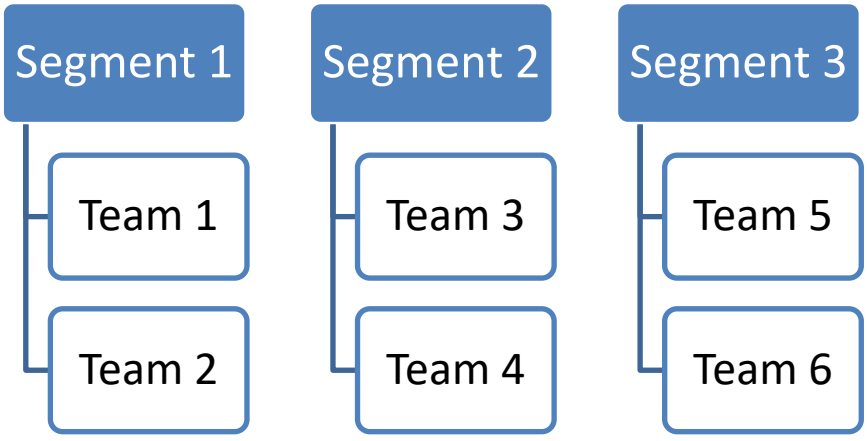


***Figure 2.*** *Basic organizational structure.*

*Figure 2* presents the organizational structure that was created roughly ten years ago. In one segment there are two or more teams and segment manager controlled these teams. Segments had names that presented their business area. At that time the organization was much smaller in employee count and team count (Personal Interview 5).

The problem was that new employees were located into segments or teams by their technology, but the technology focus was not sharp enough. This created teams that had many similar technologies in them but were not close enough for technology development. For example, data analytics can offer predictive maintenance and machine vision which are both under one technology, but not technologically same. This created distributed teams by their technology, but centrally located teams geographically (Personal Interview 1).

This created a problem that the technological offer of a team could not be utilized effectively, and modern technologies were hard or even impossible to adopt into the teams and thus also to segments (Personal Interview 3). Also, some new technologies did not have a place inside the segments that were emerging in the business environment. The products were also missing a place from the organization even though they had been growing and presented a new business area for the organization (Personal Interview 6).

Segments were named after their focus area either by technology or business, but because teams did not have this focus, also segments lost the focus in the long run (Personal Interview 1). Also, there were problems present in the past organization. For example, the segment managers had much work on their hands with managing close to hundred employees in the end (Personal Interview 3) and segment managers did not have enough communication between the segments (Personal Interview 7).

The case organization mainly focused in large projects and products at the time (Personal Interview 2). Temporary project organizations were created with team members from segments for new projects that can last from weeks to years. The segments were mainly created with customer focus from the projects, for example an industrial segment served the industrial clients that the case organization had. The project organizations worked well as those had their own standardized practices.

One clear problem that was identified at the start of the strategy change came from clients. They could not identify the business model of the case organization (Personal Interview 7). The case organization had been working as a software subcontractor from the start, but in the way, it had also created service products where one product can be used for different customers. This created confusion in customers as they did not know if the case organization was a software subcontractor or a product house.

These problems were then addressed, and a strategy change was implemented. The vision of the case organization was to become the most desired partner in industrial and business digitalization by the year 2022. This started a company-wide renewal of

organizational structure and strategy to achieve the vision. This research mainly focuses only on the organizational strategy change in the case organization as stated in “Research Objectives and Scope” -part.

### 1.3.2 The Process and Goals of Strategy Change

The organizational strategy change itself was based on three main goals: employee satisfaction, customer satisfaction and information sharing and competence development. The goals were selected in workshops that included personnel from the case organization. Also, there was a list of organizational capabilities that were needed to achieve optimal customers’ value add. These were linked to three main goals of strategy. *Figure 3* presents the main goals of strategy linked to organizational capabilities needed in the case organization.

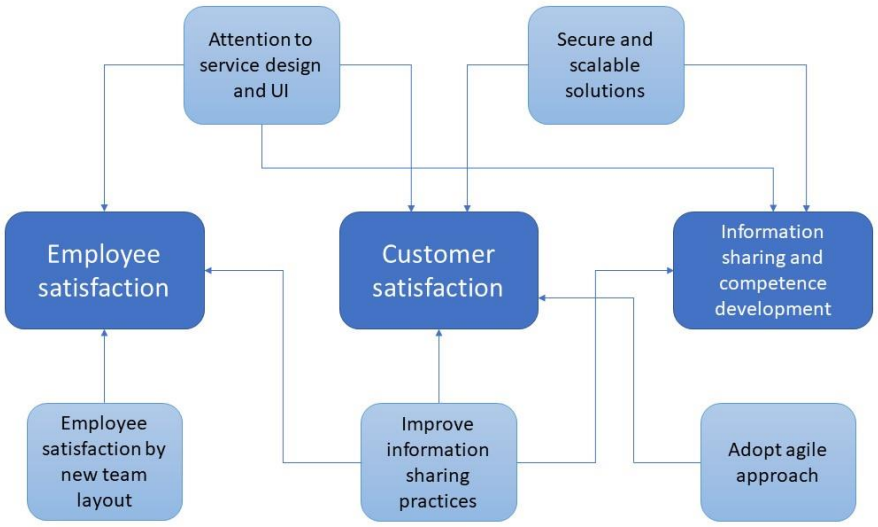


***Figure 3.*** *Organizational capabilities linked to the three main strategy pillars.*

Employee satisfaction is one goal that every organization value. In the case organization employee satisfaction was decided to become one of the main goals as employee turnover was higher than was wanted. In *Figure 3* employee satisfaction is linked to three organizational capabilities. New team layout meant that teams were more carefully thought of and team members had similar technologies to work with. This also meant that team members could now be in multiple offices instead of one. Employee satisfaction by new team layout was not linked to any other goal.

Attention to service design and user interface (UI) was linked to all three main goals. Employee satisfaction comes from more diverse projects when service design is given

more emphasis. Customer satisfaction is created as customer problem is clearly thought out with service design project implementation. Also, UI is given more emphasis on the projects. These both give customer satisfaction and at the same time creates new revenue for the case organization. The information sharing and competence development aspect is created by utilizing diverse teams to overcome the service designing problems.

As security has been key question in software development recently, secure and scalable solutions became one organizational capability needed. It was seen that customers wanted more solutions that scaled well when needed but at the same time were secure. This gives clear customer satisfaction, but also needed more information sharing inside the organization.

Agile approaches to projects have been common in software development for modern companies. The case organization saw that these agile approaches were not used widely enough in projects and it would help with customer satisfaction. This also included development and operations (DevOps) for customers which creates new services for customers.

Last organizational capability is improving information sharing practices. This was linked to every goal of the organizational strategy change. That also opened possibility to research more in depth the information sharing in the case organization and presented an idea for master's thesis. Also, the goal of improving information sharing and competence development gave clear motivation for the research.

In addition to three main goals for the goals in this strategy change, three concrete plans were created to achieve these goals which the organizational structure renewal gave the basis. These three plans were to improve agile mode of operations, technology competence development and information sharing. These three were defined from the earlier goals and organizational capabilities that were wanted.

In this research the plan of improving the information sharing is the focus. In the case organization the technology competence development was closely tied to information sharing. The plan was to create workshops that iterate ideas about information sharing and competence development, and in the end new knowledge creating methods could be delivered to organization.

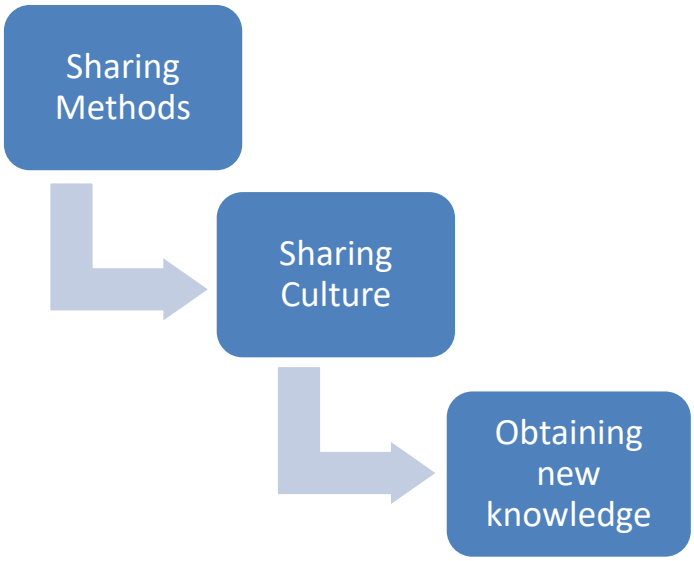


***Figure 4.*** *Knowledge sharing and competence development enhancing process.*

In *Figure 4* the development process is visualized. The plan was to have three workshops that had three general themes in them. The findings were then communicated first to management and then to all employees. In the time of the research only the first workshop had been kept.

Workshops had around 20 employees in them from different parts of the organization. All segment managers attended the workshops. Goals were defined for the workshops. The first workshop goals were to list the tools and methods that exists in knowledge sharing and select the best methods for different use cases from the earlier list.

The second workshop is about culture of knowledge sharing. This workshop had not been kept in the time of the study. The goals for the second workshop were to find ways to motivate knowledge sharing; list the roles and responsibilities and identify important knowledge for the organization.

Obtaining new knowledge -workshop is the last one of the process. It focuses on creating the policies and recommendations to whole organization regarding to knowledge sharing. Also, special activities for certain knowledge is thought in this workshop. All the policies and recommendations created must be first accepted by management before deploying them to organization.

By the time of the research only the first workshop had been kept which means that findings of this research can be used in later workshops to give ideas based on interviews and surveys. Also, theoretical study from the research can be used as basis for techniques and recommendations. This research though is not tied to the process and the process is to proceed with or without the findings from it.

### 1.3.3 Strategy Change

The renewal of organizational structure doubled the number of segments (Personal Interview 4). This meant that segments were now smaller and everyone in segment were more focused on similar technologies. Teams were also based on their technology, usually more focused than the segment's main technology.

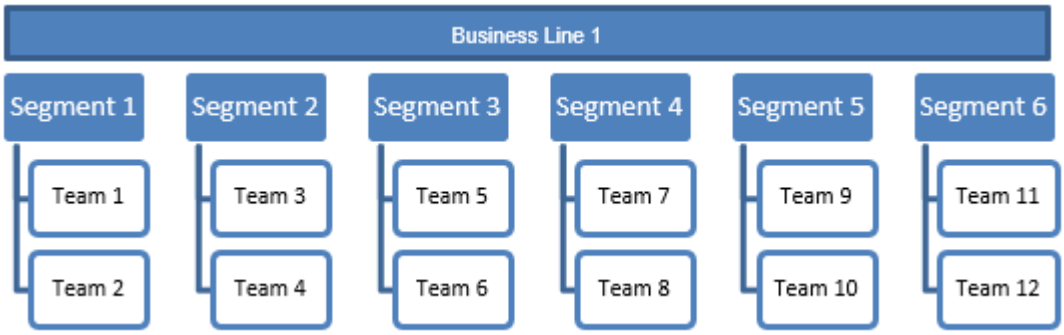


***Figure 5.*** *Renewed organizational structure.*

In *Figure 5* the new organizational structure is shown. Note that all segments had again two or more teams. Segments now had a clear technological focus and stronger role in their respective field in the company (Personal Interview 1). The segments now followed and anticipated technology trends which then led to possibility of absorbing said technologies to organization much more easily than before (Personal Interview 1).

The restrictions of office or city-based teams and project-based teams were removed, and teams were now more focused on single technology. Teams were now a part of single segment by their technology which created stronger ties between the teams in single segment (Personal Interview 4). Segments now gathered all the know-how of focused subject to single organizational unit (Personal Interview 7).

More focus was given to ways of sharing information inside the segment (Personal Interview 7). Also, company steering group focused more on sharing the information from management team meetings to every employee in the company (Personal Interview 1).

Business lines were also introduced to create a matrix organization. In the start only one business line was formed to test out the new organizational structure, but more are planned. The role of business line was to specialize in one customer area. Also, those guide the segments and present the new technologies that their business line customers needed.

Every segment also has a steering group. Steering groups were not new in the organization but were not enforced in the older organizational structure where they had no formal meetings or responsibilities. In the new organizational structure steering group

was composed of the most experienced employees of the segment's technology. They steer the segments decisions and strategy. Business line leaders were part of those segment steering groups they closely worked with as they knew most about customers and their needs. The steering groups were dynamic in nature: they had goals and members that changed when needed (Personal Interview 1).

## 1.4 Thesis Outline

This research is organized as follows. The first chapter "Introduction" introduces the subject to the reader. It also presents the motivation and background of the case organization in question. The main objective is to present the current state of knowledge sharing in the case organization. The study is significant both in scientific and organizational perspective. Scientific perspective is motivated by the new broader perspective to the subject and providing a study to fill the research gap of KM studies between SMEs and large global enterprises. Organizational motivation is created from the need of improving knowledge sharing. The background showed that employees were concerned that not enough knowledge sharing was happening and that it was known to have financial and other benefits.

The second "Knowledge Management" and third "Knowledge Sharing Barriers" chapters are the theory sections of this study. The second chapter introduces the knowledge management as a term and defines the overall background including knowledge types, knowledge dimensions and case specific knowledge management features in SMEs and KIBS. The second chapter includes also defining the knowledge sharing part of KM. The third chapter focuses in the knowledge sharing in depth and especially in its barriers. The barriers are categorized in four different levels: individual, organizational, technological and other.

The fourth chapter "Research Methodology" introduces the research methodology from the research philosophy to the data collection methods. In this study the research philosophy is interpretivism. The scientific approach is inductive and research strategy a mixed strategy with case research and action research strategies. These methodologies led to selection of interviews and surveys as the primary data collection methods. Primary data implementation and analysis framework is introduced in the end of fourth chapter.

The fifth chapter "Analysis" features the primary data analysis. The analysis is done with a sequential approach starting from case interviews and afterwards followed with the survey. The sixth chapter "State of Knowledge Sharing" is the discussion of the analysis

findings. The discussion follows the theory chapter starting from overall knowledge management and moving towards the knowledge sharing barriers. The seventh chapter “Conclusion” concludes the study presenting the theoretical and managerial implications and as well the limitations and future research trends proposed by the study. After the conclusion there are the used references and appendices.

# 2. KNOWLEDGE MANAGEMENT

The aim of this chapter is to introduce the concept of knowledge management (KM) and its importance to organizations. It introduces the basic concepts and definitions that are linked to KM in this study and introduces KM in the perspective of both knowledge intensive business services (KIBS) small and medium size enterprises (SMEs). Knowledge sharing as a part of KM is discussed in the last part of the chapter.

KM has been studied extensively from mid-1990's. A book called "Working Knowledge: How Organizations Manage What They Know" from Davenport and Prusak (1998) is one of the first extensive theoretical researching the subject of KM. The book starts by introducing why knowing the knowledge has become critical to business success and that it is the basis of business survival.

Davenport and Prusak (1998) presented a new way to investigate "business thinking" that many strategists had been already using. Traditional economists at the time were presenting business to be black box where resources come in and the products go out. Attention of the strategists though had been also inside the black box and its dynamics. This had created a way of thinking that knowledge embedded inside the business processes created more valuable products and services. It was suggested that this resulted management community to realize that the know-how of the organization and employees is the heart of how the organization functions. (Davenport & Prusak 1998)

Mouritsen (1998) came into same conclusion with Davenport that organizational competence is built into internal processes instead of external markets and competition. These both provided a way of thinking that internal processes should be given more thought which led to be a driving force of KM research. One study shows a different view on the subject. McAdam and Reid (2001) proposes in their research that the globalization and other environmental forces created new fundamental shift in organizational processes and human resources strategy that created KM. Environmental forces can be thought also as one of the driving forces behind KM research (McAdam & Reid 2001).

KM is studied in many different fields, for example psychology, management science, organizational science, sociology, strategy, computer sciences or production engineering, which leads to KM having different definitions by different fields (Edvardsson 2006). Davenport et al. (1998) defined KM to have four parts: create repositories, improve access, enhance environment and manage as an asset. In this study a more modern definition of KM is used. It is defined as a systematic process,

where an organization gathers, organizes, analyses and shares knowledge in its operations (Mazorodze & Buckley 2019). Mazorodze and Buckley (2019) provides a more modern way to define KM than the earlier researches have suggested. Other definitions mainly focus on strengthening the position of the corporate entity with knowledge creation and applications (Davenport & Prusak 1998; Edvardsson 2009; Grimsdottir & Edvardsson 2018).

This chapter of the research introduces the basic concepts of KM related to this study. The theory section is written as a funnel which is suggested by Saunders et al. (2007, p. 66) for business research. The funnel is visualized in *Figure 6.* As the first concept, the information hierarchy is defined. The hierarchy is important as the tiers are not always interchangeable and overflowing of single tier knowledge can influence the others (Davenport & Prusak 1998). Basic tiers are defined as data, information, knowledge and wisdom (Rowley 2007).

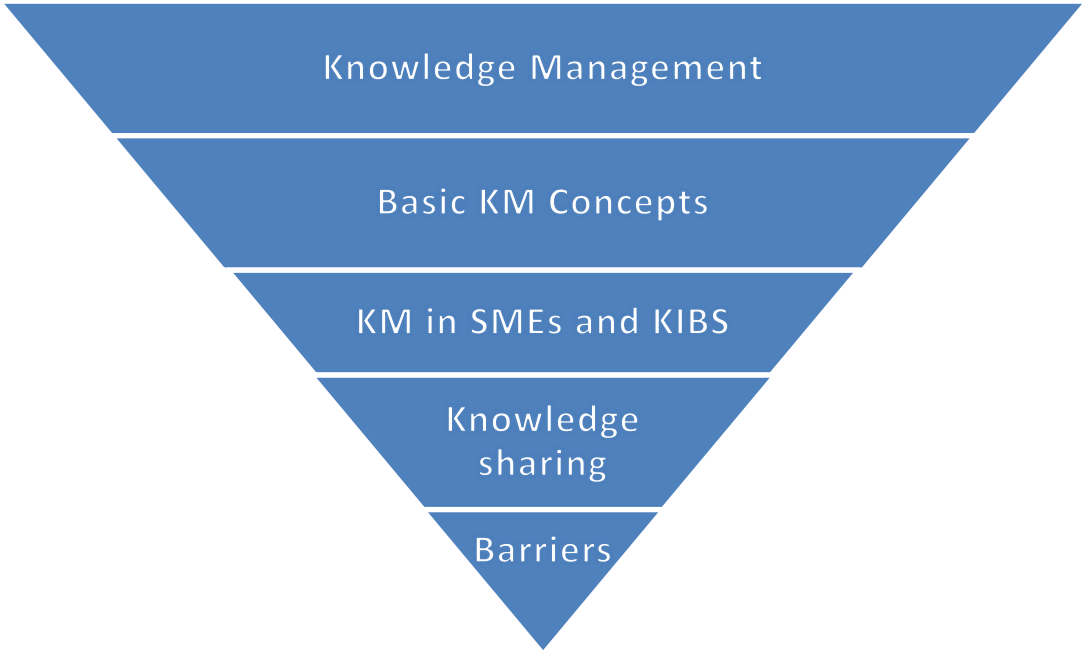


***Figure 6.*** *Structure of the two theory chapters.*

Second part of the chapter defines knowledge dimensions as a perspective into knowledge as a resource. These dimensions are tacit and explicit (Nonaka 1994). The dimensions have different processes to transform into each other and processes of how the information can be shared to other parties. The process model is known as SECI-model which consist of four parts: socialization, externalization, combination and internalization (Nonaka 1994). Two KM strategies called codification and personalization are also introduced in the dimensions part.

After the basic concepts, the case specific KM is introduced with KM in small and medium size firms (SMEs) and knowledge intensive business services (KIBS). KM in these two groups can differ vastly, for example most KM research is done for large enterprises which might not be applicable for smaller firms or for KIBS as those rely heavily on knowledge which makes KM one of the activities closely followed.

Last part of this chapter introduces the knowledge sharing part of KM. As discussed in motivation chapter knowledge sharing is the most important KM process. The part introduces the concept of knowledge sharing and literature about the subject. This leads to the third chapter about the knowledge sharing barriers.

## 2.1 The Knowledge Hierarchy

One part of knowledge management is defining the types of knowledge. This is important as the types are not interchangeable and different types have different features of how to you can use them and how you cannot use them (Davenport & Prusak 1998). Davenport and Prusak (1998) presented the knowledge concepts with three basic types: data, information and knowledge. They believed that the highest level “wisdom” was too hard for managers to concept as there was no clear definition at the time. Some described the highest concept at the time as insight, resolve or action (Davenport & Prusak 1998). Wisdom was added to the basic knowledge types later. Now the data-information-knowledge-wisdom (DIKW) hierarchy has been one of the fundamental and widely recognized models in knowledge management and knowledge literature (Rowley 2007). This hierarchy has also been referred as “knowledge hierarchy”, “information hierarchy” or “knowledge pyramid” (Rowley 2007). The hierarchy is visualized in *Figure 7*.

The hierarchy proves to be important in this research context as the knowledge sharing methods are analyzed partly by the information type they carry. As earlier Davenport and Prusak (1998) mentioned that the types are not interchangeable and that the overflowing of single type of information may create problems in sharing others. This phenomenon is called information overload where more information is given than the recipient can process or handle (Whelan & Teigland 2013). Another benefit is the value of information: by processing data to higher tiers you acquire more value from it (Smith, Elizabeth A. 2001; Rowley 2007).

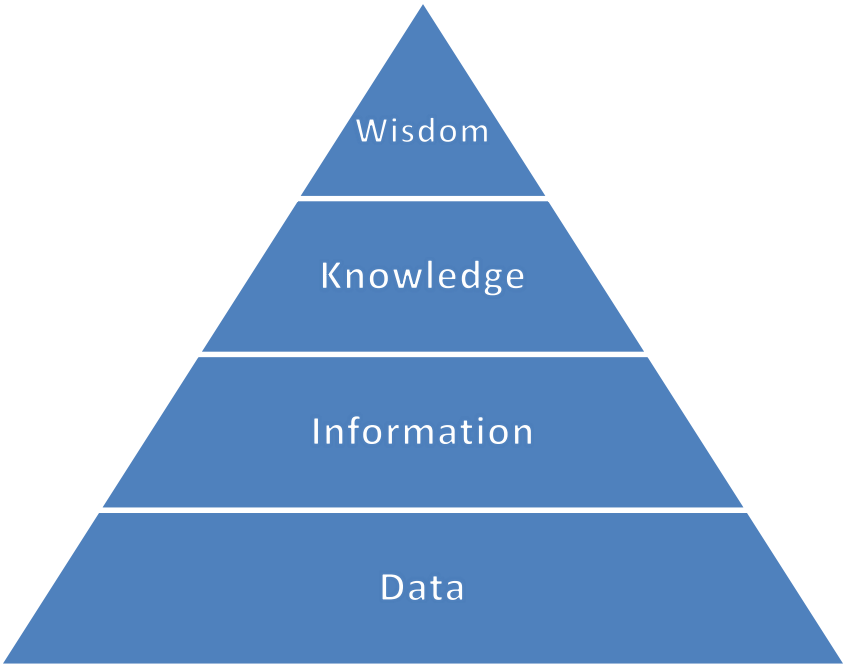


***Figure 7.*** *The DIKW -hierarchy (Rowley 2007).*

Hierarchy itself provides a way of understanding different types of information. The basic way of thinking is that the higher the information is in the hierarchy the more value it has for the user (Rowley 2007). Other perspective is that to get to higher tiers more work must be done on the information, for example more processing or combining with different type of information (Rowley 2007). Davenport and Prusak (1998) explain the higher tiers as adding meaning or experience to knowledge in the tiers below.

In the start it was mentioned that different tiers have different features in them and might not always be interchangeable. Rowley (2007) explain that the lower levels are more algorithmic or programmable, which helps to structure and store the data. The easiest type for these actions is the data, which is the lowest tier in DIKW-hierarchy. It can be considered as unorganized and unprocessed facts that carry itself no meaning or value. Davenport and Prusak (1998) define data as discrete, objective facts about events.

If the discrete objective facts called data are processed it creates information (Rowley 2007). Other perspective is to think that information is data with a meaning or data that makes a difference (Davenport & Prusak 1998). Information can move in organizations on hard or soft networks (Davenport & Prusak 1998). Hard networks are physical and visible networks, for example email and traditional mail. Soft networks are less formal and visible and usually ad-hoc, for example a note from a colleague (Davenport & Prusak 1998).

These two types of networks also propose a way to think about the information sharing in organizational context. Data is easier to manage, store and disseminate and with lots of data also information can be created from it (Davenport & Prusak 1998). Though lots of data or many information systems does not necessary improve the amount or quality of information (Davenport & Prusak 1998). As earlier mentioned, it can create an information overload for recipients which then again lowers the productivity and loses the effectiveness of information sharing (Memmi 2014).

Combining the information with experiences creates knowledge (Davenport & Prusak 1998; Rowley 2007). Knowledge can also be transmitted from another person (Rowley 2007). Though Davenport and Prusak (1998) mention that it is hard to capture or put to words. Therefore, many times knowledge is created from experience and not by reading books or instructions (Rowley 2007). In organizational context we can think that knowledge is obtainable easily by following others, for example in mentoring or in an induction. Knowledge is usually only transmitted between humans as machines themselves does not have the capacity of using experiences in their learning and processing information (Davenport & Prusak 1998).

Davenport and Prusak (1998) did not define wisdom in their research as it was too hard concept for managers to grasp at the time in their opinion. In Rowley's (2007) research about the hierarchies it can also be seen that wisdom in not easy to define. In the research there were 16 textbooks that were analyzed and only three defined wisdom. Wisdom was defined to increase effectiveness and adds a mental function called judgement (Rowley 2007). This mental judgement calls for a statement that computers cannot possess wisdom (Bellingeret al.). The DIKW-hierarchy tiers with examples is given in *Table 2*.

***Table 2.*** *DIKW-hierarchy tiers with definitions and examples.*

| **Tier** | **Definition (Rowley 2007)** | **Example** |
|---|---|---|
| **Data** | Symbols that present properties of objects, events or their environment | 5 |
| **Information** | Descripted symbols, data processed to be useful | Machine was on five minutes. |
| **Knowledge** | Know-how, transmitted from another or extracting from an experience | That machine always works for five minutes as it is broken. |
| **Wisdom** | Increases effectiveness, requires judgement | The fuse was saved as the machine was on for only five minutes. |

DIKW-hierarchy types are now defined in *Table 2*. These tiers are used in the research to study the methods of information sharing in the case organization. The methods are listed, and the type of information for them is defined. This can then help to notice if one type of information is overly represented or otherwise problems are seen.

## 2.2 Explicit and Tacit Knowledge

Earlier we discussed that knowledge has different hierarchy levels, but knowledge can also be in different dimension. Mainly the types are defined as explicit and tacit knowledge (Nonaka 1994). Polanyi (1962) was one of the first researchers to differentiate explicit and tacit knowledge. He proposed that there was personal knowledge that is harder to share than the codified knowledge and had more philosophical view on the knowledge as a subject (Polanyi 1962).

Nonaka (1994) presented a much more practical view on tacit and explicit knowledge especially in organizational context. Tacit knowledge was defined as know-how, crafts and skills that apply to specific context. Explicit knowledge then was defined as discrete or “digital” where the knowledge is captured in records, for example libraries, archives and databases. (Nonaka 1994)

The differentiation of tacit and explicit knowledge is important because in KIBS tacit knowledge can play a critical role (Chuang et al. 2016) and as Polanyi (1962) said in his book that the explicit knowledge is only the tip of the iceberg. This means that accessing all the organizational tacit knowledge can create significant knowledge resources and thus also business value for the organization.

Nonaka (1994) discussed that individual knowledge that is mainly tacit knowledge should be documented and disseminated to create explicit knowledge for the whole organization. Kukko and Helander (2012) came to almost the same conclusion that individual level knowledge should be raised to organizational level with different processes. Individual knowledge in this context is knowledge that only one person has, for example technology related knowledge with embedded individual experience. This becomes organizational knowledge as it is either written down and disseminated or presented to other employees in another way.

Disseminating and sharing tacit knowledge is not easy (Nonaka & Takeuchi 1995). Nonaka (1994) proposed a model which shows the modes of the knowledge creation. It helps to understand how tacit and explicit knowledge can transform itself into another or how to share tacit and explicit knowledge to others. This model is called the SECI-model.

It consists of four parts: socialization, externalization, combination and internalization (Nonaka 1994). The SECI-model is visualized in *Figure 8*.

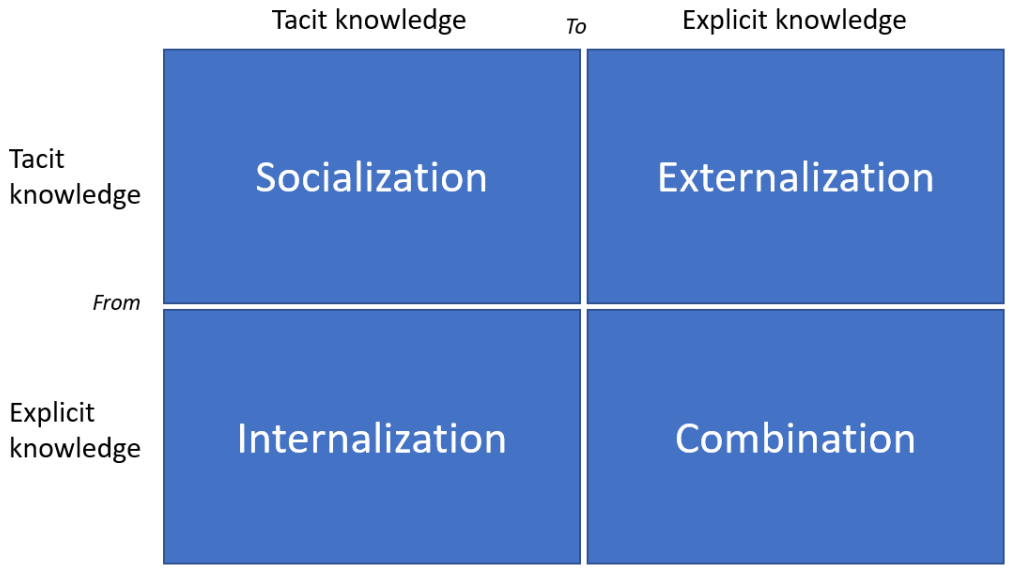


***Figure 8.*** *SECI-model of knowledge creation (Nonaka 1994).*

First quadrant discussed is the socialization process that involves transforming tacit knowledge into tacit knowledge. One thing that can be misunderstood easily about tacit knowledge is that transferring or sharing it does not need to involve language, for example you can learn by watching someone else (Nonaka 1994). Socialization is seen as a process where knowledge is created with shared experiences between the recipient and the sender (Nonaka 1994). In this thesis context socialization can be, for example learning “house rules” that are not written down, but everyone follows them.

The second quadrant discussed is the combination process that involves two or more pieces of explicit knowledge creating new explicit knowledge. This means that two individuals exchange or combine their knowledge in, for example conversation or meeting (Nonaka 1994). With combination of knowledge it is also possible to create new knowledge (Nonaka 1994). This new knowledge can then be more valuable and useful as it has been processed to higher tiers as earlier stated in the types of knowledge. In this context combination can be for example, writing technology blog post where other people can extend on the subject.

The third and fourth quadrants internalization and externalization both transfer between the dimensions from explicit to tacit or other way around. According to Nonaka (1994) knowledge creation is mainly based on these two parts of the SECI-model. The model also proposes that both types of knowledge are complementary and can be expressed in both types (Nonaka 1994). In later research Nonaka and Takeuchi (1995) adds to

earlier findings that tacit knowledge can be completely transformed into explicit knowledge which was not earlier concluded.

SECI-model basically works as a knowledge creation spiral where organizational knowledge is created in dynamic interaction between the two types of knowledge (Nonaka 1994). This also means that externalization and internalization become the most important parts of organizational processes from knowledge creation perspective. Nonaka (1994) proposes that organizational learning takes place only when all four parts form a cycle.

Smith (1998) proposes that tacit knowledge can be trained and taught to employees. In further study Smith (2001) proposes a way to teach it with three different questions:

1. What do you know about your strengths, weaknesses, values and ambitions?
2. What are the strengths, weakness, values and ambitions of others with whom you work?
3. How would you approach a similar job differently in the future?

These can be then used to improve the employee's ability to acquire and apply tacit knowledge. This provides easy and manageable way to remind employees of how much knowledge is there inside the organization to employees. In the case organization this can be used as one suggestion of how to improve tacit knowledge sharing. In SECI-model the way of teaching belongs to either externalization quadrant as the tacit knowledge of an individual is written or spoken as explicit to others or socialization where the new knowledge is learned by experiences had together.

KM can also be seen from strategy perspective. Hansen et al. (1999) defines codified strategy where knowledge in the organization is codified and stored in databases. This codified knowledge is more explicit in type than tacit. In personalization strategy knowledge is closely tied to individual persons and the sharing happens in direct person-to-person contacts (Hansen et al. 1999). Personalization strategy relies much more on tacit knowledge and its sharing between members of the organization. The choice between the two is not the most obvious and that is why both are favored and used (Hansen et al. 1999). The two types of KM strategy are compared in *Table 3*.

***Table 3.*** *Differences in personalization and codification strategies (Hansen et al. 1999).*

| Perspective | Personalization | Codification |
|---|---|---|
| **Competitive strategy** | Provide high-level advice by channelling individual expertise | Provide reliable and fast systems by reusing codified knowledge |
| **Customer problem** | Solve unique problems with customized solutions | Invest once in knowledge asset and reuse it |
| **Organizational** | Small teams | Large teams |
| **Knowledge management strategy** | Develop networks that link people to each other and allows the change of tacit knowledge | Electronic document system codifies, stores, disseminates and allows reuse of knowledge |
| **Information technology** | Invest moderately in IT. IT is seen as way to communicate between each other | Invest heavily in IT as it provides the connectivity and re-useable information |
| **Hiring / employees** | New graduates who are suited for reusing knowledge | People who like problem solving and tolerate ambiguity |
| **Training** | Train in groups and through distance learning | Train through one-to-one mentoring |
| **Rewarding** | Rewards for using and contributing to document databases | Reward for directly sharing knowledge with others |

Both strategies also differ in perspectives as seen in *Table 3.* The choice between the strategy should be based on the competitive strategy of the company (Hansen et al. 1999), for example does the company prefer unique solutions and consulting over productized offering. Choi and Lee (2002) adds that sometimes knowledge strategies differ with department type as they have different strategies and practices which must be taken account in KM strategy. The strategy works the best if it is coordinated with HR, IT and competitive strategy (Hansen et al. 1999). Case organization KM strategy is discussed in the chapter six.

## 2.3 Knowledge Management in KIBS and SMEs

This part discusses KM more in depth from the KIBS and SMEs perspective. KIBS in this research is defined as service company providing specialized information in co-production process intimately involving their clients (Muller & Doloreux 2009). SMEs are

defined by staff amount and revenue where staff headcount is under 250 and turnover is under 50 million euros (Europe Commission). The case organization is labeled as KIBS as it relies heavily on knowledge in its business services, for example consulting and service design which both need intimate co-production with clients. The case organization is over the 250 in staff headcount, but revenue is under the 50 million euros. In this research the literature about KM in SMEs is aligned better to research context as KM literature focuses mainly in large global corporations and the theory might not always be applicable in SMEs (McAdam & Reid 2001). More important part is that KM seems to be working better in large corporations and it is widely discarded in SME's (Baptista Nunes et al. 2006) which leads to KM in SMEs lead to different strategies.

### 2.3.1 KM in Small and Medium Sized Companies

SMEs are not widely studied in KM perspective, for example Massaro et al. (2016) found out in their extensive literature review about KM in SMEs that only ten authors had published two or more papers on the subject and only few specialized in it. Massaro et al. (2016) also discusses another problem with KM literature that around the world SMEs are defined differently and KM in 20 employee company is vastly different than in over 200 employee company (Massaro et al. 2016). This creates a problem as McAdam and Reid (2001) said in their article that the findings from different size corporations might not be applicable in other sizes. From the KM process perspective Massaro et al. (2016) says that most of the KM literature in SMEs focuses on social interaction as well as human, organizational and external factors.

Muizer and Kerste (2002) discuss in their research that SMEs are rather hard to persuade to use KM in their processes as it is not seen as important part of strategic management. They say that better way is to emphasize the problems in KM and provide solutions to these problems and that way show the importance of it (Muizer & Kerste 2002). Same result was obtained by Massaro et al. (2016) proposing that literature revolves around the problems and trying to solve them. Also, Matlay (2000) discusses that KM was not high on agenda in small businesses and only minority of small businesses managed strategic way to attach KM in their processes.

Higher KM-maturity though have been proven to sustain SMEs growth and positively enhance it in long term (Salojärvi et al. 2005). This can be seen in the case organization also as KM was recently taken into more consideration. There were no clear strategic benefits seen for KM before and only the active persons in the organization were disseminating knowledge. The success of knowledge creation depends on management's assumption of responsibility, justification, financial backing, and caring

(Nonaka & Konno 1998). As in the case organization was not happening at least systematically.

Taking care of KM and its processes takes resources both indirect and direct (Baptista Nunes et al. 2006). This can easily make SMEs discard the use of KM as it is seen more as a cost without major benefits. Baptista Nunes et al. (2006) emphasizes though that not maintaining KM in appropriate level makes SMEs vulnerable in efficiency, productivity and competitiveness.

In the part before we discussed codification and personalization strategy in KM. SMEs lean more on the personalization strategy as those have more limited tendency to codify knowledge than larger enterprises which can lead to knowledge loss in many SMEs (Liao & Barnes 2015; Grandinetti 2016). SMEs also rely more on acquiring knowledge outside rather than relying on the knowledge inside (Liao & Barnes 2015; Grandinetti 2016). Massaro et al. (2016) gives out one example of enhancement that managers should focus on creation of networks inside the SMEs. This could lead to more personalization in knowledge sharing and provide a way to efficiently use internal knowledge as a resource.

SMEs tend to have good knowledge sharing practices as they usually have single location and close relationship between employees. As the growth takes on and multiple sites and groups are present the knowledge sharing seems to decrease rapidly. Then again large organizations are seen to support the collaboration better between teams and functions. (Riege 2005)

***Table 4.*** *Features of KM in SMEs*

| **Features KM in SMEs** | **References** |
|---|---|
| KM not seen as important part of business strategy | (Matlay 2000; Muizer & Kerste 2002) |
| KM helps organizational growth in SMEs | (Salojärvi et al. 2005; Kukko 2013) |
| Resources are scarce, KM seen expensive | (Baptista Nunes et al. 2006; Cerchione et al. 2015) |
| Personalization strategy is mainly used | (Cerchione et al. 2015; Grandinetti 2016) |
| Acquiring knowledge outside | (Liao & Barnes 2015; Grandinetti 2016) |

The features of KM differ between large enterprises and SMEs. In *Table 4* the mentioned features of KM in SMEs are listed. Next part discusses KM in knowledge intensive business service perspective.

### 2.3.2 KM in Knowledge Intensive Business Services

KIBS rely heavily on creating and disseminating knowledge (Muller & Doloreux 2009). KM specifically in KIBS improves the organizational effectiveness as knowledge is in more critical role as a resource (Mazorodze & Buckley 2019). KIBS offer knowledge-based services for their customers which are non-routine (Muller & Doloreux 2009). Services themselves can be seen also more as non-routine and more tailor made than products (Bettiol et al. 2012). This leads to personalization to be more fit KM strategy to KIBS than codification (Bettiol et al. 2012). Though Bettiol et al. (2012) adds that codification is useful in routine and repetitive tasks for example in managing projects or when KIBS offers standardized services or products. In the case organization the project and quality management are done by the ISO-9001 -standard and all procedures are mentioned in “Quality Manual”. Project management in case organization is seen as codified more than personalized.

The case organization is knowledge intensive and works in software business which has its own differences from other industries. Kukko and Helander (2012) establishes that software companies tend to be younger, less structured in processes and rely much on innovative capabilities brought in by active KM and especially knowledge sharing. Riege (2005) sees also the benefit of flat organizational structure which is common for KIBS to help KM.

Knowledge sharing is seen as the most important part of KM for KIBS as the business is solely based on the knowledge and the effective use of it in everyday processes (Kukko & Helander 2012; Mazorodze & Buckley 2019). Kukko (2013) presented that in software companies KM can support growth but also make knowledge sharing more difficult. This means that KM must be considered carefully, and strategic plan must be made to not create haste decisions for knowledge sharing as this can only create a barrier for KM to be effective.

Mazorodze and Buckley (2019) researched benefits and barriers for KM in KIBS. The results for benefits sought after are listed in *Table 5.* As seen improving knowledge flow and managing change was the most sought-after benefit of KM. Other benefit seen as important was accelerating innovation and organizational commitment.

***Table 5.*** *Benefits of KM for KIBS asked in survey (Mazorodze & Buckley 2019).*

| **Benefit** | **Percentage** |
|---|---|
| Accelerates innovation and organizational commitment | 16 % |
| Creates competitive advantage | 6,3 % |
| Improves knowledge flow and managing of change | 52,7 % |
| Avoiding repetition of tasks | 15,1 % |
| Enhances coordination and collaboration between employees | 9,8 % |

In conclusion for KM in KIBS is that it is an important part of strategy. As knowledge is the most important resource of the business it should be also managed with the same respect. It was seen that KM should be approached in KIBS with strategic angle with close integration to business strategy for the best results.

## 2.4 Knowledge Sharing

The research uses the definition of KM by Mazorodze and Buckley (2019) which included four parts: gathering, organizing, analysing and sharing knowledge in organization. Many researchers agree that the knowledge sharing part is the most important part of KM (Wang & Wang 2012; Cerchione et al. 2016; Mazorodze & Buckley 2019). This was also discussed in motivation chapter before. Knowledge sharing was also established as one point of enhancement for the case organization in the organizational strategic change. One driver for the interest in knowledge sharing might be simply that the competitive landscape requires organizations to share knowledge in more efficient manner to stay in business (Matlay 2000).

Researchers use many different words to describe knowledge sharing. Knowledge dissemination, sharing and transferring are the most common ones used. Knowledge sharing and knowledge transferring are many times used as synonyms (see e.g. Jackson et al. 2006). Knowledge transfer is defined as a process in which one unit is affected by the experience of another (Argote & Ingram 2000). Knowledge sharing is defined in a similar way “guiding someone through own thinking or using own insights to help them see their own situation better” (McDermott 1999). These both definitions offer similarity in them. Both have a unit as the sender of the information, and both have experience as

the insight in the knowledge. In this research knowledge transfer and sharing are considered as the same concept if not otherwise stated.

Knowledge sharing was thought to happen because employees wanted to support the organizational interest, but later researchers showed that the reason behind sharing was more on micro level with competing interest, rewards and/or recognition (Donnelly 2018). Argote and Ingram (2000) also mention the similar interests in strategic manner having a positive effect on knowledge sharing. Arias Aranda and Molina-Fernandez (2002) propose that knowledge sharing should be organized by human resources (HR) with innovative and easy methods.

The case organization had a rather large organizational structure change as a part of the strategy change. Organizational structure is also a way to affect the knowledge sharing in an organization and especially flat organizational structure is seen as the best for knowledge sharing (Salojärvi et al. 2005; Mazorodze & Buckley 2019). It offers less levels of hierarchy which lowers the risk of information loss between the hierarchies (Mazorodze & Buckley 2019). Organizational culture was another one concluded important for knowledge sharing (Staadt 2015; Oyemomi 2019).

In this research a part of the data collection is done with a three-part survey. The survey is created using two different research articles. Both articles used in the survey had knowledge sharing as a part in the research. The parts used in survey are introduced in *Table 6.*

***Table 6.*** *Articles used in the survey.*

| **Part name** | **Reference** |
|---|---|
| Knowledge sharing | (Jääskeläinen et al. 2019) |
| Explicit Knowledge Sharing | (Wang & Wang 2012) |
| Tacit Knowledge Sharing | (Wang & Wang 2012) |

Jääskeläinen et al. (2019) researched KM profiling models in their article. They propose an extensive survey to determine the maturity of KM in an institute. In this research only the seventh part “Knowledge sharing” (Translated from “Tiedon jakaminen”) is used as this study only focuses on that part of KM. The part includes ten questions about overall knowledge sharing. The objective of the part is to determine the overall level of knowledge sharing and not to get specific information about it.

Wang and Wang (2012) explores the relationship between knowledge sharing, innovation and firm performance. They offer a survey with six parts where two of them were chosen for this research: one is focused on explicit knowledge sharing and other

one for tacit knowledge sharing. They found out that both explicit and tacit knowledge sharing affects operational and financial performance by improving innovativeness, speed or quality. These parts are used to compare the explicit and tacit knowledge sharing state to each other and also to the study findings.

In this chapter, first KM was introduced to manage knowledge assets and some of the basic concepts of KM were discussed. The DIKW-hierarchy introduced the types of knowledge and SECI-model the dimensions. Then KM was introduced especially in SMEs and KIBS perspective. It showed that not all organizations can use KM in the same way. In the last part of the chapter knowledge sharing was introduced as a concept as well as the articles the survey is based on.

# 3. KNOWLEDGE SHARING BARRIERS

This chapter introduces the concept of knowledge sharing barriers. The barriers are categorized by Riege's (2005) article "Three-dozen knowledge-sharing barriers managers should consider" that categorized the barriers in three different segments: individual, technological and organizational. Riege's (2005) categories have been widely used and some have added more categories to it, for example cultural and geographical categories (Anwar et al. 2019). Anwar et al. (2019) have made an extensive meta-analysis about knowledge sharing barriers and presents good overview of the barriers recognized in different studies.

Ghobadi and Mathiassen (2016) researched knowledge sharing barriers with teams and categorized the barriers by team and project features, for example team diversity and project communication. One of their findings indicate that barriers are likely to be perceived differently by the role of the subject when asked about it (Ghobadi & Mathiassen 2016). This can create confusion of which barrier is the right and proposes a challenge to find the real root cause for the knowledge sharing barriers.

One objective of this study is to identify the barriers in knowledge sharing. Finding the barriers is the first step of the process and after that the solutions or suggestions for improvements can be introduced to the organization. This kind of process is supported by research as managers tend to show more support when a clear problem is presented first (Muizer & Kerste 2002; Ismail Al-Alawi et al. 2007). If knowledge-based economies are managed improperly knowledge creation barriers can arise (Holford 2016). These two views propose that management is in key role to knowledge sharing.

In the next four parts this chapter introduces different examples of barriers in the categories of Riege's (2005) article with an added "other barriers" which includes barriers that does not fit these three categories proposed. The categories are thus individual, technological, organizational and other barriers.

## 3.1 Individual Level Barriers

The individual barriers are often related to the lack of communication skills, lack of social networks, differences in national culture, overemphasis of position statuses, and the lack of time and trust (Riege 2005). Lack of time, communication skills and lack of trust is also supported barriers by Cleveland and Ellis (2015) and Santos et al. (2012).

Santos et al. (2012) offers also another perspective to knowledge sharing barriers in individual level. He proposes that the major barrier is the codification process, for example that your knowledge is deeply embedded into your experiences and thus cannot be shared in explicit form. Smith (2001) also sees the problem in transforming the knowledge from tacit to explicit and emphasizes that it is much easier to transform explicit knowledge into tacit when people co-operate, trust and contribute their own knowledge resources.

Memmi (2014) offers a psychological perspective to individual's knowledge sharing. The research focuses on information overflow but provides good perspective on knowledge sharing barriers found out. Memmi (2014) proposes that the ability to understand and evaluate knowledge is the key to obtaining new knowledge but organizations tend to give too much information for individuals to handle and process at the given time. Argote and Ingram (2000) also proposes that absorbing all the knowledge provided is one barrier for knowledge sharing. This can be seen also as a lack of time to process all information.

In one study the results showed that gender, total years of experience and duration of employment did not influence the knowledge sharing (Al Attar & Shaalan 2016). Difference in gender was listed as a barrier in other studies (Riege 2005; Al Attar & Shaalan 2016) and difference in experience level was listed by Riege (2005). As seen individual barriers are vastly different depending on conditions, environments and culture.


***Figure 9.*** *Individual level barriers (Anwar et al. 2019).*

Anwar et al. (2019) propose the individual barriers seen in *Figure 9*. It offers similar barriers that were discussed earlier. Their study seems to be the most recent and extensive view of the subject thus providing a great overview of barriers perceived. They

also provide a list of facilitators which can be though of enablers of the knowledge sharing.

Lack of trust was seen in most studies as one barrier in the individual level (Anwar et al. 2019). Lack of trust is formed from different factors, for example there is trust that sharing the information does not create a misuse of it and trust that the knowledge is credible and accurate (Riege 2005). Santos (2012) also listed lack of trust as one of the barriers perceived. In two different studies lack of trust was mentioned as barrier by about 30% of answers in a survey done in organizational context (Al Attar & Shaalan 2016; Mazorodze & Buckley 2019).

Social networks have been also in the center of knowledge sharing (Argote et al. 2000). Especially lack of social networks negatively impacted new and old employee relationships (Anwar et al. 2019). This aspect included the inadequate social skills in research by Anwar et al. (2019) which some researchers have listed in different category (e.g. Riege 2005). Al Attar and Shaalan (2016) discusses the barrier as “lack of cross-division communications”. It can be concluded that cross-divisional networking in knowledge sharing enhances the overall knowledge sharing state.

Personal fear and shyness were also listed in many different articles as barriers (Anwar et al. 2019). This thought to be created from an old belief that suggested knowledge sharing weakens employees’ corporate position (Riege 2005). Some researchers suggest that the personal fear comes from own inferior position compared to others (Anwar et al. 2019). This is also suggested by Riege (2005) “differences in education levels” or “use of strong hierarchy”. The incompatible professional qualification has similar background than the earlier personal fear and shyness but takes more into account the personal background where one’s common terms are unknown terms for another. Santos et al. (2012) also adds that technical terminology difference in barriers.

Lack of motivation was seen especially as a barrier to share knowledge from old employees to new employees (Anwar et al. 2019). Argote and Ingram (2000) also mentions motivation as an individual barrier. Santos et al. (Santos et al. 2012) proposes that through good social interaction motivation rises in knowledge creating and sharing. Mazorodze and Buckley (2019) listed lack of time, motivation and rewards in one barrier thus making it hard to compare to other studies.

Lack of time was a barrier in most of the researches (Santos et al. 2012; Cleveland & Ellis 2015; Anwar et al. 2019). Riege (2005) adds to the lack of time to identify the need of knowledge from a colleague and Santos et al. (2012) adds also lack of resources to same point. Santos et al. (2012) mainly discusses the lack of time to codify the tacit

knowledge into explicit form. Riege (2005) also sees another barrier called the lack of time for managers to create knowledge sharing techniques and processes as a barrier. In one case study lack of time was the biggest barrier where 68% of answers listed it as a barrier (Al Attar & Shaalan 2016) and another study had “lack of time, motivation and rewards” as the second biggest barrier (Mazorodze & Buckley 2019).

The last barrier introduced by Anwar et al. (2019) is low awareness of self-knowledge. Riege (2005) addresses the same barrier as low awareness of the value of the knowledge to others. The barrier is defined in this study as individual not aware of the value of own knowledge and thus does not know the value of sharing the knowledge to others.

## 3.2 Technological Level Barriers

Technology plays a key role in knowledge sharing (Smith 2001). Many different researchers suggest that technology and tools of communication works as the enablers of knowledge sharing (Smith 2001; Chan & Chau 2008; Kukko & Helander 2012; Liao & Barnes 2015). Even though it must be remembered having access to information does not mean it is used (Ottonicar et al. 2018). It is also proposed that technology can gap the physical distance between locations (Liao & Barnes 2015). Though technology is seen many times as enabler it is also sometimes a barrier for knowledge sharing, for example in non-routine tasks frequency of accessing KM repositories negatively affected the performance of consultancy teams (Argote & Fahrenkopf 2016).

Many of the studies listed technology or tools as one of the barriers but none of them had it mentioned as a major barrier. Mazorodze and Buckley (2019) had 10% of the answers mention lack of technological infrastructure as a barrier and Al Attar and Shaalan (2016) had 14% answer tools and assets and 21% improper use of tools and assets in their surveys conducted in organizational context.

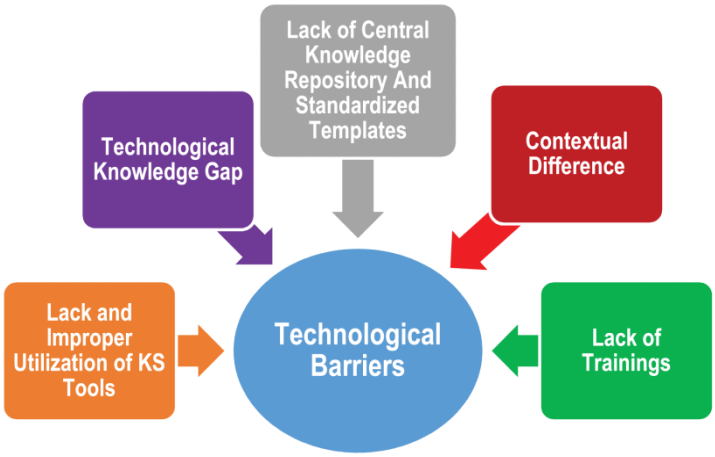


***Figure 10.*** *Technological level barrier (Anwar et al. 2019)*

Meta-analysis of Anwar et al. (2019) propose the technology level barriers in *Figure 10.* The first one presented is the lack of improper utilization of KS tools. This means basically that tools are either not used or there are not suitable tools available for knowledge sharing (Anwar et al. 2019). Riege (2005) also proposes that barriers can form if employee's needs are not satisfied technologically with knowledge sharing. Inadequate IT is also listed as a barrier in study by Santos et al. (2012).

Technological knowledge gap is close to the individual barrier "incompatible professional compatibility" where employee does not possess the skills or knowledge to use the systems provided (Anwar et al. 2019). Riege (2005) lists the barrier as reluctancy to use the system due to lack of familiarity or experience. Anwar et al. (2019) gives an example where a team wrote notes on whiteboards or an employee on a personal notebook instead of using technology services that provide a place for the knowledge sharing.

Lack of central knowledge repository and standardized templates or also inability to locate the correct knowledge source is a listed as the next technological barrier (Anwar et al. 2019). Similar barriers are also discussed in research by Riege (2005) and Santos et al. (2012) as lack of processes or lack of strategy in knowledge sharing. Also lack of compatibility between systems is listed by Riege (2005).

Technological context can be different in global teams between continents or countries. Anwar et al. (2019) gives an example where banking regulation is different and requires different team members to share the knowledge of the regulation to achieve the common goal. This creates a barrier in contextual difference (Anwar et al. 2019). This barrier was not present in any other study included in this research.

Last of technological barriers is the lack of training (Anwar et al. 2019). Argote and Ingram (2000) found out that training in internal programs resulted in more knowledge

inside organization than using external channels. Riege (2005) also lists lack of training of new IT systems and processes as a technological barrier as well as lack of technical support. One that is missing from the *Figure 10* is also lack of presenting the capabilities of the systems to all employees (Riege 2005). Santos et al. (2012) propose also that training might be done, but the learning curve for use is too high and thus prevents employees from effectively using the IT systems for knowledge sharing.

## 3.3 Organizational Level Barriers

Human inertia is the greatest obstacle for achieving good KM efforts (Wah 1999). In organizational level most of the organization must use the tools provided to achieve this "human inertia" that Wah (1999) mentions. In SMEs processes must be created in organizational level to establish a good learning environment and knowledge sharing culture (Liao & Barnes 2015).

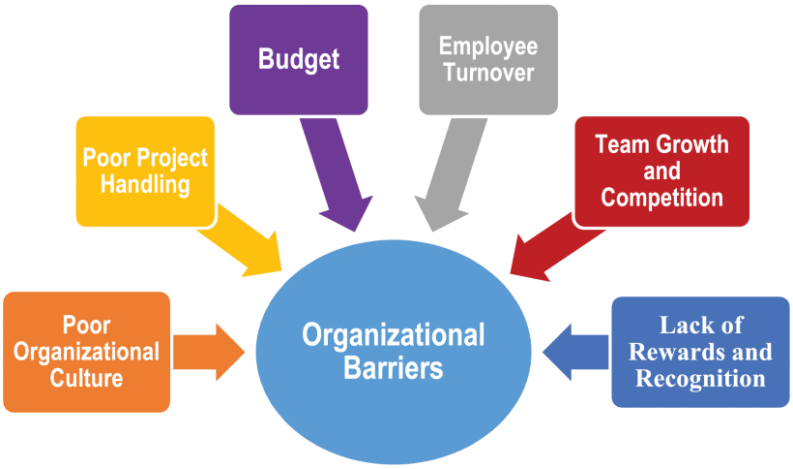


***Figure 11.*** *Organizational level barriers (Anwar et al. 2019).*

The organizational culture and individual's culture should now be differentiated and in this part "culture" will refer to only organizational culture if not stated otherwise. Smith (2001) says that the organizational cultural fit might be the most important factor in personal information sharing practices. Poor organizational culture is the first barrier in organizational level which also includes organizational structure (Anwar et al. 2019). The culture of "it is shame to ask" was selected by 8% and "I know everything" with 28% as a barrier in one study (Al Attar & Shaalan 2016).

Unstable or hierarchical organizational structure can cause a knowledge sharing barrier (Anwar et al. 2019; Mazorodze & Buckley 2019). The best organizational structure for knowledge sharing was flat which means that flattening the structure promotes

knowledge sharing (Mazorodze & Buckley 2019). The flatter organizational structure was also supported by Riege (2005).

The organizational culture barrier includes also managerial focus and lack of leadership, which was mentioned in Riege (2005) and Mazorodze and Buckley (2019). Holste and Fields (2010) add also that managers tend to focus on explicit knowledge sharing which leads tacit knowledge sharing to become neglected. Managers also tend to lack the commitment to lead the KM efforts efficiently to finish (Nonaka & Takeuchi 1995). 57% of participants listed lack of executive support as a barrier to knowledge sharing making it the second biggest barrier in one case study (Mazorodze & Buckley 2019).

Poor project handling includes the sharing of requirements, lessons learned and absorbed information (Anwar et al. 2019). For example, lack of sharing the lessons learned was deemed as barrier for 39% of the employees in one study (Al Attar & Shaalan 2016). Anwar et al. (2019) sees the problem of project handling especially in distributed teams. Wenger (2000) proposes that central people should be named to facilitate knowledge sharing in distributed organizations.

In the chapter about KM in SMEs it was introduced that SMEs lack in KM as the cost is easy to measure but the benefits are not (Baptista Nunes et al. 2006). The measurement of return on investment of KM was also a problem proposed in research by Mazorodze and Buckley (2019). The budget, cost and other monetary reasons are the next barriers. Anwar et al. (2019) discusses this barrier only in project perspective when others discussed this as an organizational issue (Riege 2005; Baptista Nunes et al. 2006; Mazorodze & Buckley 2019). In one study the lack of budget for KM was the biggest barrier to knowledge sharing with 68% answering it in survey (Mazorodze & Buckley 2019).

Employee turnover aspect includes lack of job security as barrier as well (Anwar et al. 2019). Lack of job security could be labeled also under the individual level barriers as it affects only individuals, but employee turnover then again is an organizational problem. Lin (2008) proposes that higher commitment from employees to organization leads to better knowledge sharing. Also, another study saw that if an employee moves inside the organization to different position the knowledge employee must adapt to new conditions before sharing knowledge is effective again (Argote & Ingram 2000).

Organizational growth can be considered as a risk for knowledge sharing (Kukko 2013). Kukko (2013) proposes that good knowledge sharing methods should be taken care of during the growth. The problems in growth appears as complexity of the organization rises and employees cannot keep up with the changes happening (Anwar et al. 2019).

Team growth and competition was barriers mentioned by Anwar et al. (2019). Internal competition between employees in business units, functional areas and subsidiaries was a barrier also by Riege (2005) and Santos et al. (2012).

Rewards offer a controversial discussion when linked to knowledge sharing. One study says that if rewards are introduced at knowledge sharing environment which is in bad shape, the motivation does not increase for knowledge sharing and might even decrease it (Husted & Michailova 2002). Lack of rewards was also a barrier by many researches (Riege 2005; Anwar et al. 2019; Mazorodze & Buckley 2019). This suggests that when the overall quality of knowledge sharing is in appropriate level then rewards can create a good incentive to share knowledge. The rewards itself has not to be monetary, for example the recognition of naming of the best knowledge sharer of the month is also a good incentive (Anwar et al. 2019).

## 3.4 Other Barriers

The structure of this chapter was based on Riege's (2005) categories of individual, organizational and technological. There is not one widely accepted framework for knowledge sharing barriers, which leads to different categories in studies. For example, Anwar et al. (2019) adds a cultural and geographical category and Vuori et al. (2018) adds network-level and knowledge-specific barriers. Some studies also prefer to study barriers in general level without any categories (Al Attar & Shaalan 2016; Mazorodze & Buckley 2019).

In this part the culture refers to individual's culture, for example Western or Finnish culture. The cultural barriers include language and cultural norms (Anwar et al. 2019). The language and culture differences are in individual level barriers in Riege's (2005) model. Also, it seems that some researchers have studied the culture and its effect on knowledge sharing in more depth for example, Middle East (Al Attar & Shaalan 2016) and Russia (Husted & Michailova 2002). In project work specifically Santos et al. (2012) studied barriers in agile teams and saw also individuals' culture as a problem when terminology differs.

Physical distance or any other geographical barrier to knowledge sharing was not yet mentioned as a sole barrier. Anwar et al. (2019) lists distance and time zone differences in geographical barriers. As mentioned in the technology part, the gap of physical distance is helped usually with different technological solutions, for example video conferencing (Liao & Barnes 2015).

Nonaka (1994) offers also some problems with SECI-model that are related to knowledge specific problems highlighted by Vuori et al. (2018). Though Vuori et al. (2018) focuses on inter-organizational barriers in the context as Nonaka (1994) in overall knowledge management processes both internal and external. As this study focuses on internal processes the Vuori et al. (2018) article findings on network level barriers are not discussed.

One problem in SECI-model knowledge sharing was the failure to build dialogue between the knowledge dimensions where knowledge is stuck on one dimension and cannot form the other (Nonaka 1994). As Smith (2001) states “Unless management clearly states expectations for sharing knowledge, employees are likely to share only explicit knowledge because it is easier to code, document and transfer.” Other problems mentioned are that combination creates already known information, failing to assimilate knowledge and knowledge shareability is bad (Nonaka 1994).

In overall level it can be noted that there are many knowledge sharing barriers identified in research literature. This study focuses on barriers by Riege (2005) and Anwar et al. (2019) as those two studies provided comprehensive listing of barriers with the levelled categories. Similar studies that can be used to compare findings include Mazorodze et al. (2019) and Kukko and Helander (2012).

# 4. RESEARCH METHODOLOGY

This chapter introduces the research methodology. The research methods include the techniques, instruments and procedures used to obtain and analyze the information for the research (Duignan 2016). The goal is to introduce the research methodology from the philosophy of science to the specific data gathering methods used.

The chapter is organized as follows. First the philosophy of science is introduced which in this research is interpretivism. Scientific approach is the second part with inductive approach selected. Third part introduces the research strategy as a mixed strategy with both case and action research strategies introduced. Fourth part introduces the data collection methods: interview and survey and their implementation and analysis process.

## 4.1 Philosophy of Science

There are four different philosophies for science: positivism, realism, interpretivism and pragmatism (Saunders et al. 2007, pp. 109-118). The adopted philosophy determines how the researcher views the world. The philosophies differ in the researcher's view of the nature, acceptable knowledge and values which are also known as ontology, epistemology and axiology (Saunders et al. 2007, pp. 109-118). The philosophy plays a critical role in selecting the research strategy and the methods.

The positivist philosophy includes that the researcher itself extends itself from the research environment (Saunders et al. 2007, pp. 113-114). It also features using mostly quantitative methods and large samples (Saunders et al. 2007, pp. 113-114). As the main researcher in this study is included in the case organization the philosophy of choice is not positivism. The realist philosophy views the facts without human thoughts and beliefs relying on world views and cultural experiences (Saunders et al. 2007, p. 119). As the study focuses on human centered processes and data collection the realist philosophy cannot be used. Pragmatism includes using multiple perspectives to answer the research questions (Saunders et al. 2007, p. 119). As the study only features one case organization and a single perspective a pragmatic philosophy is not used in this study.

The goal of the study is to interpret the current state of the organization. In the philosophy of interpretivism the concern is not to make change, but to understand and explain the environment and actions (Saunders et al. 2007, pp. 121). Interpretivism is selected as

the philosophy of science for this study. This choice is supported by Burke (2007) who concluded that in information management interpretivism is the philosophy of choice because of large involvement of people, culture and information in the research.

In interpretive research the need is based on the people and information and the goal is to share the perspective of the group (Burke 2007). In this study the goal is to present the state of an organization, which means researching the practices formed by the individuals and groups inside the organization. These individuals and groups are social constructs which are both subjective and changing (Saunders et al. 2007 pp. 109-119).

This leads to a qualitative aspect on the research which cannot be separated nor duplicated as it is closely related to the changing environment and social constructs. The research relies on qualitative data and quantitative data will only be used to confirm the results and to generalize and compare the findings to earlier research on the subject. This also means that the goal of the study is not to create a new theory, but to understand the practices and structures with the known theory.

## 4.2 Scientific Approach

There are two scientific approaches: deductive and inductive (Saunders et al. 2007, p. 124). This study is an explorative research as the research questions are answered in an explorative manner with the collected data or as Saunders et al. (2007) concluded the theory follows the data. Theory section of the study included general themes of the subject, which are interpreted in the case environment with the data collected. The interpretivism as the philosophy, explorative nature and general theory suggests selection of the inductive scientific approach (Saunders et al. 2007; Creswell 2014) thus the selected scientific approach is inductive.

In inductive approach the researcher is a part of the research (Saunders et al. 2007, pp. 125-126). As the researcher in the study is a part of the case organization, it cannot differ itself from the research environment thus being part of the research. The environment is closely tied to the study, and also the findings are tied to the environment. This leads to conclusion that the findings cannot be generalized, which is typical for inductive approach (Saunders et al. 2007, p. 125-126). These points further validate the selection of inductive approach.

## 4.3 Research Strategy

The study is focused on one the case organization that was descripted in the first chapter. Case research involves an in-depth analysis of the case, which is bound by time and activity (Creswell 2014). It is used to study the phenomena in its own context and environment without altering it by removing or adding variables (Saunders et al. 2007, pp. 145-146).

An action research involves a genuine concern in an organization where the findings are obtained from members of an organization (Eden & Huxham 1996). This is also emphasized by Schein (1999), whom also adds that for action research to succeed it needs to involve employees. This also helps to manage the change needed after the concern has been identified and suggestions for improvement given.

The research strategy is thus a mixed strategy of single case research and action research. These are also supported by the earlier selection of inductive scientific approach (Saunders et al. 2007, p. 146).

## 4.4 Data Collection Method

In business and management research it is feasible to use multiple data collection methods (Saunders et al. 2007, p. 151). As both qualitative and quantitative methods are used it is called mixed method research. This allows the use of two or more data sources and provides more confidence for the research conclusion. This process is called triangulation (Saunders et al. 2007, p. 154).

Using multiple methods also helps to generalize the findings and to study different aspects (Saunders et al. 2007, p. 154). In this study a semi-structured interview and survey is used as the primary data collection methods. This type of process with both qualitative and quantitative methods is suggested to be used in further studies in a similar study by Keyes (2008) to obtain better results.

### 4.4.1 Interview

The interviews in the study needs to provide opinions based on themes about the subject interviewed. In this study the interview theme and case problem are known, but more background and information are needed. Non-standardized interviews are usually used in this scenario, which leaves two options: semi-structured interview and unstructured interview, which are both supported by the explorative nature of the study (Saunders et al. 2007, pp. 323-324).

As the research questions were formulated before the interviews and main themes known the study uses semi-structured interview. It uses a list of themes and questions that are covered in the interview, but also provides a possibility of adding questions or change the order during the interview if needed (Saunders et al. 2007, p. 321). The purpose of an interview structure is to create synergized questions where a flow is created between them and sensitive questions are asked last (Walle 2015).

Interview is built on main questions, which answers every research question the study has (Rubin & Rubin 2005). The main questions provide the conversational structure and the earlier mentioned flow. In this study the interview is structured in a chronological order starting from the background and moving from the strategy change to the present state and suggestions. The interview structure is found in *Appendix A*. Follow-up questions are asked when more explanation is needed from the interviewee.

### 4.4.2 Survey

The interview provides the qualitative data of the research. As there are limited number of interviews conducted a survey is used to fill in the gaps and provide validity and confidence for the analysis and conclusion. In the survey the main goal is to collect precise data to answer the research questions (Saunders et al. 2007, pp. 360-301). Surveys are not recommended to be used in explorative studies as the explorative nature requires the use of open-ended questions (Saunders et al. 2007, p. 362). This study uses the survey to further validate the findings from the interview and not for the explorative part.

A convenience sample is used in this study. It means that survey is administered for everyone wanting to give an answer from the focus group. An undisguised survey is type of survey which clearly states the mission of it (Walle 2015). The survey in question is undisguised as it clearly states the study it is part of and goals.

Survey can include both open and closed questions (Saunders et al. 2007, p. 374). In this study the survey included 23 closed questions and one open question. The survey is found in the *Appendix B*. The closed questions are rated from 1 to 5 or in text from highly disagree to highly agree. This scale is known as the Likert-style rating scale (Saunders et al. 2007, p. 378-379). In the study the middle rating “3” is labeled as neutral and no opinion is given by skipping the question. The open question in this survey asked about other comments regarding to knowledge sharing from the participants in the end of the survey.

The survey in this study is created from two ready-made and tested research surveys, which were introduced in the end of chapter 3. The ready-made surveys provide better validity and offer the possibility to compare the results with the earlier study. This also gives the possibility to replicate the study in the survey part in the future (Saunders et al. 2007, p. 374). This is important as the change is happening and to measure the effect of an indicator is needed, which the survey provides.

## 4.5 Implementation and Analysis

This part introduces the implementation of data collection. The primary data source in this study is the interviews as stated earlier. The survey provides more data to fill the gaps and validate the findings from the interview. Implementation part starts from interviews and moves from there to survey.

The interviews gain credibility when the subjects are experienced and have knowledge about the research problem (Rubin & Rubin 2005). The selection of subjects began from asking about the subject in the case organization as proposed in (Rubin & Rubin 2005). This led to selection of eight subjects from the management team. They had the in-depth knowledge about the organizational change and by having subjects from different parts of the higher management it provided different perspectives from the subject. Information about the conducted interviews is in *Table 7*.

***Table 7.*** *Information about the interviews.*

| **Subject** | **Date** | **Time elapsed (min)** | **Type** |
|---|---|---|---|
| Management Member 1 | 10.05.2019 | 59 | Face to face |
| Management Member 2 | 20.05.2019 | 48 | Face to face |
| Management Member 3 | 29.05.2019 | 50 | Virtual conference |
| Management Member 4 | 22.05.2019 | 48 | Face to face |
| Management Member 5 | 22.05.2019 | 57 | Face to face |
| Management Member 6 | 21.05.2019 | 46 | Face to face |
| Management Member 7 | 16.05.2019 | 55 | Face to face |
| Management Member 8 | 21.05.2019 | 50 | Face to face |

The interviews were conducted during May 2019. One hour was scheduled for every interview. All interviews were completed during the one-hour time slot. Seven of the eight interviews were conducted face to face and one with video conference. Face to face was the preferred choice for the interviews.

Preparation is key for good interview. Saunders et al. (2007, pp. 328-336) proposes four actions before starting the interview: know the research topic, sent relevant information to interviewee, use appropriate location and clothes in the interview and make opening comments before starting. The research topic is in two parts: the organizational part and the theory part. The basic background of the organization was gathered before the interviews and literature about subject was read. During the interviews, interviewer knew the research topic and that helped with credibility during the interviews.

Interviewees were sent the main themes in good time before the interviews. Sending the list of themes provides validity and reliability as the interviewee can gather knowledge prior to the interview (Saunders et al. 2007, p. 328). In this study the interviewees were also sent a privacy policy as their personal information was gathered during the study. Privacy policy had to be accepted by the interviewee to conduct the interview. It was created according to GDPR policies (see https://eugdpr.org/the-regulation/).

The interviews were conducted in the conference rooms of the case organization. This provided a convenient, comfortable and peaceful place for both participants. These three features were supported for location by Saunders et al. (2007, p. 329). Appropriate clothing was worn during the interview. Saunders et al. (2007, p. 330) propose wearing clothing that is generally accepted for the setting.

The last part before starting the questions was to conduct opening comments. It is the interviewee's responsibility to start the opening comments, which are also related to credibility and interviewee's confidence (2007, pp. 330-331). Opening comments provided a way to introduce the topic to the interviewee and the goals for the interview. Before the start also privacy policy was explained and confirmed from the interviewees.

After the opening comments the planned interview could start. The interviews followed the structure in *Appendix A*. As these were semi-structured interviews there were added questions when needed, for example to explain the subject mentioned further. The semi-structured interviews flowed well and provided good discussions.

During the interviews, notes were taken and audio was recorded. This is the first step of the analysis plan adopted from Burnard (1991). The plan was created from the article mentioned with slight modifications. The interviews were recorded, and this provided the possibility of listening the interviews, which lead to selection of listening the interviews instead of reading through in stages 2 and 7. The final 14 stage plan for interview analysis is shown in *Table 8.*

***Table 8.*** *The analysis process of the interviews (Burnard 1991).*

| Stage | Task |
|---|---|
| 1 | Make notes of the interviews and think about categorizing during the interviews |
| 2 | Listen through records and make notes of general themes |
| 3 | Use open coding to generate more codable data |
| 4 | Make a list of the categories |
| 5 | Refine the categories list |
| 6 | Enhance the validity of the list |
| 7 | Listen through records with the categories |
| 8 | Code the open coded transcripts with finished categories |
| 9 | Cut each coded category section together |
| 10 | Paste the cut-out sections with appropriate headings |
| 11 | Selected respondent is asked to check the appropriateness |
| 12 | File the sections together |
| 13 | Start the writing up process |
| 14 | Link the data with literature about the subject |

The stages from 2 to 6 focuses on creating categories for the interview analysis. First part is to create general themes, which were easy to generate as the interview was structured on four themes. A fifth theme of methods was added to four main themes. The final themes listed were:

- Background and motivation
- Strategic change effects
- Methods
- Barriers and enablers
- Suggestions for improvements.

The list was refined to have sub-categories under them, for example methods had indicators, types, dimensions and direction of information flow. After this the list was verified with one interviewee. The final themes list for analyzing is in the *Appendix C*. Open coding in stage 3 means labeling or naming the words, sentences or paragraphs to generate labels for the data (Saunders et al. 2007, pp. 509-510)

The stages 7 to 12 focused on linking the interviews with the earlier themes. This means that the open coded interviews from the stage 3 were linked to a theme. In practice there

were five different colored highlighter pens, which each correspondent one theme. Highlighters were used to highlight every open coded answer from the interviews. This led to all the answers belonging to one theme. The answers were then compiled with corresponding themes. After this an interviewee was asked to check the appropriateness of the answers to the themes list. This led to one verification round as an opinion had been miscategorized.

After the verification the writing process could began. The interviews were analyzed before the surveys, which meant that the analysis had a sequential approach (Creswell 2014). The approach involves two parts, which starts by analyzing the qualitative data. Then the second phase involves quantitative data that builds into the first. The main challenge of the approach is to focus on right qualitative findings that are supported with the quantitative findings (Creswell 2014).

The survey was timed to start after the interviews, but as one interview had to be cancelled the survey started day before the last interview 28.05.2019. The last answer was given on 13.06.2019. This leads the results being obtained in 17 days' time. A convenience sample was used when conducting the survey. The survey was first tested on two respondents and no modifications had to be done. Then the survey was sent to middle management in the case organization by email totaling 35 employees.

The tool used for the survey is called ZEF. It was the survey tool used inside the case organization, so it was the natural choice. The tool provided a direct link to the survey, which was sent to the respondents. The survey itself was answered in browser and needed no additional software installed. No supervision was done during the survey and respondents were free to answer the survey during anytime during the timeframe.

A total of 18 answers were given from 35 surveys sent, which of 13 was acceptable. Answers were disqualified for having less than 50% of questions answered, as it meant either that they had no knowledge of the subject or that they had not completed the survey to the end. The final answer percentage was 13 / 35 ≈ 37,1%. Survey questions and results are found in the *Appendices B, D, E* and *F.*

Saunders et al. (2007, pp. 428-429) propose that quantitative data analysis starts by exploring the data. This means using different diagrams and visualization to help understand the data. The survey tool ZEF provided a good quick look on the data with ready-made visuals as seen in *Figure 12,* which shows the raw data visualized by question number from the first part of the survey.


***Figure 12.*** *ZEF summarization of the survey results.*

As the interview is analyzed before the survey it provides a good guide on analyzing the results. Saunders et al. (2007, pp. 427-429) adds that research questions and objectives are kept in mind during the exploration on the data. The exploration was done using the ZEF visualizations with notes made of the observations. The raw data from the survey was downloaded from ZEF for the analysis chapter. The raw data was analyzed with Microsoft Excel. The first step was to remove the disqualified answers from the dataset. This left 13 answers to be analyzed as earlier mentioned.

Statistics usually describe two different aspects: the central tendency and the dispersion (Saunders et al. 2007, p. 444). There are three different ways to measure central tendency: mode, median and mean (Saunders et al. 2007, p. 444). The most used measure for central tendency is the mean, which is also known as the average. It takes account in all the data values in the data set. This is calculated for all the questions and the three sections. The section mean is calculated using the question means as the questions have uneven number of answers.

The survey dispersion is calculated using two different measurements: standard deviation and standard error of the mean. Standard deviation describes the spread of the data (Saunders et al. 2007, pp. 447-448) and standard error of the mean measures the accuracy of the population mean (Duignan 2016). Standard error of the mean is used in graphs to visualize the possibilities of the mean position.

# 5. ANALYSIS

The analysis chapter is divided into two different parts: “Interview” and “Survey”. The main goal of the chapter is to analyze the primary data that was collected during the study. The chapter starts by recapping the current organizational state. Following the recap is the analysis of the primary data in sequential approach. The analysis is started with interviews followed with the survey analysis. Survey analysis is linked with the earlier interview analysis providing a broader perspective to the subject.

The organizational strategy change provided a way to redo processes linked to knowledge sharing, for example segment managers and steering groups have regular meetings in the present state. The study is done during the strategic change where the organizational structure has been done including the six segments, but the other changes are still work in progress. The other changes include other aspects that can be linked to the three main goals of the strategy change. Knowledge sharing in the organization got a major role during the change. Information sharing and competence development was named one of these main goals where the other two goals were employee and customer satisfaction which both can also be linked to knowledge sharing. This study now analyses first briefly the past state and then in more depth the present state of knowledge sharing during the strategy change.

## 5.1 Interview

The interview analysis follows the Burnard’s (1991) guide introduced in chapter earlier with writing up process and linking the findings with theory. The chapter is structured in a chronological order first starting from past state problems and enablers. Then second, moving to both inactive and active methods of knowledge sharing. Third part introduces the present state findings and fourth part the suggestions that came up in the interviews. Tables are presented in each part to summarize the findings. The table contents are ordered the same order they were mentioned in the interviews.

### 5.1.1 Past State Problems and Enablers

This part analyzes the past state problems and enablers that were mentioned in the interviews. Starting from organizational problems analyzed from the interviews in *Table 9.* From there we move to identify the enablers of knowledge sharing. The goal of the

part is to analyze the past organization and collect a list of problems and enablers from the interview.

In the introduction the past organizational structure was introduced as three segments which mostly were based on business area and teams either based on project or location. The first problem in the old organization was the information flow between the segments which was mentioned in four of the eight interviews. One said that in the managerial level (team leaders and upwards) there were not much communication (Personal Interview 5) and other one that between projects there were not much discussion (Personal Interview 7).

Four of the eight also saw that the problem was sharing culture or that there was no systematic way of sharing information. One of the interviewees highlighted: “the sharing culture on lower levels was not clear” (“Jakamisen kulttuuri alemmilla tasoilla ei ollut selkeä”) and that the projects had different sharing methods which raised more questions than answers (Personal Interview 7).

One mentioned that information sharing was highly informal and if you knew where to look for you might find the right information (Personal Interview 2). Same kind of view was given by the other management member when asked about knowledge sharing in past organization: “If you happen to knew a person who has the knowledge you might get knowledge” (“Jos satuit tietämään henkilön, joka tietää asiasta, saat tietoa”) (Personal Interview 1).

Finding, facilitating and documenting knowledge was a problem also as the tools were not good for the job. Three of the eight interviews said that tools provided did not do the job well. “We were missing a tool for internal knowledge sharing” (“Työkalu sisäiseen tiedon jakamiseen puuttui”) (Personal Interview 1). One especially said that it was easier to find the right person to ask than try to find it from the documents in repositories (Personal Interview 4).

The next problem was just the lack of motivation: “It has been tried but there has not been enough motivation” (“Yrityksiä on ollut, mutta motivaatiota ei ole ollut”) (Personal Interview 7) and another one: “There was a reluctance to the knowledge sharing, because nobody knew how much resources could be used on it” (“Haluttomuus lähteä edistämään tiedon jakoa, koska oli epäselvää kuinka paljon siihen voidaan käyttää resursseja”) (Personal Interview 6).

The problems were also present in the managerial level. Five out of the eight interviews said that there were some problems in the higher management levels: not enough time for everything and general managing was challenging as the segments were large with

about hundred employees. Adopting new technology was impossible for managers to handle because of large and dispersed segments.

High hierarchy was also a problem as said: “Knowledge sharing was present only in higher level” (“Tiedon jakaminen ollut ylhäällä.”) (Personal Interview 7). As managers tend to have more control of what they can do, and lower level employees had no clear rules or ways to share information the sharing culture was dull and became inactive.

Location of the employees was a problem presented by three interviews. Two interviews presented the problem that some employees were not even at own premises which included also another aspect on how to reach them and keep them updated on organizational matters (Personal Interview 5; Personal Interview 6). Also, sharing the information to another city was a problem (Personal Interview 4).

Only one of the interviews brought up the lack of indicators and measuring information sharing as a problem in the past organization (Personal Interview 4) . The indicators are discussed more thorough in the next “Methods of Knowledge Sharing” -part of this chapter.

Teams were mainly based on locations and projects which became a problem as the information began to silo inside the projects and segments. Information silos were mentioned in four of the eight interviews as a problem in the past organization: “There were three segments and the information was siloed inside the segment” (“Oli kolme segmenttiä ja tieto siiloutui segmentin sisälle”) (Personal Interview 8).

Four of the eight interviews also saw a clear problem in strategy of the company or segment: there was no focus. This can be also linked to managerial problems as they had no time to assess the state of the segment and that the segment steering groups that were supposed to guide the segment had no official meetings (Personal Interview 1). The problems of past organization are listed in *Table 9*.

***Table 9.*** *Problems that arose in the past organization.*

| **Problem** | **Mentions** |
|---|---|
| Information flow between segments | 4 / 8 |
| No systematic information sharing / no information sharing culture | 4 / 8 |
| Finding the information | 2 / 8 |
| Tools provided | 3 / 8 |
| Lack of motivation | 2 / 8 |
| Problems in management (time, new tech) | 4 / 8 |
| High hierarchy | 1 / 8 |
| Location of employees (out of own premises*) | 3 / 8 |
| Measuring and indicators | 1 / 8 |
| Information siloes | 4 / 8 |
| No clear technological focus | 4 / 8 |

These problems presented were in the old organizational structure. The new structure was proposed to solve the problems in knowledge sharing with different measures. These are discussed in the part “Present State Problems and Enablers”. Now the discussion leads to enablers of the knowledge sharing in past organization. Most of the enablers discussed in the interviews were the tools and methods used.

Different technological tools were listed as enablers for knowledge sharing: communication platform “Mattermost” and videoconferencing with especially company-wide info both were seen good by three of the eight interviews. Also, different presentations from projects or demos were important part of knowledge sharing before the organizational change (Personal Interview 3). Email and email lists were also established as good enabler for easier knowledge sharing (Personal Interview 2).

There was clearly only one established routine: weekly team meetings (Personal Interview 2; Personal Interview 5). One interview also added that it was good routine when everyone followed it (Personal Interview 5). Stating also the fact that everyone was not having these weekly meeting routines. This was mainly because some teams were in customer premises and saw those irrelevant to their job (Personal Interview 5).

Another enabler of knowledge sharing was blog texts and videos (Personal Interview 6). Videos were good as they offered joy for longer time than other methods (Personal

Interview 2). Knowledge sharing was also happening with company-wide fun-days which usually included videos of the stuff done (Personal Interview 6).

The last enabler mentioned was the project standards. Project standards and especially the quality standard was a good enabler for the knowledge sharing as it forced the projects to work systematically to share knowledge (Personal Interview 1). Even though in one interview it was said that inside the project the knowledge sharing was not working (Personal Interview 7). The enablers are summarized in *Table 10* with interviews mentioned.

***Table 10.*** *Enablers of knowledge sharing in past state.*

| **Enabler** | **Interview** |
|---|---|
| Technological tools | 4 / 8 |
| Established routines (weekly team meetings) | 3 / 8 |
| Different methods to share (blogs, presentation, videos etc.) | 2 / 8 |
| Standards | 2 / 8 |

If a quantitative look is given to past state having eleven problems and four enablers there was a clear organizational problem in hand. Though no straight analysis can be given from the number of enablers and problems, but the interviews had clearly stated that there were many problems and as we can see not too many enablers. In the next part we discuss the methods which some of them were already mentioned in this part.

### 5.1.2 Methods of Knowledge Sharing

This part compiles all the methods of knowledge sharing that were mentioned in the interviews. Knowledge management systems (KMS) can be divided into two parts: KM-practices and KM-tools (Centobelli et al. 2018). KM-practices are the methods and techniques that that support the KM processes and KM-tools are the IT systems supporting KM. In this part both past and present KM-practices and KM-tools are listed. Part also discusses the dimension of information shared and indicators for knowledge sharing. Brief discussion of the direction of knowledge flow is in the end of this part.

The methods mentioned in the interviews are categorized in three different categories: Communication tools / platforms (*Table 11*), meetings (*Table 12*) and other methods (*Table 13*). *Table 11* includes the KM-tools as *Table 12* and *Table 13* the KM-practices. All the methods have mention if they are active in present state or not and the interviews those were mentioned in. It was mentioned that in this phase of strategy change it is proposed that segments can choose their knowledge sharing methods which suits them

the best and test out different methods (Personal Interview 2). At the time of the interviews it was known that one segment actively sought out new ways to share information even though it was suggested for every segment to try. This means that the active methods listed are relatively static and thus are relevant to the study.

***Table 11.*** *Communication tools and platforms mentioned.*

| **Method** | **Active** | **Interview** |
|---|---|---|
| Mattermost | X | 6 / 8 |
| Email and email lists | X | 2 / 8 |
| Skype | X | 2 / 8 |
| Virtual rooms | X | 1 / 8 |
| Online courses | X | 2 / 8 |
| Videos | X | 1 / 8 |
| Intra | X | 3 / 8 |
| Confluence | X | 3 / 8 |
| Company Family | X | 2 / 8 |

*Table 11* only discusses the tools and platforms as technology to help knowledge sharing. All the *Table 11* tools expect the company family can be found from recent study (Centobelli et al. 2018) that included 61 SMEs. One conclusion from the tools compared to list in the earlier study is that the case organization used older tools than seen in the research article, for example there is no internal social media or data mining used in the case organization.

Even though technology has brought out many options for knowledge sharing email has been keeping up the top spot as the most used and reliable knowledge sharing method even surpassing face to face discussions (Snyder & Eng Lee-Partridge 2013). In the interviews only two of the interviews mentioned email even though it is in active use. Both interviews also had mentioned ready-made lists of respondents for easier and faster using to manage groups. Email also offers a reliable method for knowledge sharing in one to one discussion (Snyder & Eng Lee-Partridge 2013).

Mattermost is a team collaboration and messaging application that can be deployed to cloud (Mattermost, 2019). A study revealed that in university environment virtual chat rooms deliver low threshold place to ask questions but on the negative side can cause information overload (Tuhkala & Kärkkäinen 2018). Mattermost in the case organization has technology specific, general, off-topic and hobby channels. Six of the eight interviews

mentioned Mattermost in some context. No negative comments were said about Mattermost and positive comments were related to low threshold of asking and sharing information. Two segments were mentioned having own segment channel where the segment can discuss their internal matters mostly technology related or information from management. Though the other one said that the segment channel is sometimes quiet.

Skype offers instant messages, voice and videocalls (Skype, 2019). Two of the eight interviews mentioned Skype as a knowledge sharing method used. Skype is in active use in the organization. One reason why Skype and email were not mentioned as knowledge sharing methods might be because those have embedded themselves to everyday life. Mattermost is a recently brought tool compared to Skype and email and might be the reason it was mentioned in more interviews. Results does not correlate how active the tools are but more of how the interviewees viewed the tools as methods for sharing.

Skype offers videoconferencing and the case organization also has video conference available in their meeting rooms to other offices. One of the interviews mentioned video conferences as a good method for knowledge sharing: “video meeting rooms, those are good” (“videoneukkarit, ne on hyviä” (Personal Interview 4). Those offer an easy to way to communicate between offices and with groups. Mostly video conferencing is used from one to many but can be used one to one also.

Training the skills of a member of the organization is also knowledge sharing (Argote & Fahrenkopf 2016). In the case organization there has been one company wide online course. It provides a great way to teach new things for example, related to security matters or company policies. The case organization can follow who has completed the courses to measure the course completion. Two interviews mentioned the online courses as method for knowledge sharing.

Three of the interviews mentioned videos as a method of knowledge sharing. In this context videos means for example, instructions or demos that have been filmed for future use. One said: “videos are good and those have been used for good time” (“videot ovat hyviä ja niistä on ollut kauan iloa”) (Personal Interview 6). One also said that mostly the videos have been for fun use but there could be a place for internal Youtube kind platform for sharing them (Personal Interview 5). Videos also offer a great way to share to many people and in one case study it offered good place for further discussion after client events (Skok et al. 2013). Other study showed that audio-visual instructions gave the highest influence on organizational and skill related knowledge sharing (Khera & Gulati 2015).

One problem in the old organization was finding the knowledge. Four of the methods listed in *Table 11* offers a search function: intra, confluence, company family and Mattermost. Intranet is an internal communication platform with features like news, blogs and documents sharing (Skok et al. 2013). Intranet in case organization offers search function but three interviews said that searching was hard or searching only works if the key words are known. That makes intranet hard to use and studies have shown that easy to use tools are preferred to be used in daily communication (Snyder & Eng Lee-Partridge 2013) which explains why intranet is not used actively for knowledge sharing in the case organization.

Confluence is an open shared workspace for organizations which can be used by single teams or by the whole organization (Confluence, 2019). Confluence was mentioned in three interviews where one said: “Confluence is easier to use (than intra)” (“Confluence on helpompi käyttää”) (Personal Interview 1). It also offers a search function which was not mentioned in the interviews. The reason might be as every team has their own confluence and searching is not needed yet when workspaces are small and manageable. In one case example project managers had problems sharing information as they lacked in standardized templates in Confluence (Santos et al. 2012). This should now be adopted before it becomes a problem as Confluence is used more and more in the case organization.

The next, company family tool, is closely linked to intra as it is a part of it. It is a list of all employees, with filters and search functions given to help searching the right person. Each employee has email, team name etc. listed in their profile. In the company family skills can be added to own profile. One interview mentioned that it could be used to search for the person with right skills when needed (Personal Interview 2). One also stated that now the tool does not work as everyone has not added their skills (Personal Interview 3).

Next we discuss the meeting routines inside the case organization. These belong to KM-practices in the case organization. In total eight routines were found and seven of those were active. The meeting routines are listed in *Table 12*.

***Table 12.*** *Meeting routines in case organization.*

| **Method** | **Active** | **Interview** |
|---|---|---|
| Ask CEO -hour | | 1 / 8 |
| Company-wide info | X | 3 / 8 |
| Technology focused meeting | X | 1 / 8 |
| Segment monthly meeting | X | 2 / 8 |
| Weekly team meeting | X | 7 / 8 |
| Team leader morning | X | 2 / 8 |
| Segment manager's bi-weekly meeting | X | 4 / 8 |
| Steering group meetings | X | 1 / 8 |

The first routine in *Table 12* was the only one not active in present state. The "Ask CEO -hour" was a concept tested at some point in the case organization. It was abandoned at some point and an alternative was given but not activated that management team members or some of them could continue the activity. Everyone could attend the meeting as it was kept in virtual conference room and employees were free to ask questions concerning them. (Personal Interview 2) This could still offer a great way for employees to ask different questions from management and thus also lower the gap between hierarchies the case organization by bringing the conversation closer to lower levels.

The next one "company-wide info" is also kept in virtual conference room and is still active. Three interviews mentioned it in their interviews. One said that in the future more information about segment to outside could be shared there (Personal Interview 7). This could offer a way to break the segment silos that were introduced in the past problems. Now it provides a way to share basic information for whole organization (Personal Interview 2).

Technology focused meetings were one of the routines that was not yet company-wide but in the future can be expanded for everyone interested in to join the meeting (Personal Interview 8). It was also proposed that the presentations kept are then posted to either Confluence or intra for everyone to see (Personal Interview 8). This answer also showed that there are no rules now where the information on single topic should be saved to.

Two of the six segments had some sort of segment monthly meeting which everyone on the segment can join. In one of the segments it provided the way of discussion the newly adapted technologies and presentation of demos for whole segment. This was one of

the ideas which brought the technology focused meetings to surface (Personal Interview 8).

Every team has a weekly team meeting where they are free to discuss aspects of their work. There are no real guidelines but mostly these are for reporting project and work statuses, for example sales team reports their weekly sales activities (Personal Interview 2). Segments had teams also working outside case organization premises and these teams usually had their own meetings with the client organization and did not have the weekly team meetings other teams had.

The next three meetings are all for only specific people in the organization. “Team leader morning” is for team leaders, “segment managers bi-weekly” is for segment managers and “steering group meetings” are for steering group members. These all have their own agenda which was not discussed further in the interviews. Steering groups were introduced in background information chapter. Main goal of these meetings is to provide specific information that is especially needed by the people attending.

***Table 13.*** *Other knowledge sharing practices used.*

| **Method** | **Active** | **Interview** |
|---|---|---|
| Lessons Learned | X | 1 / 8 |
| Ad-hoc information sharing | X | 3 / 8 |
| Presentations (tech brief/demo) | X | 3 / 8 |
| Mentoring | X | 1 / 8 |
| Project day | | 2 / 8 |
| Customer reporting | | 1 / 8 |

*Table 13* lists the rest of the methods that did not fit the groups earlier. Lessons learned is related to project management and especially the project managements standard procedures. One said: “Lessons learned is one of the key methods in project work” (“Lessons learned on yhtenä keskeisenä projektityöskentelyssä”). Same interview also proposed that the lessons could be shared more than once in the end of the project as the projects tend to be long (Personal Interview 1).

Three interviews mentioned ad-hoc information or face to face knowledge sharing as a method. One said that it was only applicable in one of the offices as it was bigger than others thus had more employees and more knowledge in it (Personal Interview 2). One also said that in their segment it was particularly easy to just walk to another member’s desk and ask them as the teams were mostly centrally located (Personal Interview 8).

Presentations were discussed earlier in little extend in some of the meeting routines, but this refers more to creating presentations to explicitly share the knowledge that you have gathered of something without the need of presenting it. It can also be presented in company-wide info or team meeting, but the main point is to have documented information of the subject that everyone can read or watch. The presentations were all mentioned as ways to share tacit knowledge in the organization. This type of knowledge sharing allows both tacit and explicit knowledge to be shared (Argote & Fahrenkopf 2016).

Mentoring was a new activity for knowledge sharing in the case organization. It is a way for new project managers to get knowledge from the more experienced project managers (Personal Interview 2). It is in an early stage and the results of the method working are not known yet in good extend.

Two of the last ones were not active methods anymore. The first one is “project day” which was introducing different projects to mainly customers but also to company employees. This provided a way for everyone to see outside their own perspective of what everyone is doing inside the organization (Personal Interview 3). The second one “customer reporting” was a method that was defined as heavy but good (Personal Interview 3). The goal of it was to report what was happening and planned with the client, but at some point, the method was dropped out. As the method was heavy, the dropping might be related to segment managers having too much on their plate before the organizational change.

One question of the interview was to about how these methods work. The findings are in *Figure 13.* None of the interviewees said that the methods are not working at all. Three of the eight said that methods work well and five said something along neutral, for example “works moderately” (“toimii kohtuullisesti”) (Personal Interview 2) or “could be more proactive” (“voisi olla proaktiivisempaa”) (Personal Interview 3).

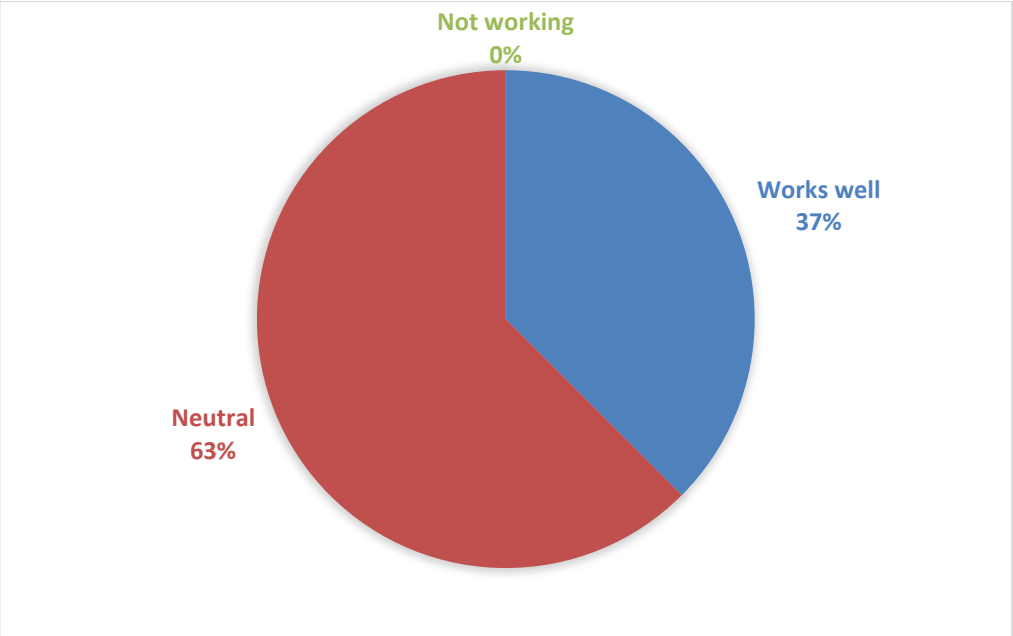


***Figure 13.*** *Question "How the methods work?" results.*

One also added that depends on the context asked; some offices and employees are very active but there are a lot of discrepancy between these. Other things mentioned was that culture is not proactive enough (Personal Interview 3; Personal Interview 1) and strategy must be enhanced (Personal Interview 5). One said that there are enough methods, but systematic planning could enhance the sharing (Personal Interview 2).

It was also answered to the same question in *Figure 13* that results should be measured to know how the methods work (Personal Interview 5). This leads nicely to next question about measurement of knowledge sharing. The results are in *Figure 14.* Two of the eight said that knowledge sharing is not measured systematically but some measurement is done. Six others said that no measurement is done at all. The two that mentioned some measurement or indicators had them relating to their own position in the case organization or by their own interest in the subject.

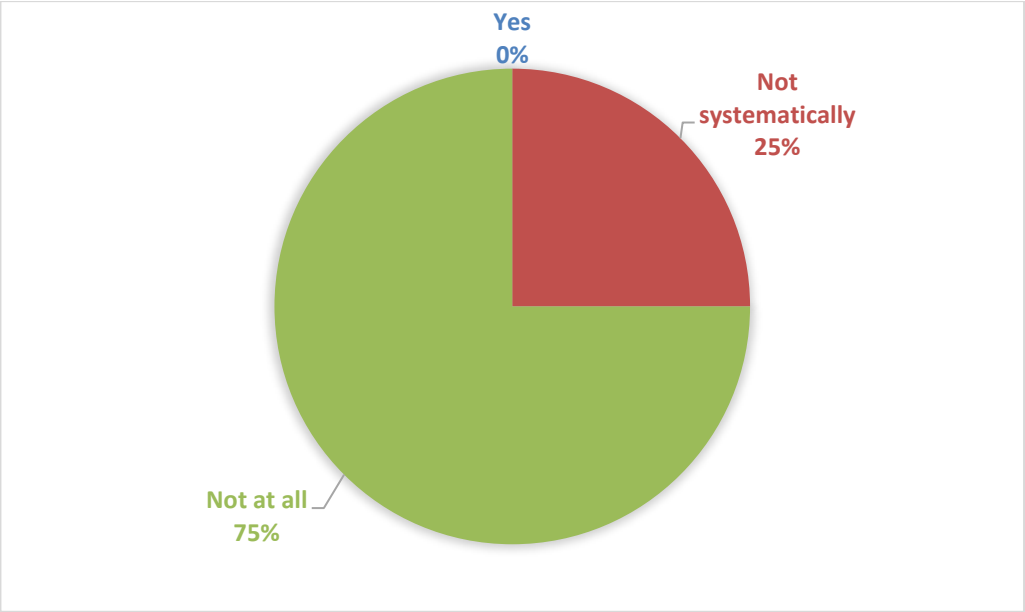


***Figure 14.*** *Question "Is knowledge sharing measured?" results.*

One said that for example, safety instructions and other must-know information are measured (Personal Interview 2). Other one said that no systematic measurement is done but some criteria had to be made to know that knowledge sharing needs enhanced and was selected as part of the strategy change (Personal Interview 5). This leads to think that the knowledge sharing was not measured by indicators but by personal views of the subject or by hearing from employees except the must-know information earlier mentioned.

Three of the interviews also raised the question of how the knowledge sharing should be measured. One emphasized that this was also a key question in the first workshop which was introduced in the introduction (Personal Interview 6). This leads to believe that indicators could be wanted, but there is no knowledge of how to create them or what to measure. This is discussed further in the next chapter.

The type of knowledge shared is not defined by the case organization (Personal Interview 1). Most of the information is tied to resources, clients, technology, project management (Personal Interview 1) or company news (Personal Interview 2). Also, presenting the individuals or groups know-how was one type of knowledge shared which is basically the tacit knowledge of the individual or a group (Personal Interview 7).

Resources were also one key knowledge that was shared (Personal Interview 5). Mainly this was regarding to human resources and project resources. Also, the need for more resources from recruitment point of view (Personal Interview 8). The segment managers report the project resource status to management team (Personal Interview 8).

Inside the segment the technological goals and trends are shared and discussed, sometimes also shared to management team and steering group (Personal Interview 4). One interview stated that most of the communication inside the segment is news from management which the segment manager shared forward to team leaders and they can then discuss the news in weekly team meetings if necessary (Personal Interview 6). Two interviews mentioned that technology or know-how was shared outside of the segment (Personal Interview 6; Personal Interview 8).

Segment steering groups has a place in knowledge sharing of the segment. Those especially share the knowledge regarding to trends and goals for the segment (Personal Interview 1) as well as general news and needs of the segment (Personal Interview 4). The trends and goals are discussed inside the segment with members but also with the segment steering group. Segment steering group defines the goals of the segment and the discussion to the group can come from either inside or outside the segment.

In project work there are also confidential information involved. This has been accounted in the work and is only shared with people needing it (Personal Interview 1). Between the projects most of the information is general, for example lessons learned or technology specific information (Personal Interview 3).

It was noted that projects have a lot of tacit knowledge in the form of relationships with customers, technology specific knowledge and lessons learned (Personal Interview 4). Tacit knowledge was mentioned also to be shared in team meetings with presentations (Personal Interview 5). Most other of the information shared seemed to be explicit in nature, for example the resources, client information, project statuses and news.

The methods are now listed with types, dimensions and the people those reached in *Table 14.* The methods are listed in the same order those were introduced in the this part earlier. Non-active methods were removed from the list and meetings were categorized under one category “Meetings”.

The “Information type” in *Table 14* includes the types from the information hierarchy. “D” refers to data, “I” to information, “K” to knowledge and “W” to wisdom. In the information types section information as a type is present in most of the methods with 12 of 15. Knowledge also has a good share with 9, but data and wisdom only present in 1.

The “Dimension” in *Table* 14 includes the two information dimensions. “E” refers to explicit knowledge and “T” to tacit knowledge. The dimension columns have explicit on 6, tacit on 2 and both on 7. There are not many tacit only methods, but then again, the methods that have both dimensions rely heavily on tacit knowledge, for example Mattermost or Skype with specific technology related questions. These belong to

externalization or socialization depending on context of the knowledge sharing in Nonaka's (1994) SECI-model.

The categories in "Amount reached" in *Table 14* is "S" for small, "M" for medium and "L" for large. The amounts are as follows: small < 10, medium 10<100 and large > 100. All categories have methods in them, and three methods have all categories listed as available. Every category has methods that solely fit only one category. The amount of methods looks balanced for every category.

Also, most of the knowledge-type information is shared to medium or smaller group and those which have large in amount reached selected have also information as type except videos. Same is in dimensions where tacit knowledge is mostly shared to small and medium amount of people.

***Table 14.*** *Methods listed with types, dimension and amount of people reached.*

| | **Information type** | | | | **Dimension** | | **Amount reached** | | |
|---|---|---|---|---|---|---|---|---|---|
| Method | D | I | K | W | E | T | S | M | L |
| Mattermost | | X | X | | X | X | X | X | X |
| Email and email lists | | X | | | X | | X | X | X |
| Skype | | X | X | | X | X | X | X | |
| Virtual rooms | | X | X | | X | X | X | X | X |
| Online courses | | X | | | X | | | X | X |
| Videos | | | X | | X | X | | | X |
| Intra (blog posts*) | | X | | | X | | | | X |
| Confluence | X | X | X | | X | | | X | |
| Company Family | | X | | | X | | | | X |
| Company-wide info | | X | | | X | | | | X |
| Meetings | | X | X | | X | X | | X | |
| Lessons Learned | | X | | | X | X | | X | |
| Ad-hoc information sharing (*f2f) | | | X | | | X | X | | |
| Presentations (tech brief/demo) | | X | X | | X | X | | X | |
| Mentoring | | | X | X | | X | X | | |
| Sum | 1 | 12 | 9 | 1 | 13 | 9 | 6 | 9 | 7 |

The methods, indicators and types of knowledge in the case organization has been now discussed. One more thing to discuss is the direction of information flow starting from vertical flows and moving then to horizontal flows. The resources and project statuses flow vertically from project managers to segment managers and last to management team so basically upwards in the organization (Personal Interview 8).

The news usually comes from management team and flows downwards. Sometimes first to segment managers who pass it along to team leaders and they discuss the news in weekly team meetings (Personal Interview 7). It was mentioned that information from teams and team meetings does not flow upwards (Personal Interview 3). Inside the teams though at least people sitting close by share knowledge actively (Personal Interview 8). Most of the information is flowing from higher hierarchies to lower ones.

The horizontal flow is a different aspect. Inside the segments there was no information flow between teams at least in one segment (Personal Interview 3). Between projects though the flow was seen to work (Personal Interview 3). So, between teams in segment flow is not working but between projects it is better. Horizontal flow between the segments is done in higher hierarchy through the bi-weekly segment meeting (Personal Interview 3) One also said: “There is not much connections outside coffee breaks and lunch.” (“Kahvitaukojen ja lounaiden ulkopuolella ei paljon yhteyksiä”) (Personal Interview 6).

Information flow vertically works mainly with news and other information from management downwards vertically, but upwards the flow is not seen as good. The horizontal flow between segments works with segment managers and projects and also the lunch and coffee breaks make some information flow between segments on lower levels as well, but there is room for enhancement.

### 5.1.3 Present State Problems and Enablers

The goal is now to introduce the present state enablers and problems. This chapter begins by introducing solutions to the past state problems in *Table 15*. The solutions listed here are the ones provided by the case organization. The research suggests solutions and improvements in the discussion and conclusion chapters of the study.

***Table 15.*** *Past problems with proposed solution.*

| **Problem** | **Solution** | **Interview** |
|---|---|---|
| Information flow between segments | New methods and practices | 4 / 8 |
| Managing the segment (and size) | Smaller easier manageable segment | 3 / 8 |
| Information siloes (especially in projects) | No more project specific teams | 2 / 8 |
| No clear technological focus | No more office-based teams | 4 / 8 |
| Adopt new technologies / answer to new client needs | Segments and teams have clear technology focus | 6 / 8 |
| Organizational changes were not well established | - | - |

Last part ended on the discussion of information flow which was a problem in the past organization. Especially the information flow between the segments was mentioned as a problem. New methods and practices were made to enhance this flow. One of methods was the segment bi-weekly meeting that was mentioned in the methods part earlier. This provided the segments a knowledge flow from other segments with information such as projects, technology and other interesting subjects.

The next problem was managing the segment. This had become a problem as the segments had grown a lot (Personal Interview 5). The solution was straight forward: create smaller segments that are easier to manage. This problem and solution are closely linked to next two as the new segments revised the old constraint of location or project-based teams. This then again created new teams that had a clear technological focus. The teams were now in a segment that matched their technology. Thus, also providing the segments a clear technology focus. The technology focus itself brought the possibility to name new technologies for specific teams to focus and helped with adopting new technologies.

The last problem was that organizational changes were not well established. There was no clear solution provided and it was still seen as a problem in the present state: “how to make the organization believe that this change will happen?” (“Kuinka saada

organisaatio uskomaan, että tämä tulee tapahtumaan?") (Personal Interview 2) was a question raised in one interview.

The new organizational structure clearly helped with some of the problems in the past organization. This does not mean that there are no problems in the new organization as an example the earlier question. One interview even mentioned: "Although we share a lot of knowledge, it will always be seen as a problem" ("Vaikka jaetaan kuinka paljon niin nähdään aina ongelmana").

The past organization problems are now discussed with their solutions on present organization. The present state was the goal of the study and will be analyzed further than the past state. This part introduces the problems perceived in the present state. The findings are summarized in *Table 16.*

In the theory section the first individual level barrier was the lack of time. It was already discussed that in the past state the segments managers simply had no time to do everything needed. Now it has gotten better, but still four said that the lack of time is clear problem for knowledge sharing. One said that the knowledge sharing has gotten better, but there might be even too much information (Personal Interview 4). The interviews said that in lower hierarchy an individual has no need, desire or time to share knowledge (Personal Interview 1). Motivation and time were mentioned by others as well (Personal Interview 7; Personal Interview 3; Personal Interview 4). It looks like the lack of time is still a barrier and also present in lower hierarchy.

Tacit knowledge also proposed a problem when an individual has no knowledge of the value of their knowledge or does not share it (Personal Interview 4). The problem of sharing and having knowledge available was suggested by another interview also (Personal Interview 8). These both were more on individual side where the employee does not share the knowledge because of the earlier reasons (need, time, motivation or knowledge of the value).

That also work other way around where an individual does not have courage to ask for the knowledge needed. This was proposed as a problem by one interview (Personal Interview 3). This leads to the question if the knowledge is easy to find otherwise. Two of the interviews mentioned that the search functions in company intra were hard to use and you could not find specific topics without knowing the keywords. Intra proposed also another problem: "Intra's blog feature is hard to use, especially formatting" ("intran blogi-ominaisuus on hankala käyttää varsinkin formatointi on hankalaa") (Personal Interview 3).

One problem was also present in Mattermost. If you share information in Mattermost first does anyone see it and second can anyone find it afterwards (Personal Interview 8). Overall in whole organization one said that there was too much knowledge, it was not structured, and people does not know how to search it (Personal Interview 4).

Another problem from tools was the user rights. Access is only on certain people so that confidential information is not available for everyone (Personal Interview 4). Other interview saw the same problem in projects as they had non-disclosure agreements (NDAs) (Personal Interview 1). One though said that this was already become part of normal working as many projects from the start has these agreements (Personal Interview 1).

Six of the eight interviews mentioned organizational culture as a problem in knowledge sharing. Two emphasized on the lean organizational culture which prefers more billable work and minimizing all other (Personal Interview 3; Personal Interview 2). Two others said that the resource structure does not support knowledge sharing (Personal Interview 6; Personal Interview 5).

One part of the strategy change was also new values for the case organization. One interview said that these should now be tied closely to knowledge sharing to obtain the maximal benefit from both (Personal Interview 4). One also said that there are already too many changes happening and employees are impatient of all the changes without responsible to finish them (Personal Interview 2). This problem could be tied to earlier past organization problem of changes not being well established.

Four interviews had mention of the problem that organization is missing the rules of knowledge sharing. One said: “Management has to create a good model otherwise we will stay in ad-hoc information sharing forever” (“Johtotason luotava hyvä suunnitelma, jotta ei jäädä ad-hoc tasolle tiedon jakamisessa”) (Personal Interview 5). Two others already discussed that the model should not be too tight for employees to use ways they see fit for themselves (Personal Interview 2; Personal Interview 8). For example, writing blogs was deemed too big job for some people (Personal Interview 8). The rules would activate everyone to more freely share information as now employees do not know can they use their time for it (Personal Interview 5). One also viewed the problem in other way that too defined plan can affect the knowledge sharing in negatively (Personal Interview 6).

It was emphasized also that relevant information should be shared as freely as possible and have a low threshold to share it (Personal Interview 8). The threshold should be low to also share the knowledge to different hierarchies as one pointed that the hierarchies

might be too high for everyone to share knowledge there (Personal Interview 6). One other added extending to earlier blog posting that if the work is too time consuming or hard it will not be done. (Personal Interview 3).

As the company has expanded to many different cities and offices a question rose in two interviews that should different practices be invented to different places to support them better. As the biggest office has over hundred employees and smallest ones have only around ten those could have different practices at least in office participation way.

***Table 16.*** *Problems perceived in present state knowledge sharing.*

| **Problem** | **Interview** |
|---|---|
| Lack of motivation | 2 / 8 |
| Lack of time | 4 / 8 |
| Withholding knowledge | 2 / 8 |
| Searching knowledge (unstructured) | 3 / 8 |
| Tool usage | 2 / 8 |
| Knowledge restrictions (NDA) | 2 / 8 |
| Culture | 6 / 8 |
| Lack of budget | 4 / 8 |
| Lack of systematical plan | 3 / 8 |
| Too defined plan | 1 / 8 |
| High hierarchy | 1 / 8 |
| Location | 2 / 8 |

Problems mentioned in the present state are now listed in *Table 16.* Further identifying is done in the next chapter. At this point the point was to find the problems mentioned in the interviews. Next we discuss the enablers of knowledge sharing in the present state.

First enabler is that you must have knowledge to share. Without anything to share you cannot share it. This is more important in explicit knowledge than in the tacit. Tacit knowledge sharing is more based on your own experiences as explicit is based on the knowledge databases and written reports. This was mentioned in one interview (Personal Interview 8).

All interviews mentioned tools relating to IT as an enabler to knowledge sharing. The tools mentioned were already discussed in the earlier part. There was one office specific method mentioned which was related to the ad-hoc information sharing. As one of the

offices is easily the biggest one it provides a way to share knowledge by walking to another employee's desk (Personal Interview 8).

In organizational view four of the interviews mentioned that the new organizational structure helped knowledge sharing. One said: "we can produce and refine knowledge better" ("Voidaan tuottaa ja jalostaa tietoa paremmin") (Personal Interview 3). Other one also emphasized that now the employees have a clear place in the organization which also helps the knowledge sharing (Personal Interview 7). The clear place in the organization has helped employees find others with same interest which has also had an effect in one to one communication (Personal Interview 4). This was seen happening most in the new teams (Personal Interview 7).

One enabler was also in the problems list: the systematical plan. This might have been in both as it was seen as an enabler but not yet in use. Two also mentioned the upcoming communication plan which included plan for every organizational part and project of what they should be communicating about especially to outside (Personal Interview 5; Personal Interview 4).

There was also a mention of organizational culture: "Voluntary and relaxed atmosphere, all the sharing is not completely systematic" (Vapaaehtoisuus ja rentous, kaikki jakaminen ei täysin systemaattista) (Personal Interview 6). One also added that segments have the freedom and the responsibility now to drive the knowledge sharing (Personal Interview 7).

***Table 17.*** *Present state enablers.*

| **Enabler** | **Interview** |
|---|---|
| Knowledge existence | 1 / 8 |
| Tools | 8 / 8 |
| Office size | 2 / 8 |
| New organizational structure | 4 / 8 |
| People to people communication | 2 / 8 |
| The systematical plan | 5 / 8 |
| Atmosphere and freedom | 2 / 8 |

This interview data was based on the data from about half year existence of the new organizational structure. This might explain why some of the enablers were upcoming as there was yet not enough time to think through how these should be used, or the first steps have just taken out. From *Table 17* it is seen that tools and plan are the main

enablers of the case organization in the interviewees' opinion. Other enablers are supporting these two main actors.

This part discussed the present state problems and enablers of knowledge sharing from the interviews. Main problems perceived was lack of time, budget and the non-supportive organizational culture. The main enablers were systematical plan and tools provided. In the next part the discussion leads to improvements suggested in the interviews based on the earlier views.

### 5.1.4 Suggestions for Improvement

One question in the end of the interview was about improvements to knowledge sharing. This was not the hot topic of the interviews, but everyone gave a suggestion or two. This part starts from suggestions to culture (*Table 18*) then moves to tools and practices (*Table 19*) and last is the indicators (*Table 20*). The suggestions here are based on the interviews and not the final suggestions to case company.

***Table 18.*** *Suggestions relating to culture from the interviews.*

| **Suggestion** | **Interview** |
|---|---|
| Continue relaxed knowledge sharing | 1 / 8 |
| Leading with an example | 1 / 8 |
| Rewards for knowledge sharing | 3 / 8 |
| Aspect of asking for knowledge | 1 / 8 |

First suggestions are regarding to culture as one interview said: "Culture first then the tools" ("Kulttuuri ensin, sitten välineet") (Personal Interview 7). List starts from the relaxed culture and wanting it to continue that way. Six other interviews said that there were problems in culture, and one suggests that this culture should remain. This suggests that one part of the organization works well in knowledge sharing or has no knowledge of what could be done by enhancing it.

Second suggestion is especially to management. Leading with an example has been known to have a significant effect on their followers (Loerakker & van Winden 2017). This could prove an easy method if management positioned people become more active and show the knowledge sharing practices in action.

In the culture suggestions rewarding was mentioned by three interviews. Both nominal (one mention) and monetary (two mentions) rewards were suggested. Lack of motivation was suggested by two in problems but neither of them suggested rewards as the solution

to that problem. In research it has been suggested that rewards might not be an effective way of enhancing the environment of knowledge sharing (Husted & Michailova 2002).

Last suggestion in culture is about aspect of asking knowledge. This was also linked to tools as the problem is not knowing who to ask which leads to question of how to find the person with right knowledge. The company family offers a list of skills which anyone can edit on their profiles. Searching there provides a list of candidates to ask the question from.

***Table 19.*** *Suggestions relating to tools and practices from the interviews.*

| **Suggestion** | **Interview** |
|---|---|
| More coaching | 1 / 8 |
| Creating a plan | 3 / 8 |
| Pick a responsible (person or group) | 3 / 8 |
| Suggestion of new technology | 4 / 8 |
| Enhance the searching of knowledge | 3 / 8 |

Tools and practices provide interesting suggestions for the case organization. First one is adding more coaching. This leads to more human to human contact which might enhance the tacit knowledge sharing inside the organization. Coaches have usually been longer in the organization than the employees that are coached which leads old employees' knowledge to transfer to younger employees.

The second and third suggestions are related to each other. Both tries to solve the problem where there is no concrete planning and the creating the plan has no responsible. Three interviews suggested the plan and three suggested picking a responsible which is either a group or an individual. One said: "We need to reserve time and people who are responsible for the project and its goals." ("On varattava aikaa ja henkilöitä, jotka vastaavat projektista ja sen tavoitteista") (Personal Interview 5).

Four interviews suggested a new technology to be brought into the case organization. These included company wiki (Personal Interview 1; Personal Interview 6), internal video sharing platform (Personal Interview 5) and enhancing the video conferencing tools (Personal Interview 4). Wikis have not been studied widely in organizational context. One study found in that context suggest that wikis stimulate dialogue and facilitates discussion which can also enhance the knowledge flows horizontally and vertically (Alqahtani 2017).

The last suggestion is related to problem of not finding the information. Three interviews suggested enhancing the searching of knowledge by different ways. Suggestions included searching with keywords, search function with artificial intelligence and combining all knowledge under one search. Three giving suggestions to search also saw it as a problem in the present state.

***Table 20.*** *Suggestions relating to indicators from the interviews.*

| **Suggestion** | **Interview** |
|---|---|
| Organizational indicators | 1 / 8 |
| Tool indicators | 3 / 8 |

Two suggestions for indicators were found from the interviews. First one suggests different kind of quantified plans for organization to have. This could relate closely to the plan of knowledge sharing where different groups have goals on their knowledge sharing. This could mean that one team must write a blog post every two months (Personal Interview 7) or management must send information mail to all employees from every meeting they have (Personal Interview 2).

Other way to think is measuring the activities in tools, for example how many employees are in Mattermost channels and how many messages there are in certain time (Personal Interview 3). These two could also be linked to see how the tools are used in different teams and thus provide feedback for knowledge sharing to different parts of organization.

These are all the improvements that were mentioned in the interviews. This also concludes the analyzing of the interviews. Findings included problems, enablers, tools, practices and suggestions. These findings are used in the next chapter when discussing the present state of knowledge sharing in the case organization.

## 5.2 Survey

The survey was constructed from two different researches from the KM field. Both researches had parts discussing the knowledge sharing part of KM. First part of the survey was from overall view of knowledge sharing and the two others on knowledge dimensions. There was also an open question in the end of the survey for comments on the matter. This part starts analyzing from the open question moving second to “Knowledge Sharing” then third the “Explicit Knowledge Sharing” and last is the fourth “Tacit Knowledge Sharing”. The goal is to analyze the results of the survey. The analyzing includes the parts that are deemed interesting or critical to the research.

Overall the survey was answered by 18 people where 13 had acceptable answers. The five answers taken out were disqualified for having less than 50% of the questions answered as it was possible to skip questions. The final answer percent was 37,1% and with disqualified answers 51,4%. All the respondents accepted the privacy notice and thus their answers can be used in the analysis.

The open question got five responses out of the 13 answers. One was regarding to their own status of just beginning as a team leader and said that the answers are based on earlier experience about the matter. Four others were saying that the knowledge sharing is not in good condition, for example one said “There is much to improve on this field…” These are the same results as in the interviews that there are things that needs enhancing.

### 5.2.1 Knowledge Sharing

First part of the questionnaire is about overall state of knowledge sharing. Statistics of the results are in *Table 21* and visualization in *Figure 15.* The overall results show that there are mixed results regarding the knowledge sharing. Results from the first part of the survey is found in *Appendix D.*

***Table 21.*** *Questionnaire "Knowledge Sharing" -part results.*

| **Question** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** |
|---|---|---|---|---|---|---|---|---|---|---|
| Mean | 3,46 | 3,08 | 3,00 | 2,78 | 3,00 | 2,86 | 2,75 | 3,30 | 2,92 | 2,31 |
| Std. Deviation | 0,75 | 0,64 | 0,96 | 0,42 | 0,47 | 0,64 | 0,83 | 0,78 | 0,76 | 0,72 |
| Mean Error | 0,21 | 0,18 | 0,27 | 0,12 | 0,13 | 0,18 | 0,23 | 0,22 | 0,21 | 0,20 |

*Figure 15* shows the question means with related mean error. Black line shows the neutral position of three. The higher the mean is the higher the agreement with the question statement. Questions 1 and 8 were the true positives in the first part of the questionnaire and questions 4, 7 and 10 the negatives. Other parts are neutral in the agreement.

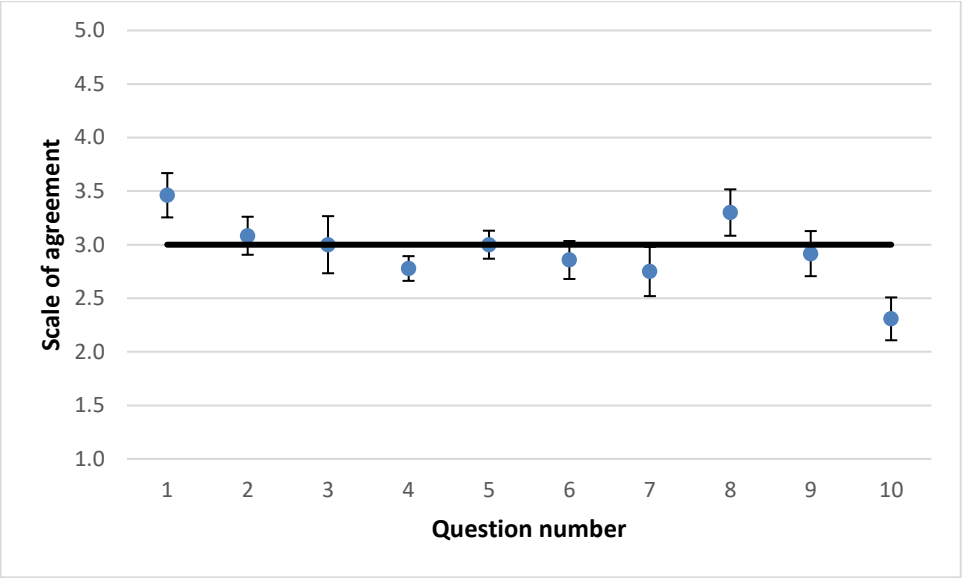


***Figure 15.*** *Questionnaire "Knowledge Sharing" -part results visualization.*

From the questions 1, 2 and 3 we can analyze that employees know the goals better than the indicators or measurement results. This leads to think that there might not be enough communication from the superiors to employees about the results of the single employee. This might be also linked to the knowledge sharing having no indicators and thus receiving the neutral opinion in the questionnaire.

The questions 7, 8 and 9 are regarding to practices and tools of KM. These have received mixed opinions with variance above the others in the part. The question 7 was practices for communicated reported data which was seen little bit under of neutral view. Though question 8 of information system timely information was over the neutral point. Knowledge sharing platforms in question 9 got a close to neutral agreement. Explicit reported data created by employees might not be in state which the employees would like to, but the information system data seems to be good as well as knowledge sharing platforms. The explicit reported knowledge might be missing due to the lack of plan of creating and disseminating them which was mentioned in several interviews.

The question 10 “In general, I am pleased with the information sharing practices” had the highest disagreement in the first part. This shows that clearly team leaders’ opinions of the sharing practices are not good which was also supported by the interviews from the higher management. This proposes that also the lower management levels saw the information sharing as not working well enough. In the interviews nobody saw the methods as not working, because there was no scale on the interview it cannot be compared straight to survey answers.

From the first part it seems like the tools provided are in good shape, but the case organization is missing the plan for reported data. This can be seen in results from

questions 7 and 9, but also from 10 which shows the it clear that something in knowledge sharing is not working.

### 5.2.2 Explicit Knowledge Sharing

This part discusses the explicit knowledge sharing part of the questionnaire results. Statistics from the results are in *Table 22* and visualization from the results in *Figure 16.* The raw results for the second part of survey is found in *Appendix E.* This part dives deeper into the explicit knowledge. From the earlier part it could be seen that explicit knowledge sharing might have some problems at least in communicating the reported data.

***Table 22.*** *Questionnaire "Explicit Knowledge Sharing" -part results.*

| **Question** | **1** | **2** | **3** | **4** | **5** | **6** |
|---|---|---|---|---|---|---|
| Mean | 2,54 | 3,00 | 2,73 | 2,82 | 2,08 | 2,92 |
| Std. Deviation | 0,93 | 0,91 | 0,86 | 0,57 | 0,62 | 0,73 |
| Mean Error | 0,26 | 0,25 | 0,24 | 0,16 | 0,17 | 0,20 |

In explicit knowledge sharing there were no true agreement with any of the questions. The highest mean with 3.0 agreement was on question 2. Four of the six questions were below the neutral line. Question 5 was also the only question below 2,5 agreement in the whole questionnaire results. The results visualization is in *Figure 16*.

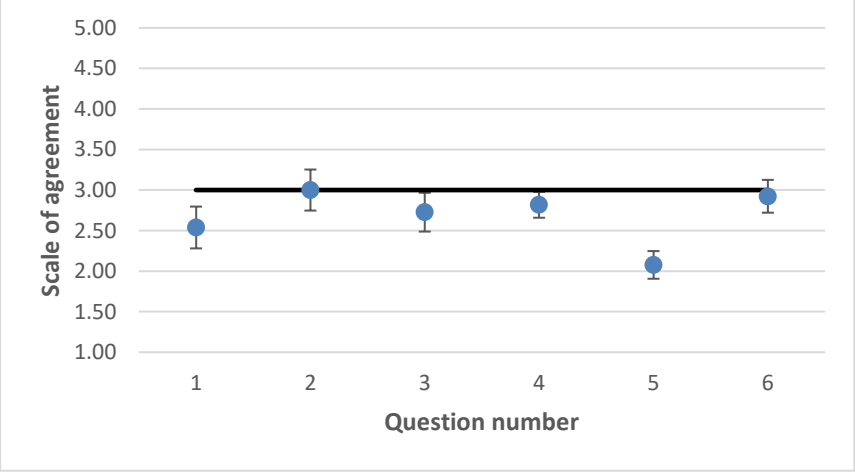


***Figure 16.*** *Questionnaire "Explicit Knowledge Sharing" -part results visualization.*

The question 1 on this was “People frequently share existing reports and official documents with members of my organization.” This question had a biggest variance and standard mean error in the part, but it was still under the neutral line. The question 2 was about sharing themselves made reports which is on the neutral line. This might confirm

the earlier conclusion that explicit reports are not shared frequently enough in team leader's opinion, but the question 2 creates confusion on the matter. The problem is that employees that create documents, for example in projects are forced to share them and this leads the second question to be higher than the first in mean average.

Question 4 "People in my organization are frequently encouraged by knowledge sharing mechanisms." is also interesting. It looks like the knowledge sharing mechanisms are not encouraging enough as the results are just below the neutral line. In the interviews it could also be noticed, for example that blogs are too big job to do and there is no smaller way to share. This might lead to conclusion that the mechanisms are not encouraging enough.

The one question that caught the eye in *Figure 16* is the question 5. It was about the training and development programs. Now it should be remembered that the strategy of the case organization stated that competence development is one of the priorities. Now this question is showing that there is not enough development done. This might be related to too close technology focus as the question states "…variety of training courses…" whereas the training might only be focused on one main competence. This survey though does not give an answer to that question.

### 5.2.3 Tacit Knowledge Sharing

The last part of the questionnaire was about tacit knowledge sharing. The theory section provided a view that in SMEs use the personalization strategy more than codification which leads to more tacit knowledge sharing. *Table 23* and *Figure 17* shows the results of the last part and all answers are found in *Appendix F*.

***Table 23.*** *Questionnaire "Tacit Knowledge Sharing" -part results.*

| **Question** | **1** | **2** | **3** | **4** | **5** | **6** | **7** |
|---|---|---|---|---|---|---|---|
| Mean | 3,15 | 3,25 | 3,00 | 3,00 | 3,00 | 3,42 | 2,75 |
| Std. Deviation | 1,03 | 1,09 | 0,96 | 0,82 | 0,78 | 0,76 | 0,92 |
| Mean Error | 0,28 | 0,30 | 0,27 | 0,23 | 0,22 | 0,21 | 0,26 |

In overall view first we can see that the standard deviation and mean error are higher in this part than in the earlier parts. There are no true negatives in this part and only one question with mean average below the neutral line. Six questions were on neutral and one is a true positive.

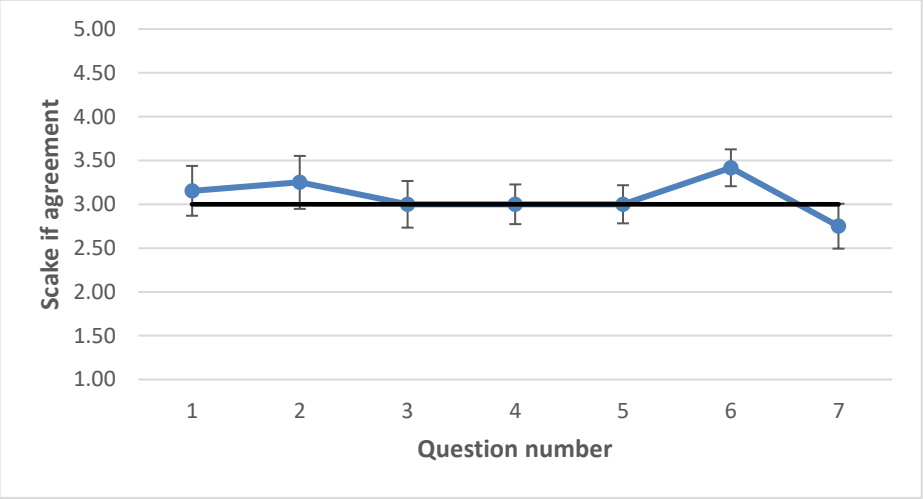


***Figure 17.*** *Questionnaire "Tacit Knowledge Sharing" -part results visualization.*

The first two questions are regarding to sharing and collecting experiences. The mean averages on both questions was over the neutral line. This means that experiences are shared and collected more than written reports and dimensionally it means that tacit knowledge is shared more than the explicit knowledge. In the interviews it was mentioned that it is hard to find the right knowledge with the search functions. This can also be seen in the survey as existing reports are not shared much, but self-made reports are shared more. Then again also experiences are shared and collected as those cannot be lost behind the search functions.

The next relevant questions are 5 and 6 which are about sharing and collecting knowledge based on expertise. It looks that question 5 of sharing expertise knowledge is lower on the scale than the number 6 of collecting knowledge when looking at mean values. This leads to conclusion that people are looking for knowledge from other people more than sharing their own experiences.

The question 7 is interesting as in the interviews it was discussed that lesson learned is a compulsory task in every project. That is the lowest score in the tacit knowledge sharing part. It was also said that this will be improved in the future by releasing these lessons also during the project and not only in the end of the project which might lead to better results in the same question in the future.

Overall view of tacit knowledge sharing might be little higher than in the explicit knowledge sharing. In quantified way the results are that explicit had four true negatives and two neutral and tacit part six neutrals and one true positive. These though cannot be compared straight to each other and conclusion should be made carefully.

# 6. STATE OF KNOWLEDGE SHARING

This part discusses the earlier analysis findings and links them to related theory. The goal is to discuss in the perspective of the research questions presented in the introduction. The chapter starts from discussing the effect of the strategy change and mainly concentrating in changes and their effects on knowledge sharing. Then the main research question of present state is brought up. First the present state is discussed regarding to theory section “Knowledge Management”. Then the present state is discussed in different levels regarding to “Knowledge Sharing Barriers” starting from first the individual level, second the technological level, third the organizational and last the other levels. All these parts include the enablers, barriers and suggestions and each level is discussed with relevant research on the topic.

## 6.1 The Effect of the Strategy Change

In summarization the study was motivated by the strategy change happening in the case organization and especially the study concentrated on the organizational strategy change happening. The main goals of the strategy change were employee satisfaction, customer satisfaction and information sharing and competence development. This study focuses on information sharing and competence development goal.

The biggest change in the case organization was in the organizational structure. New segments were introduced with better technological focus and old rules for segment and team creation were removed. New segments were smaller in size and thus were easier to manage. This left more time for segment leaders to focus on more important things.

At the same time teams got a more precise technological focus, which was supposed to help in bringing more knowledge sharing to team and segment level both horizontally and vertically. Some segments even introduced segment wide meetings to share knowledge about technologies. Though not many new practices were introduced, the few introduced in interviews were seen as positive in their opinions. For example, the segment bi-weekly provided the vertical information flow between segments that was almost non-existent before the strategic change.

Most of the problems perceived in knowledge sharing in the past state was fixed with the strategy change, for example the vertical knowledge flows between segments. The only problem that was clearly left was the well-established organizational changes. This

problem persists even in the present state and should be one of the focus points on the improvements for the case organization.

It must be mentioned that the new organizational strategy had been active only under half a year when the interviews were conducted. Thus, the interviews provided different views on how the change has actually affected and some even emphasized that they cannot yet provide accurate information on the effects. Also, some of the strategy changes and structure changes were either happening or happened after the interviews, which tells that overall view of the change effects cannot yet be given.

## 6.2 Current State

This part starts from discussing the current state which includes the tools and practices that were analyzed in part 5.1.2 “Tools and Practices of Knowledge Sharing” and the survey. The discussion starts from ground up developing from the knowledge type and dimension to overall strategy of the knowledge sharing in the organization. Discussion of how the case organization compares in the strategy to counterparts in recent studies about SMEs and KIBS. After those there are four sub-parts, which include the enablers, barriers and suggestions for knowledge sharing in the different levels introduced in the “Knowledge Sharing Barriers” theory section. Barriers are categorized in major and minor barriers to show the importance for the case organization.

In the theory section DIKW-hierarchy was introduced. It proposed that more refined information provides more value and meaning, but at the same time it becomes for embedded to an individual (Rowley 2007). Information also featured two dimensions called explicit and tacit. In the analysis chapter the methods were listed with types, dimension and amount of people for the information shared.

Theory section provided two strategies for KM called codification and personalization. An effective KM-strategy blends business, technology and human factors (Skok et al. 2013) . Hansen et al. (1999) proposes three question, which help choosing the right strategy:

1. Do you offer standardized or customized products?
2. Do you have a mature or innovative product?
3. Do your people rely on explicit or tacit knowledge to solve problems?

The case organization has standardized software, but also provides customers customized projects, for example consulting and service design. The software products are always customized for the need of the customer, which leans the first question to customized products. The second question is easy to answer as the case organization

wanted to become the main technology partner and provide all needed technology services for the customers. As the software services provided are highly customized tacit knowledge is needed to solve the problems. These three questions lean on personalization strategy, which is supported for service companies by the study of Hansen et al. (1999).

Personalization strategy relies on IT to be a facilitator for tacit knowledge sharing. In the case organization nine methods listed provided a way for tacit knowledge sharing. Tacit knowledge can be shared to others with two processes socialization and internalization in Nonaka's (1994) SECI model. All other tacit knowledge sharing methods except lessons learned provided a way to share knowledge as the type of information. One also featured wisdom as the type.

The socialization process in SECI-model meant that tacit knowledge is transferred as tacit knowledge to others. A good example in the case organization is the mentoring as a method. Mentoring offers the mentor to share own experiences and lets the mentee learn by doing with help provided when needed. This gives the mentee the best possible knowledge or even wisdom in the activity. This belongs to socialization as two members socially contact each other. It might have parts of externalization where tacit is first turn to explicit for future use, for example instructions to use certain tools typical for project manager.

Internalization is the process of creating tacit knowledge from explicit knowledge (Nonaka 1994). In the case organization many methods offered both explicit and tacit knowledge both to be shared. In text-based communication (e.g. Skype, Mattermost and blogs in intra) explicit information is shared and it can be internalized as tacit knowledge with own experiences. Though the message itself can contain the author's tacit knowledge. The conversion of tacit knowledge to explicit is known as the externalization (Nonaka 1994).

The remaining fourth process not discussed is called combination. It involves explicit knowledge to be combined with explicit knowledge. As the personalization strategy highly revolves around tacit knowledge, the combination is not as well established in the case organization. Confluence, intra and Mattermost provide a way for everyone to share their explicit knowledge but combining knowledge from many people into one is not active. There is room for improvement in the combination part. This is also supported by the survey conducted, which revealed that explicit knowledge sharing was in worse

shape than the tacit knowledge sharing when comparing the section means. Slight overlap is seen when standard mean error is calculated as seen in *Figure 18*.

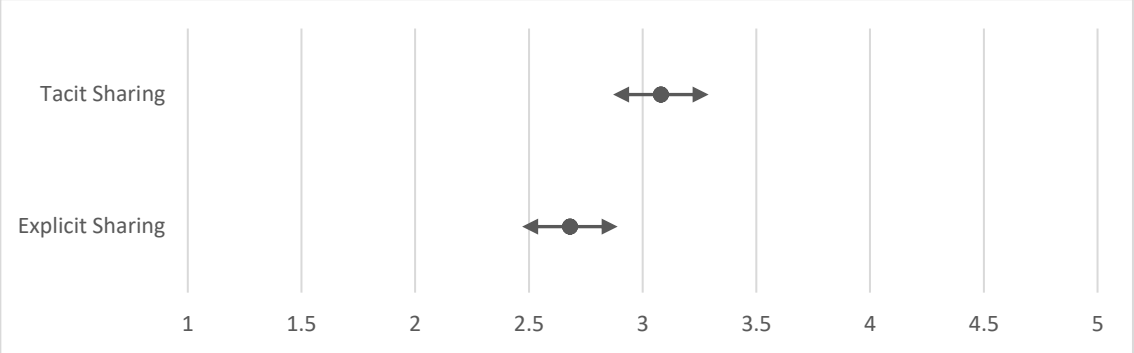


***Figure 18.*** *Tacit and explicit knowledge sharing means with error comparison.*

The survey highlighted well the words “experience” and “expertise” in tacit knowledge sharing part that are same words appearing in definition of knowledge and wisdom. This leads to believe that knowledge and/or wisdom is shared actively inside the organization. The explicit sharing part of the survey featured reports and documents, which can be associated with information. These had slightly lower grades than the tacit knowledge sharing question presented earlier.

The interviews and survey both indicate that in the explicit knowledge sharing and especially the existing explicit knowledge is not shared efficiently. In the survey sharing existing knowledge (*Figure 16, Question 1*) had mean value of 2,54; which is the lowest after training and general view of knowledge sharing by the mean value. The reason for bad existing explicit knowledge sharing is discussed further in the barriers section.

The survey can be compared to the earlier study that conducted it in China with 89 KIBS (Wang & Wang 2012). The survey had Likert-scale of 1 to 7 in their study as this study had 1 to 5, but otherwise the two survey parts are the same. In their study the mean value for tacit knowledge sharing part was 3,04 (adjusted for same scale) as in this study tacit knowledge part had 3,08. This shows that tacit knowledge sharing is close to same when comparing the two studies. Explicit knowledge sharing in the study had mean value of 2,96 and in this study 2,68. This further enhances the conclusion that explicit knowledge sharing is the one not working well and needs improvement.

The interviews in this study had question about the indicators and measurements. Interview question about indicators shown in *Figure 14* represents that no active monitoring is done in knowledge sharing. Centobelli et al. (2018) concluded that SMEs’ have bad alignment between KM systems and knowledge as SMEs have no dedicated resources to monitor KM. Interviews also concluded that there is no concrete plan, nor

the budget given to knowledge sharing, which both leave room for improvement and shows similar results as Centobelli et al. (2018).

Cerchione and Esposito (2017) studied KM-practices and KM-tools and concluded that many SMEs use more traditional tools and practices and are slow to adopt more modern methods. Similar finding was also in case study by Keyes (2008). In the case organization similar results are obtained. Traditional tools like email, communication platforms and document management systems were in active use. This can be one reason explicit knowledge sharing has become in bad shape as the knowledge systems facilitating knowledge sharing is not encouraging enough. In the survey there was a question regarding to that matter, which had mean score of 2,82. It can be concluded that those are not encouraging, but neither seen as the main reason for low scores.

The lowest mean score in the survey was in the offering the variety of training and development programs. This is supported by Kukko (2013), which concluded that in software business training is usually forgotten especially towards supportive technology to knowledge sharing. In this study the results show two things. First, this shows that the competence development that was goal of the strategy change has not been yet reached. Second, this provides more evidence on the point that explicit knowledge is not shared and, in this part, especially related to competence development via training and development programs. Though the results might be due to fact that the organization provides training in ways that are not categorized as programs, for example mentoring and code reviews.

The overall view shows that dimensionally tacit knowledge is transferred well, and explicit knowledge is in worse shape. Especially the sharing of existing explicit knowledge was concluded to have room for improvement compared to other studies. In knowledge types wisdom was represented by only one method as well as data, but information and knowledge had many methods backing their sharing. In the SECI-model thought should be given to combination part of the process.

### 6.2.1 State of Individual Level

This sub-part discussed the individual level of knowledge sharing. The study focused on organizational change, which led the interviews on certain perspective on the subject. This can have effect on the answers and thus the individual level was not represented by large amount of discussion in the interviews. Though individuals can be considered the foundation for the organizational and technological levels and thus are the most important ones to take care (Anwar et al. 2019).

Individual absorbing too much information was mentioned in one interview and if the knowledge sharing keeps on rising in all the methods the information overflow can become a problem. Keyes (2008) found a similar result that in the case study employees had no time to organize the knowledge they got from all the sources. Main reason for the overflow can be the lack of refinement. By refining the information, it will be easier and faster for others to adopt (Memmi 2014). Refinement also includes thinking about the recipients, who needs the knowledge and what value does this give to them. Memmi (2014) proposes that evaluation and verification is done before the knowledge is shared. The refinement in explicit knowledge happens in the combination processes, which was concluded as worse state than other three processes.

Tacit knowledge is passed as tacit knowledge in people to people communication, which is usual process in the personalization strategy. This communication between two or more people was seen as an enabler for knowledge sharing in the case organization. The survey stated that collecting and sharing knowledge based on experience and expertise was both deemed in good shape with mean score on neutral or over. This leads to believe that one enabler is the communication between employees happening due to different factors both informal and formal. In this context it must be remembered that the best method for knowledge sharing both for the teachers and learners is one on one, which also enables the higher tier knowledge sharing (Smith 2001).

In the interviews one stated the importance of lunch and coffee breaks as there was not many other places for informal discussion. Riege (2005) proposed the lack of contact time and interaction as one barrier, which can be derived from the earlier statement if other places for discussion are not introduced. Though the people to people communication was seen also as an enabler it is a contradicting statement. This leads to believe that the root cause might be somewhere else, for example Riege (2005) and Anwar et al. (2019) lists individual barriers poor communication skills and the lack of social networks, which can be related to earlier statement, but the root cause can not be verified with the data available.

In this study the biggest barrier on individual level is the lack of time. The lack of time has many reasons to emerge. Kukko and Helander (2013) explains that manager's lack of time is related to organic growth which brings time pressures and thus affects multiple level of knowledge sharing. Other reasons are proposed in the interview, for example lean culture and too laborious methods were mentioned. This is critical barrier to knowledge sharing as it can be seen from other studies that lack of time can be linked straight to the lack of motivation (Cleveland & Ellis 2015) and knowledge seeking (Riege

2005; Cleveland & Ellis 2015) and as earlier said also to other level barriers (Kukko & Helander 2012) and causing problems in absorbing knowledge (Keyes 2008).

The lack of motivation was also a barrier noticed in this study. The earlier study by Cleveland and Ellis (2015) propose that the motivation affects especially the knowledge contributing. Then again, they also proposed that lack of time (which was related to motivation in their study) causes also problems in knowledge seeking. In this study the withholding of knowledge as an individual barrier could be helped by enhancing the knowledge seeking. As the problem of withholding in the interview was defined that employees do not know the value of the knowledge they possess. The barrier of low awareness of individuals knowledge value was a barrier proposed by Riege (Riege 2005). Thus, providing a way for people to seek for this valued knowledge could help with the withholding. The solution might lie in the existing tools company family and Mattermost. Company family could provide the knowledge seeker the right employee by using key words such as skills and Mattermost by using the crowd to tell who could possess the needed knowledge.

Even though lack of trust was introduced as one major individual level barrier in many studies (Cleveland & Ellis 2015; Anwar et al. 2019; Mazorodze & Buckley 2019) in this study it was not mentioned in interviews, nor it can be identified from the survey. This might be due to small team sizes and focused technologies, which creates more conversation between people in the case organization. Kukko and Helander (2012) also propose that usually in organic growth lack of trust is not formed as a barrier, but in acquisitioned and networked growth it can become.

The individual level can be concluded to have one major barrier: the lack of time that can be linked to other ones in the same level. The finding is supported by a recent study where lack of time, motivation and rewards was the biggest barrier tied to individuals (Mazorodze & Buckley 2019). The study thus proposes in the individual level to relieve the lack of time which leads to helping the minor barriers lack of motivation, information overflow and knowledge seeking behavior to better state. Knowledge seeking behavior is seen contradicting as survey states it is in good condition but related theory links it to lack of time and motivation barrier. The major barrier lack of time was proposed to be caused by organic growth, lean culture and too laborious methods. By solving these the lack of time can be relieved. Other minor barrier introduced was lack of contact time and interaction, but it was deemed as contradicting, thus no straight suggestion is given for improvement.

### 6.2.2 State of Technological Level

Modern technology has provided tools that integrates systems and mechanisms providing a platform for knowledge sharing (Riege 2005). Tools were the only enabler mentioned in all eight interviews of knowledge sharing and thus in this study it seen as the biggest enabler in the present state. A case study showed that technological infrastructure was the second lowest mentioned barrier with 8,9% and the lowest being educational differences in survey taken by 112 participants from KIBS (Mazorodze & Buckley 2019). Also, Keyes (2008) concluded that IT has a strong influence in achieving effective knowledge sharing.

Earlier discussion led to conclusion that there were enough tools, but mainly the tools are traditional, which was supported by earlier research. The second part of survey provided a question about IT systems facilitating knowledge sharing. It got a mean value of 2,93, which leads to believe that the IT system's role as a facilitator for knowledge sharing is not seen as big in middle management when comparing the results to higher. It is though hard to compare the survey and interview results to each other.

Higher management was selected for interviews as they had the most knowledge of internal processes. The results of interviews seeing tools as the enabler of knowledge sharing might be due to them having more knowledge of the possibilities IT enables in the case organization. Riege (2005) proposes the barrier as lack of training and familiarization to IT systems, which in this case would be a barrier for the lower hierarchies. The problem could also rise from the barrier lack of communication about the benefits of chosen technologies presented by Kukko and Helander (2012). This study proposes that the lack of communication about benefits and lack of training are both barriers. The lack of benefits is barrier more on the lower hierarchies as the higher management can see the whole knowledge sharing perspective thus seeing the benefits more easily.

The survey also provided results on the lack of training, though the training includes also other training not regarding to knowledge sharing. The second part question 5 of case organization offering variety of training and development programs showed the lowest mean score of the survey. The suggestion is to develop in this area to provide technological support and training to employees. Technological support is the second most mentioned facilitator in the meta-analysis of Anwar et al. (2019) and proposed as key factor in effective knowledge sharing also in Keyes' (2008) case study. The process of improvement in the case organization should include both the training and technological support where the training focuses on introducing the possibilities and

advantages of different tools and the support provides help with the questions and problems rising. The training could be done as an online course that was already introduced as one method. Same type of training for KM-tools is used by Siemens for every employee and electronical certificate is given for the completion of the course (Al Attar & Shaalan 2016).

Three interviews also proposed the problem of searching the knowledge. The problem is caused by having many systems to store information and search function does not work accordingly. Centralized libraries and knowledge repositories were mentioned as a major facilitator in the meta-analysis of Anwar et al. (2019), but in the same study the barrier of lacking central repository was not a major barrier. This study proposes that the barrier is lacking central repository. This is especially seen in the interviews where the word “unstructured” was shown as the knowledge was distributed in many systems.

The strategy change included workshops that studied the knowledge sharing inside the organization. The last workshop included creating new policies and recommendations to enhance information sharing and competence development. In the technological level this study recommends that new methods are brought in carefully. One study highlighted that the number of knowledge management systems had a negative relationship to their intensity of use (Cerchione & Esposito 2017). The main objective should be to first measure the current activities in tools now used and then think where the problems lie. Also, as new systems are easy to deploy and does not need much investments (Centobelli et al. 2018) the urge to introduce new ones is high when problems found. Smith (2001) also gives a reminder that tools in knowledge sharing work efficiently when people talk to another regularly in work.

The technological level state is concluded to include two major barriers the lack of training employees and the lack of communication about the benefits of knowledge sharing. The lack of training was supported by the survey findings and both supported by earlier study from Kukko and Helander (2012). Minor barriers identified were the lack of modern tools and lack of central repositories, which are both suggested to be approached carefully. The technological tools were still seen as the biggest enabler for the case organization with being the only enabler all interviews mentioned. Suggestions on technological side included also measuring the activities in each of the tools and thus helping to remove the unused and modern tools could replace them with the earlier caution, for example Cerchione and Esposito (2017) recommends cloud computing and wikis.

### 6.2.3 State of Organizational Level

In the organizational level first thing to discuss is the organizational structure. The change provided a new structure for the whole organization, which was said to improve knowledge sharing. Four of the eight interviews said that the new organizational structure helps the knowledge sharing. Half of the interviews though did not mention it at all. Still it was the third most mentioned enabler after tools and systematical plan.

Regarding to organizational structure, high hierarchy was mentioned as a barrier in one interview. Small enterprises usually have low hierarchy and usually there will not form a barrier between hierarchies (Kukko & Helander 2012). The case organization though has grown and is considered as a large company and the first sign of too high hierarchy is now seen. In one case study 100% of the participants in the survey answered that flat organization is better for knowledge sharing (Mazorodze & Buckley 2019). As only one interview mentioned high hierarchy is labeled as a minor barrier. Suggestion is to lower the gap between the hierarchies by higher management visiting team meetings and introducing them to new employees as the interviews mentioned that some higher management members had not visited any weekly team meetings. Another proposal is to have the “Ask CEO hour” again, but with higher management of whom to ask the questions. This provides a good way for employees to ask question that they have been wanting to ask.

The organizational change also created focuses for teams and segments. Implementing communities with similar interest either formally or informally creates a common interest that can boost knowledge sharing (Smith 2001). Other method is to use “knowledge guardians” seeking internal and external knowledge to generate and probe for new ideas (Wah 1999). This is implemented in both internal and external way in the steering groups that in present state have much more responsibility and goals than before the strategy change. Also, business lines in the case organization provides knowledge on their specialized industry. Steering groups also feature dynamic structure that helps to bring new knowledge and perspectives to group.

The only problem that was not solved from the past organization was the established organizational changes. Skok et al. (2013) propose that managerial support is one of the cornerstones when making KM changes. Mazorodze and Buckley (2019) lists lack of budget to support KM and lack of executive support as the two biggest barriers in knowledge sharing with 67,9% and 57,1% selecting it from a list of barriers presented in survey. Similar result that management is not involved enough was found in Keyes’ (2008) case study. One suggestion is to lead with an example and establish the changes

better with clear responsible team or individual. Regarding to KM it could include a dedicated budget and team to create and manage the KM plan and strategy. Both lack of budget and executive support is considered as a minor barrier.

The earlier suggestion included the plan and the strategy as lack of plan was a mentioned as a barrier in three interviews. Though in one interview also too defined plan was seen as a barrier as the methods that are now in use are too laborious and does not include easy ways to share knowledge. Memmi (2014) suggests that clear internal rules and norms are needed to enhance the activities. Cerchione and Esposito (2017) mention that codified rules are good for organizations that way everyone can easily access the rules. In the case organization good example is the codified project management led by the ISO-9001 standard and quality manager and as the company is growing quality team will be established to ensure good quality. The systematical plan was also the second biggest enabler after tools in the interviews. Even though there is not yet a universal concrete plan made according to the interviews. The lack of plan is considered as a major barrier as it can clear minor barriers from many levels and the too defined plan a minor barrier in the organizational level.

Two interviews mentioned the atmosphere and freedom as an enabler for knowledge sharing. Segments in the case organization had the freedom to test and choose techniques that fit their needs, but the interviews stated that only one segment was actively testing different methods. This leads to think that the culture is not supportive for changes or the managers does not have time or knowledge to test new methods. The culture was mentioned as the biggest barrier in organizational level and second in all barriers with five of the eight interviews mentioning it. In a recent case study Mazorodze and Buckley (2019) saw that 33% of respondents selected culture as a barrier for knowledge sharing, but another study by Kukko and Helander (2012) concluded that organizational culture was not a barrier in software companies. As many interviews saw the culture as a problem the barrier is listed as a major one, even though literature suggests it as minor or even non-existent. The suggestion to improve the culture is to enhance the current one and not try to enforce or create a new replacing culture.

The last organizational level enabler and barrier is rewards for good knowledge sharing. Rewarding employees for knowledge sharing offers a contradicting view in literature. Michailowa and Husted (2003) concluded that rewards might even be harmful for knowledge sharing. Another view is provided by Mazorodze and Buckley (2019) that saw lack of time, motivation and rewards as one of the biggest problems, though in their study the three were grouped as one barrier. Kukko and Helander (2012) saw that lack of rewards does not create a barrier in software companies. In the interviews it was

mentioned as a suggestion for future and with the help of earlier literature the suggestion is to not use rewards as incentives to knowledge sharing.

The organizational level created good discussion, many major and minor barriers were identified. The major barriers in the case organization are lack of concrete plan for KM and organizational culture. Minor barriers that were discussed included high hierarchy, lack of budget and lack of executive support. Rewarding for knowledge sharing was seen contradicting and thus it is not recommended by this study. There were many suggestions introduced, the main idea is to create a focused plan for organizational changes happening and select responsible for them.

### 6.2.4 State of Other Levels

Other level barriers focus on SECI-model, geographical and cultural problems. Nonaka (1994) introduced problems that organizations can have relating to SECI-model. One problem that was identified in this study was the lack of combination process. This creates a problem as SECI-model works in a loop and as one process is not working the whole loop slows down. The suggestion is to define methods for knowledge sharing in SECI-model quadrants and measure the activeness of each process. If problems arise in certain process the methods are revised and tested.

One problem that came up in the interviews was the office sizes. There are many offices and the number of employees differ from ten to over hundred. One interview stated that office specific methods could be used to overcome this barrier. The problem is mostly related to easier access to face to face connection and also networking during lunch and coffee breaks. Kukko and Helander (2012) say that in small companies it is easy to “bump” into other employees and share knowledge at that moment. Visits and relocation are proposed by Anwar et al. (2019) as one facilitator to overcome this barrier. Different office size is proposed as minor barrier in this study.

One clear barrier that is hard to overcome was security and NDAs for knowledge. It was mentioned in two interviews. Security proposed a problem also in case study by Keyes (2008). In that study security measures affected negatively to knowledge sharing, for example sending a file was hard to do after security was enhanced. In the interviews the discussion was more related to specific knowledge that cannot be shared to outsiders out of the NDAs and general information, for example lessons learned could be shared. Information security is thus seen as a minor barrier in knowledge sharing.

Many studies included the individual’s culture and language problems in barriers (Husted & Michailova 2002; Riege 2005; Al Attar & Shaalan 2016; Mazorodze & Buckley 2019).

In the case organization no signs of barrier in these two was seen in interviews or survey. The case organization is located in Finland and most of the discussion is either in Finnish or English. The organization has English as the main language, but as most of the employees are Finnish it is also spoken between employees. Information from management is always in English thus preventing problems in understanding the message. Neither one is thus a barrier in this case study.

Overall the other level state left only a little to discuss. There were no major barriers in this category, but three minor barriers are identified: lack of combination process in the SECI-model, different office sizes and information security. Language and culture were not identified as barriers even though related literature suggested it as a barrier.

# 7. CONCLUSIONS

The case organization had a major strategy change that included an organizational strategy change. One goal of the change was to improve information sharing which provided an opportunity to study the subject further. Thus the motivation for the study came from the organization. This study was done to fill the knowledge gap about KM inside the organization. The scientific motivation is created by the case environment. The study showed a knowledge gap of large enterprises that have grown out of SME status but re not yet global or otherwise large. Also, as KIBS are fast changing with their environment this study offers a recent perspective on KM in KIBS.

The main objective of the study was to present the current state of knowledge sharing in the case organization. A mixed strategy with both single case and action research were used to obtain information. The primary data collection methods used were interviews and a survey. Analysis method was explorative and sequential, starting from the interviews and linking the interview findings to the survey. The data collection methods (interview and survey) were recommended for studying knowledge sharing by Keyes (2008).

The interviews were done according to good interview guidelines by Saunders et al. (2007). The analysis of interviews followed a guide that was adapted from study by Burnard (1991). The study by Burnard is widely cited (>1000 citations on Scopus), so it is a widely used interview analyzing guide. This study did not follow the guide in full extend, because time constraints limited writing full transcripts and only one validation round was done on the steps 6 and 11. Final validation on step 11 was effective as it found out a misconception which led to checking all interviews for a second time. Because all the interviews were validated the results of the interviews can be assumed to be valid.

The survey was based on two different studies. The first part is based on study by Jääskeläinen et al. (2019) and the second and third part by Wang and Wang (2012). The first part was created to be used for public organizations but the knowledge sharing part was seen to fit also this study in general manner. The first part's results are not used in drawing major conclusions and are used as a supportive primary data source in the analysis, as the study is new and the survey has not been used before in the private sector. Thus the validity is lower in the first part compared to the other parts. The second and third part are from an older study from 2012. The survey in Wang and Wang (2012)

study has been adapted also by two other studies (Beyene et al. 2016; Ryszko 2016) which led also picking it for this study. As these studies have found out Wang and Wang (2012) survey valid this study has the same conclusion.

The case organization had grown out of the SME status, but was compared against SMEs as the case organization KM practices were closer to an SME than a large company in KM strategy perspective. The present state KM strategy was concluded to be personalization with some codification strategy practices, for example using standard templates in project management. These findings are in line with studies by Kukko (2012) for software companies and by Hansen et al. (1999) for service companies.

The study included knowledge types and dimensions in the discussion of the present state. It was concluded that tacit knowledge sharing was in better shape than explicit knowledge sharing. This was seen especially from the survey results in *Figure 18*. The tacit knowledge sharing was in similar state compared to another study by Wang and Wang (2012), but explicit sharing was in worse state by a little margin. Knowledge types were all represented and clear problems did not arise in the analysis or discussion.

KM-tools and KM-practices provided good discussion. Literature suggested that SMEs use traditional tools like email and databases (Cerchione & Esposito 2017). This study found similar results in the case organization. Also, literature suggested that training is many times neglected in software companies especially towards supportive technology to knowledge sharing (Kukko & Helander 2012). The study found a similar result as the lowest mean score in the survey was regarding to access to variety of training for the employees. Though it was suggested by case company that the training was happening but not with “programs” as it was mentioned in the survey.

The first supportive research question was about to strategy change. The problems that were identified in the interviews from past state were mostly fixed during the change process. The organizational change also provided new enablers for knowledge sharing, for example the new organizational structure was mentioned in interviews as an enabler. Well-established changes were a problem that persists even after the change. This problem is one focus point for enhancement for the case organization.

The second supportive research question was the enablers of knowledge sharing. The study focused mostly on finding the negative aspects called barriers which led to finding out only small number of enablers. A more comprehensive study of enablers in the case organization is needed to find all the enablers of knowledge sharing. The enablers found in different levels are in *Table 24*. The organizational level had the most enablers, but tools were the biggest single enabler according to conducted interviews.

***Table 24.*** *Knowledge sharing enablers in the case organization.*

| **Level** | **Enabler** |
|---|---|
| **Individual** | People to people communication |
| **Technological** | Technological tools |
| **Organizational** | Organizational Structure<br>Systematical Plan<br>Atmosphere and Freedom |
| **Other** | Homogenous culture |

In the theory section it was proposed that the problems should be addressed before any suggestions for improvements are planned. The problem first approach helps to find the right solution to the identified problems. This study found out barriers in knowledge sharing in all levels introduced. Five major barriers and twelve minor barriers were identified in the case organization. The barriers identified in the present state case organization are in *Table 25*.

***Table 25.*** *Knowledge sharing barriers identified in the case organization.*

| **Level** | **Major Barriers** | **Minor Barriers** |
|---|---|---|
| **Individual** | Lack of time | Lack of motivation<br>Lack of knowledge seeking behavior<br>Lack of contact time and interaction<br>Information overflow |
| **Technological** | Lack of training<br>Lack of communication about benefits of knowledge sharing | Lack of modern tools<br>Lack of central repository |
| **Organizational** | Lack of concrete plan<br>Organizational culture | High hierarchy,<br>Lack of budget and<br>Lack of executive support |
| **Other** | - | Different office sizes<br>Information security<br>Lack of combination process in SECI-model |

Case studies in SMEs, software companies and KIBS have found similar enablers and barriers for knowledge sharing as this study (Keyes 2008; Kukko & Helander 2012; Santos et al. 2012; Kukko 2013; Mazorodze & Buckley 2019) . This provides validity and reliability for the research and also gives clear comparison of the knowledge sharing state. The overall state can be concluded the same as Kukko (2013) that in the young

software industry organizations do not pay enough attention to KM and thus well-established KM-practices are still scarce.

The main theoretical finding is the found list of major barriers. This presents a recent view into KM in KIBS and shows the obstacles those face. Also, it was implicated that there is a research gap about studies of large organizations that have recently grown out of SME status and are not a global organization. This study presented an extensive view on knowledge sharing in that type of organization. The survey can be used in further studies to make comparison to other organizations.

## 7.1 Managerial Implications

The study concluded that personalization strategy is the KM strategy in use. Also, the study pointed that the growth of the organization had created barriers in knowledge sharing. The case organization is categorized as a large organization by growing out of the definition of an SME. As larger corporations prefer using more systematical KM strategy codification could be the key to success. This change leads to easier management of the organizational knowledge resources and thus easier KM in overall perspective.

This study proposes barriers that managers of KIBS and growing SMEs should consider when developing KM strategy. Knowledge sharing enablers provide the positive aspect and barriers the negative aspect. The barriers found should be all approached carefully and with a clear plan. Haste decisions can only create more problems and thus are not recommended. Suggestions for overcoming barriers were included in the discussion chapter.

The main suggestion is to create a responsible either as team or individual that steers the KM strategy of the organization. The responsible should create a systematical plan that includes tools, practices, indicators and state for the knowledge sharing processes. The strategy should be aligned closely with the business strategy and vision of the organization. The plan should be revised at certain intervals, for example after organizational changes or yearly.

## 7.2 Limitations

The explorative nature of the study is led by a single perspective of the researcher. This can lead to wrong conclusions and misconceptions. Saunders et al. (2007) introduces two problems relating to this problem: interviewee and interviewer bias. These both can

lead to misinterpreting or leading the answers and thus lead to wrong conclusions. This is a limitation as the time constraints left the qualitative data to be validated only once in the theme selection process, and once in checking appropriateness. Bernard (1991) adds that the qualitative method as a primary analysis leaves out the possibility of generalization. Also, the research strategy of single case offers only limited availability for generalization.

The limited amount of data gathered also provides a limitation for the study. Eight interviews and 13 survey answers were used to gather the primary data. A more extensive study is needed to further study the subject and make more appropriate conclusions. This study is limited to fit the master's thesis timeframe and workload. The interview and survey both could be refined to further answer the research questions, for example having multiple themes for interviews or having a more extensive survey.

## 7.3 Future Research

The study proposes that future research focuses firstly on larger sample of organizations thus providing a more generalized conclusion. Second to focus more on SECI-model processes and list the KM methods to different processes and provide a clear view if the problem of single process creates certain knowledge sharing barriers. The third suggestion is to use observation to study further the knowledge types and dimension that transfer during the processes.

# REFERENCES

Al Attar, F. & Shaalan, K. (2016). Enablers and Barriers of Knowledge Spiral, Proceedings of the The 11th International Knowledge Management in Organizations Conference on the changing face of knowledge management impacting society, ACM, pp. 1-8.

Alqahtani, F.H. (2017). The acceptance of corporate wiki use for knowledge diffusion purposes, Aslib Journal of Information Management, Vol. 69(6), pp. 642-659.

Anwar, R., Rehman, M., Wang, K.S. & Hashmani, M.A. (2019). Systematic Literature Review of Knowledge Sharing Barriers and Facilitators in Global Software Development Organizations Using Concept Maps, IEEE Access, Vol. 7 pp. 24231-24247.

Argote, L. & Fahrenkopf, E. (2016). Knowledge transfer in organizations: The roles of members, tasks, tools, and networks, Organizational behavior and human decision processes, Vol. 136 pp. 146-159.

Argote, L. & Ingram, P. (2000). Knowledge Transfer: A Basis for Competitive Advantage in Firms, Organizational behavior and human decision processes, Vol. 82(1), pp. 150-169.

Argote, L., Ingram, P., Levine, J.M. & Moreland, R.L. (2000). Knowledge Transfer in Organizations: Learning from the Experience of Others, Organizational behavior and human decision processes, Vol. 82(1), pp. 1-8.

Arias Aranda, D. & Molina-Fernández, L.M. (2002). Determinants of innovation through a knowledge-based theory lens, Industrial Management & Data Systems, Vol. 102(5), pp. 289-296.

Baptista Nunes, M., Annansingh, F., Eaglestone, B. & Wakefield, R. (2006). Knowledge management issues in knowledge-intensive SMEs, Journal of Documentation, Vol. 62(1), pp. 101-119.

Bellinger, G., Castro, D. & Mills, A. Data, Information, Knowledge and Wisdom.

Bettiol, M., Di Maria, E. & Grandinetti, R. (2012). Codification and creativity: knowledge management strategies in KIBS, Journal of Knowledge Management, Vol. 16(4), pp. 550-562.

Beyene, K.T., Shi, C.S. & Wu, W.W. (2016). Linking culture, organizational learning orientation and product innovation performnace: The case of Ethiopian manufacturing firms, South African Journal of Industrial Engineering, Vol. 27(1), pp. 88-101.

Burke, M.E. (2007). Making choices: Research paradigms and information management: Practical applications of philosophy in IM research, Library Review, Vol. 56(6), pp. 476-484.

Burnard, P. (1991). A method of analysing interview transcripts in qualitative research, Nurse education today, Vol. 11(6), pp. 461-466.

Centobelli, P., Cerchione, R. & Esposito, E. (2018). How to deal with knowledge management misalignment: a taxonomy based on a 3D fuzzy methodology, Journal of Knowledge Management, Vol. 22(3), pp. 538-566.

Cerchione, R. & Esposito, E. (2017). Using knowledge management systems: A taxonomy of SME strategies, International Journal of Information Management, Vol. 37(1, Part B), pp. 1551-1562.

Cerchione, R., Esposito, E. & Spadaro, M.R. (2016). A literature review on knowledge management in SMEs, Knowledge Management Research & Practice, Vol. 14(2), pp. 169-177.

Cerchione, R., Esposito, E. & Spadaro, M.R. (2015). The spread of knowledge management in SMEs: A scenario in evolution, Sustainability (Switzerland), Vol. 7(8), pp. 10210-10232.

Chan, I. & Chau, P. (2008). Getting Knowledge Management Right: Lessons from Failure, pp. 40-54.

Choi, B. & Lee, H. (2002). Knowledge management strategy and its link to knowledge creation process, Expert Systems With Applications, Vol. 23(3), pp. 173-187.

Chuang, C., Jackson, S.E. & Jiang, Y. (2016). Can Knowledge-Intensive Teamwork Be Managed? Examining the Roles of HRM Systems, Leadership, and Tacit Knowledge, Journal of Management, Vol. 42(2), pp. 524-554.

Cleveland, S. & Ellis, T. (2015). Rethinking Knowledge Sharing Barriers: A Content Analysis of 103 Studies, International Journal of Knowledge Management (IJKM), Vol. 11(1), pp. 28-51.

Confluence. (2019). Atlassian Confluence, Retrieved from: http://www.atlassian.com/confluence (15.07.2019)

Creswell, J.W. (2014). Research design: qualitative, quantitative, and mixed methods approaches, 4th ed. Sage, Los Angeles.

Davenport, T.H. & Prusak, L. (1998). Working knowledge: how organizations manage what they know, Harvard Business School Press, Boston (Mass.).

Donnelly, R. (2018). Aligning knowledge sharing interventions with the promotion of firm success: The need for SHRM to balance tensions and challenges, Journal of Business Research, Vol. 94 pp. 344-352.

Drucker, P.F. (1993). Managing for the future-the 1990's and beyond, Butterworth Heinemann, Oxford, 281 pp, Strategic Change, Vol. 2(1), pp. 57-60.

Duignan, J. (2016). A Dictionary of Business Research Methods, Oxford University Press.

Durst, S. & Runar Edvardsson, I. (2012). Knowledge management in SMEs: a literature review, Journal of Knowledge Management, Vol. 16(6), pp. 879-903.

Eden, C. & Huxham, C. (1996). Action research for management research, British Journal of Management, Vol. 7(1), pp. 75-86.

Edvardsson (2009). Is knowledge management losing ground? Developments among Icelandic SMEs, Knowledge Management Research & Practice, Vol. 7(1), pp. 91-99.

Edvardsson (2006). Knowledge management in SMEs: the case of Icelandic firms, Knowledge Management Research & Practice, Vol. 4(4), pp. 275-282.

Europe Commission. (2019). What is an SME? Retrieved from: https://ec.europa.eu/growth/smes/business-friendly-environment/sme-definition_en (06.07.2019)

Garg, S., Pandey, D.K. & Vashisht, A. (2018). Importance of Knowledge Management for Organizational Management, Deliberative Research, Vol. 37(1), pp. 41-45.

Ghobadi, S. & Mathiassen, L. (2016). Perceived barriers to effective knowledge sharing in agile software teams: Knowledge-sharing barriers in agile teams, Information Systems Journal, Vol. 26(2), pp. 95-125.

Gour, P., Singh, R.J. & Sohani, N. (2013). Interpretive Structural Modeling of Information Sharing Barriers in Indian Manufacturing Firms, Journal of Supply Chain Management Systems, Vol. 2(3), pp. 26-32.

Grandinetti, R. (2016). Absorptive capacity and knowledge management in small and medium enterprises, Knowledge Management Research & Practice, Vol. 14(2), pp. 159-168.

Grimsdottir, E. & Edvardsson, I.R. (2018). Knowledge Management, Knowledge Creation, and Open Innovation in Icelandic SMEs, SAGE Open, Vol. 8(4).

Hansen, M.T., Nohria, N. & Tierney, T. (1999). What's your strategy for managing knowledge? Harvard business review, Vol. 77(2), pp. 187.

Holford, W.D. (2016). Managerial Implications on Viewing Knowledge as Constructions, 2016 49th Hawaii International Conference on System Sciences (HICSS), IEEE, pp. 4154-4162.

Holsapple, C.W. & Joshi, K.D. (2001). Organizational knowledge resources, Decision Support Systems, Vol. 31(1), pp. 39-54.

Holste, J.S. & Fields, D. (2010). Trust and tacit knowledge sharing and use, Journal of Knowledge Management, Vol. 14(1), pp. 128-140.

Husted, K. & Michailova, S. (2002). Knowledge Sharing in Russian Companies with Western Participation, Management International, Vol. 6(No 2), pp. 17.

Ismail Al-Alawi, A., Yousif Al-Marzooqi, N. & Fraidoon Mohammed, Y. (2007). Organizational culture and knowledge sharing: critical success factors, Journal of Knowledge Management, Vol. 11(2), pp. 22-42.

Jackson, S.E., Chuang, C., Harden, E.E. & Jiang, Y. (2006). Toward Developing Human Resource Management Systems for Knowledge-Intensive Teamwork, in: Anonymous (ed.), Emerald Group Publishing Limited, pp. 27-70.

Jääskeläinen, A., Sillanpää, V. & Helander, N. (2019). A model for profiling information and knowledge management in the public sector, IFKAD 2019 Conference Proceedings.

Kanellos, N.S. & Papadimitriou, L.S. (2013). The Networking of High-tech Firms as basis for Knowledge Transfer, Procedia - Social and Behavioral Sciences, Vol. 73 pp. 263-267.

Kembro, J. & Selviaridis, K. (2015). Exploring information sharing in the extended supply chain: an interdependence perspective, Supply Chain Management, Vol. 20(4), pp. 455-470.

Keyes, J. (2008). Identifying the barriers to knowledge sharing in knowledge intensive organizations, ProQuest Dissertations Publishing.

Khera, S.N. & Gulati, K. (2015). Training Methods and Tacit Knowledge Sharing: Evidence from IT Organizations, Jindal Journal of Business Research, Vol. 4(1-2), pp. 11-26.

Kukko, M. & Helander, N. (2012). Knowledge Sharing Barriers in Growing Software Companies, 2012 45th Hawaii International Conference on System Sciences, IEEE, pp. 3756-3765.

Kukko (2013). Knowledge sharing barriers in organic growth: A case study from a software company, Journal of High Technology Management Research, Vol. 24(1), pp. 18-29.

Liao, Y. & Barnes, J. (2015). Knowledge acquisition and product innovation flexibility in SMEs, Business Process Management Journal, Vol. 21(6), pp. 1257-1278.

Lin, W. (2008). The effect of knowledge sharing model, Expert Systems with Applications, Vol. 34(2), pp. 1508-1521.

Loerakker, B. & van Winden, F. (2017). Emotional Leadership in an Intergroup Conflict Game Experiment, Journal of Economic Psychology, Vol. 63 pp. 143-167.

Massaro, M., Handley, K., Bagnoli, C. & Dumay, J. (2016). Knowledge management in small and medium enterprises: a structured literature review, Journal of Knowledge Management, Vol. 20(2), pp. 258-291.

Matlay, H. (2000). Organisational learning in small learning organisations: an empirical overview, Education + Training, Vol. 42(4/5), pp. 202-211.

Mattermost. (2019). Mattermost Home Page, Retrieved from: https://mattermost.com/. (15.07.2019)

Mazorodze, A.H. & Buckley, S. (2019). Knowledge management in knowledge-intensive organisations: Understanding its benefits, processes, infrastructure and barriers, SA Journal of Information Management, Vol. 21(1), pp. e-e6.

McAdam, R. & Reid, R. (2001). SME and large organisation perceptions of knowledge management: comparisons and contrasts, Journal of Knowledge Management, Vol. 5(3), pp. 231-241.

McDermott, R. (1999). Why Information Technology Inspired But Cannot Deliver Knowledge Management, California management review, Vol. 41(4), pp. 103-117.

Memmi, D. (2014). Information overload and virtual institutions, AI & SOCIETY, Vol. 29(1), pp. 75-83.

Mouritsen, J. (1998). Driving growth: Economic Value Added versus Intellectual Capital, Management Accounting Research, Vol. 9(4), pp. 461-482.

Muizer, A. & Kerste, R. (2002). Effective knowledge transfer to SMEs, Scales Research Reports.

Muller, E. & Doloreux, D. (2009). What we should know about knowledge-intensive business services, Technology in Society, Vol. 31(1), pp. 64-72.

Nonaka, I. (1994). A Dynamic Theory of Organizational Knowledge Creation, Organization Science, Vol. 5(1), pp. 14-37.

Nonaka, I. & Konno, N. (1998). The Concept of "Ba": Building a Foundation for Knowledge Creation, California management review, Vol. 40(3), pp. 40-54.

Nonaka, I. & Takeuchi, H. (1995). The knowledge-creating company: how Japanese companies create the dynamics of innovation, Oxford University Press, New York.

Ottonicar, S.L.C., Valentima, M.L.P. & Mosconib, E. (2018). A competitive intelligence model based on information literacy: organizational competitiveness in the context of the 4th Industrial Revolution, Journal of Intelligence Studies in Business, Vol. 8(3), pp. 55-65.

Oyemomi, O. (2019). How cultural impact on knowledge sharing contributes to organizational performance, Journal of business research, Vol. 94 pp. 313-319.

Polanyi, M. (1962). Personal knowledge: towards a post-critical philosophy, Corr. ed. University of Chicago Press, Chicago.

Riege, A. (2005). Three-dozen knowledge-sharing barriers managers must consider, Journal of Knowledge Management, Vol. 9(3), pp. 18-35.

Rowley, J. (2007). The wisdom hierarchy: representations of the DIKW hierarchy, Journal of Information Science, Vol. 33(2), pp. 163-180.

Rubin, H. & Rubin, I. (2005). Qualitative Interviewing (2nd ed.): The Art of Hearing Data, 2nd ed. Thousand Oaks, California.

Ryszko, A. (2016). Proactive environmental strategy, technological eco-innovation and firm performance-case of Poland, Sustainability (Switzerland), Vol. 8(2), pp. 156.

Salojärvi, S., Furu, P. & Sveiby, K. (2005). Knowledge management and growth in Finnish SMEs, Journal of Knowledge Management, Vol. 9(2), pp. 103-122.

Santos, V.R., Soares, A.L. & Carvalho, J.Á (2012). Knowledge Sharing Barriers in Complex Research and Development Projects: an Exploratory Study on the Perceptions of Project Managers, Knowledge and Process Management, Vol. 19(1), pp. 27-38.

Saunders, M., Lewis, P. & Thornhill, A. (2007). Research methods for business students, 5th ed. Prentice Hall, Harlow.

Schein, E.H. (1999). Process Consultation Revisited, Addison-Wesley, Reading, Mass. u.a.

Shang, W., Ha, A.Y. & Tong, S. (2016). Information Sharing in a Supply Chain with a Common Retailer, Management Science, Vol. 62(1), pp. 245.

Shujahat, M., Sousa, M.J., Hussain, S., Nawaz, F., Wang, M. & Umer, M. (2017). Translating the impact of knowledge management processes into knowledge-based innovation: The neglected and mediating role of knowledge-worker productivity, Journal of Business Research, Vol. 94 pp. 442-450.

Skok, W., Clarke, K. & Krishnappa, S. (2013). Managing Organisational Knowledge: A Case Study of a Global Energy Consulting Group, Knowledge and Process Management, Vol. 20(3), pp. 123-130.

Skype. (2019). Skype for Business Home Page, Retrieved from: https://www.skype.com/en/business/. (15.07.2019)

Smith, E.A. (1998). The role of creativity in motivation and productivity, Proceedings of Seventh International Conference on Productivity and Quality Research, pp. 11-23.

Smith, E.A. (2001). The role of tacit and explicit knowledge in the workplace, Journal of Knowledge Management, Vol. 5(4), pp. 311-321.

Snyder, J. & Eng Lee-Partridge, J. (2013). Understanding communication channel choices in team knowledge sharing, Corporate Communications: An International Journal, Vol. 18(4), pp. 417-431.

Sousa, M.J. & Rocha, Á (2019). Strategic Knowledge Management in the Digital Age: JBR Special Issue Editorial, Journal of Business Research, Vol. 94 pp. 223-226.

Staadt, J. (2015). The Cultural Analysis of Soft Systems Methodology and the Configuration Model of Organizational Culture, SAGE Open, Vol. 5(2).

Tuhkala, A. & Kärkkäinen, T. (2018). Using Slack for computer-mediated communication to support higher education students' peer interactions during Master's thesis seminar, Education and Information Technologies, Vol. 23(6), pp. 2379-2397.

Visvalingam, S. & Manjit, S.S. (2011). Organisational culture's influence on tacit knowledge-sharing behaviour, Journal of Knowledge Management, Vol. 15(3), pp. 462-477.

Vuori, V., Helander, N. & Mäenpää, S. (2018). Network level knowledge sharing: Leveraging Riege's model of knowledge barriers, Knowledge Management Research and Practice.

Wah, L. (1999). Making Knowledge Stick, Management Review (USA), Vol. 88(5), pp. 24.

Walle, A.H. (2015). Qualitative Research in Business : A Practical Overview, Cambridge Scholars Publishing, Newcastle upon Tyne, United Kingdom.

Wang, N. & Wang, Z. (2012). Knowledge sharing, innovation and firm performance, Expert Systems With Applications, Vol. 39(10), pp. 8899-8908.

Wenger, E. (2000). Communities of Practice and Social Learning Systems, Organization, Vol. 7(2), pp. 225-246.

Whelan, E. & Teigland, R. (2013). Transactive memory systems as a collective filter for mitigating information overload in digitally enabled organizational groups, Information and Organization, Vol. 23(3), pp. 177-197.

# INTERVIEW REFERENCES

Personal Interview 1, Tampere, Conducted 10.05.2019, Face to Face

Personal Interview 2, Tampere, Conducted 10.05.2019, Face to Face

Personal Interview 3, Vaasa, Conducted 29.05.2019, Video Conference

Personal Interview 4, Vaasa, Conducted 22.05.2019, Face to Face

Personal Interview 5, Vaasa, Conducted 22.05.2019, Face to Face

Personal Interview 6, Vaasa, Conducted 21.05.2019, Face to Face

Personal Interview 7, Tampere, Conducted 16.05.2019, Face to Face

Personal Interview 8, Vaasa, Conducted 21.05.2019, Face to Face

# APPENDIX A: INTERVIEW STRUCTURE

1. Strategiamuutosta edeltävä aika
    a. Mitä eroja organisaatiossa oli ennen strategiamuutoksen alkua?
    b. Minkä takia strategiamuutokseen päädyttiin?
    c. Minkä takia tiedon jakaminen valittiin strategian osa-alueeksi?
2. Tiedon jakaminen ennen strategiamuutosta
    a. Mitä ongelmia tiedon jakamisessa oli ennen strategiamuutosta?
    b. Mitä onnistuneita käytäntöjä tiedon jakamisessa oli ennen strategiamuutosta?
    c. Otettiinko näitä huomioon muutosta tehdessä?
3. Tiedon jakamisen nykytila ja käytännöt
    a. Miten tiedon jakaminen on tällä hetkellä otettu huomioon uudessa segmentissä?
    b. Minkälaisia tiedon jakamisen käytäntöjä segmentillä on käytössä?
    c. Onko hiljaisen tiedon jakaminen otettu huomioon jollain tavalla?
    d. Toimiiko käytännöt?
    e. Seurataanko tiedon jakamisen kehitystä? (mittareilla tai muilla tavoilla)
    f. Miten tiedon jakaminen toimii segmentissä tällä hetkellä?
        i. Segmentin sisälle
        ii. Segmentin ulkopuolelle (organisaation sisällä)
        iii. Asiakkaille
    g. Keiden kanssa tietoa jaetaan segmentin ulkopuolella?
    h. Mitä tietoa heidän kanssansa jaetaan?
    i. Onko tiedon jakaminen muuttunut lähiaikoina? Miten?
4. Tiedon jakamisen mahdollistajat ja esteet
    a. Mitkä tekijät auttavat tiedon jakamista?
        i. Yksilölliset
        ii. Organisaatiolliset
        iii. Teknologiset
    b. Mitkä tekijät haittaavat tiedon jakamista?
        i. Yksilölliset
        ii. Organisaatiolliset
        iii. Teknologiset
    c. Mitä ideoita parantaa tiedon jakamista tunnistat?
    d. Muita huomioita aiheeseen liittyen?

# APPENDIX B: SURVEY STRUCTURE

1. Knowledge Sharing

| Number | Question |
|---|---|
| 1 | Our employees receive information about goals concerning them. |
| 2 | Our employees receive information about the indicators concerning them. |
| 3 | Our employees receive information about the measurement results concerning them. |
| 4 | Our stakeholders receive information about goals concerning them. |
| 5 | Our stakeholders receive information about the indicators concerning them. |
| 6 | Our stakeholders receive information about the measurement results concerning them. |
| 7 | We have established practices for communicating reported data. |
| 8 | Our organization's information system produces timely information. |
| 9 | Information generated by knowledge sharing platforms is up to date. |
| 10 | In general, I am pleased with the information sharing practices. |

2. Explicit knowledge Sharing

| Number | Question |
|---|---|
| 1 | People in my organization frequently share existing reports and official documents with members of my organization. |
| 2 | People in my organization frequently share reports and official documents that they prepare by themselves with members of my organization. |
| 3 | People in my organization frequently collect reports and official documents from others in their work. |
| 4 | People in my organization are frequently encouraged by knowledge sharing mechanisms. |
| 5 | People in my organization are frequently offered a variety of training and development programs. |
| 6 | People in my organization are facilitated by IT systems invested for knowledge sharing. |

3. Tacit Knowledge Sharing

| Number | Question |
|---|---|
| 1 | People in my organization frequently share knowledge based on their experience. |
| 2 | People in my organization frequently collect knowledge from others based on their experience. |
| 3 | People in my organization frequently share knowledge of know-where or know-whom with others. |
| 4 | People in my organization frequently collect knowledge of know-where or know-whom with others. |
| 5 | People in my organization frequently share knowledge based on their expertise. |
| 6 | People in my organization frequently collect knowledge from others based on their expertise. |
| 7 | People in my organization will share lessons from past failures when they feel necessary. |

4. Open question in Survey

“Other comments about knowledge sharing and its practices?”

# APPENDIX C: FINAL LIST OF THEMES WITH SUB-CATEGORIES

1. Background and motivation
    a. Motivation
    b. Background
2. Changes with strategy
3. Methods of knowledge sharing
    a. Types and direction
    b. Methods
    c. Indicators
4. Enablers and barriers
    a. Past
    b. Present
5. Suggestions for improvements
    a. Problems without suggestions
    b. Clear suggestions

# APPENDIX D: SURVEY PART ONE RESULTS

| **Respondent \ Question** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** |
|---|---|---|---|---|---|---|---|---|---|---|
| Respondent 1 | 4 | 3 | 3 | 3 | 4 | | 2 | 5 | 3 | 2 |
| Respondent 2 | 4 | 4 | 4 | 3 | 3 | 3 | 2 | 3 | 3 | 2 |
| Respondent 3 | 4 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 3 |
| Respondent 4 | 2 | 2 | 2 | | | | 2 | | 3 | 2 |
| Respondent 5 | 3 | 3 | 2 | 3 | 3 | 2 | 3 | 4 | 3 | 2 |
| Respondent 6 | 4 | 3 | 1 | 3 | 3 | 4 | 1 | 2 | 1 | 1 |
| Respondent 7 | 4 | 3 | 4 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Respondent 8 | 4 | 4 | 4 | | | | 4 | | | 3 |
| Respondent 9 | 3 | | 3 | | | | 3 | 3 | 4 | 3 |
| Respondent 10 | 4 | 3 | 4 | 2 | 3 | 2 | 3 | 3 | 3 | 2 |
| Respondent 11 | 4 | 4 | 4 | | | | 4 | 4 | 3 | 3 |
| Respondent 12 | 2 | 2 | 2 | 2 | 2 | | | | 2 | 1 |
| Respondent 13 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Mean | 3,46 | 3,08 | 3,00 | 2,78 | 3,00 | 2,86 | 2,75 | 3,30 | 2,92 | 2,31 |
| Std. Deviation | 0,75 | 0,64 | 0,96 | 0,42 | 0,47 | 0,64 | 0,83 | 0,78 | 0,76 | 0,72 |
| Mean Error | 0,21 | 0,18 | 0,27 | 0,12 | 0,13 | 0,18 | 0,23 | 0,22 | 0,21 | 0,20 |

# APPENDIX E: SURVEY PART TWO RESULTS

| **Respondent \ Question** | **1** | **2** | **3** | **4** | **5** | **6** |
|---|---|---|---|---|---|---|
| Respondent 1 | 1 | 3 | 2 | 3 | 2 | 4 |
| Respondent 2 | 2 | 2 | 2 | 3 | 2 | 3 |
| Respondent 3 | 4 | 4 | 3 | 3 | 3 | 2 |
| Respondent 4 | 4 | 4 | | 2 | 2 | 4 |
| Respondent 5 | 3 | 3 | 2 | 3 | 2 | 3 |
| Respondent 6 | 3 | 5 | 5 | 2 | 2 | 2 |
| Respondent 7 | 3 | 3 | 2 | 4 | 2 | 4 |
| Respondent 8 | 2 | | 3 | 2 | 2 | 3 |
| Respondent 9 | 3 | 3 | | | 1 | 2 |
| Respondent 10 | 1 | 2 | 3 | 3 | 3 | 3 |
| Respondent 11 | 2 | 2 | 3 | 3 | 1 | 3 |
| Respondent 12 | 2 | 2 | 2 | | 2 | 2 |
| Respondent 13 | 3 | 3 | 3 | 3 | 3 | 3 |
| Mean | 2,54 | 3,00 | 2,73 | 2,82 | 2,08 | 2,92 |
| Std. Deviation | 0,93 | 0,91 | 0,86 | 0,57 | 0,62 | 0,73 |
| Mean Error | 0,26 | 0,25 | 0,24 | 0,16 | 0,17 | 0,20 |

# APPENDIX F: SURVEY PART THREE RESULTS

| **Respondent \ Question** | **1** | **2** | **3** | **4** | **5** | **6** | **7** |
|---|---|---|---|---|---|---|---|
| Respondent 1 | 3 | 4 | 2 | 3 | 2 | 3 | 1 |
| Respondent 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Respondent 3 | 2 | 2 | 3 | 3 | 3 | 4 | 4 |
| Respondent 4 | 4 | 4 | 2 | 2 | 3 | 4 | 2 |
| Respondent 5 | 4 | 3 | 4 | 3 | 4 | 3 | 3 |
| Respondent 6 | 5 | 5 | 5 | 4 | 3 | 4 | 2 |
| Respondent 7 | 4 | 5 | 4 | 4 | 4 | 4 | 3 |
| Respondent 8 | 4 |  | 2 |  | 2 |  | 4 |
| Respondent 9 | 3 | 3 | 3 | 2 | 4 | 4 | 3 |
| Respondent 10 | 2 | 3 | 3 | 3 | 3 | 3 | 3 |
| Respondent 11 | 2 | 2 | 3 | 4 | 3 | 4 | 2 |
| Respondent 12 | 2 | 2 | 2 | 2 | 2 | 2 |  |
| Respondent 13 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| Mean | 3,15 | 3,25 | 3,00 | 3,00 | 3,00 | 3,42 | 2,75 |
| Std. Deviation | 1,03 | 1,09 | 0,96 | 0,82 | 0,78 | 0,76 | 0,92 |
| Mean Error | 0,28 | 0,30 | 0,27 | 0,23 | 0,22 | 0,21 | 0,26 |