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SEARCHING THE LINKS BETWEEN "KNOWLEDGE GOVERNANCE MECHANISMS", "THE CONDITIONS OF INDIVIDUAL KNOWLEDGE SHARING", AND "INDIVIDUAL'S KNOWLEDGE SHARING BEHAVIOUR"

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ABSTRACT

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The objective of this study was to understand how organizational knowledge governance mechanisms affect individual motivation, opportunity, and the ability to share knowledge (MOA framework), and further, how individual knowledge-sharing conditions affect actual knowledge sharing behaviour. The study followed the knowledge governance approach and a micro-foundations perspective to develop a theoretical model and hypotheses, which could explain the casual relationships between knowledge governance mechanisms, individual knowledge sharing conditions and individual knowledge sharing behaviour. The quantitative research strategy and multivariate data analysis techniques (SEM) were used in the hypotheses testing with a survey dataset of 256 employees from eleven military schools of Finnish Defence Forces (FDF).

The results showed that "performance-based feedback and rewards" affects employee's "intrinsic motivation towards knowledge sharing", that "lateral coordination" affects employee's "knowledge self-efficacy", and that "training and development" is positively related to "time availability" for knowledge sharing but affects negatively employee's knowledge self-efficacy. Individual motivation and knowledge self-efficacy towards knowledge sharing affected knowledge sharing behaviour when work-related knowledge was shared 1) between employees in a department and 2) between employees in different departments, however these factors did not play a crucial role in subordinate–superior knowledge sharing. The findings suggest that individual motivation, opportunity, and the ability towards knowledge sharing affects individual knowledge sharing behaviour differently in different knowledge sharing situations. Furthermore, knowledge governance mechanisms can be used to manage individual-level knowledge sharing conditions and individual knowledge sharing behaviour but their affect also vary in different knowledge sharing situations.

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1 INTRODUCTION

The knowledge-based view of an organization identifies knowledge as a vital driver of organizational capabilities and performance (Kogut & Zander, 1992; Grant, 1996; Spender, 1996). Nowadays, to success in a fast changing environments, organizations need to develop and renew their knowledge and capabilities. They need to be able to maintain, multiply, develop, and modify their knowledge, functions, and strategies continuously. With renewal capability, an organization has the ability to learn, innovate and strengthen its operations. (Pöyhönen, 2004; Kianto, 2008; Junell & Ståhle, 2011.)

In recent years, with a capability focused research stream, scholars have been increasingly attracted to examine the level of organization better where organizational value and performance are created. The debate is whether source of knowledge and organizational capabilities lie at the individual level or at the collective level. (Felin and Hesterly, 2007.) However, in organizations, the knowledge resides within individuals, more precisely, in employees who create, acquire, use, and share knowledge while carrying out their tasks. What individuals come to learn in their work life will benefit their colleagues and, eventually, the whole organization. (Nonaka et al., 2006.) Organizational knowledge creation is therefore strongly rooted in individual employees, their knowledge, and their behaviour. Consequently, knowledge sharing between employees and organizational units is the key activity that enables organizational knowledge creation (Nonaka & Takeuchi, 2005) and renewal (Pöyhönen, 2004).

For the reasons mentioned above, the collective-level approach has recently been challenged by the increasing amount of micro-level studies. These studies demonstrate the importance of individual-level and interpersonal-level ”micro-foundations” in developing organizational capabilities (see Foss, 2007; Felin & Hesterly, 2007; Felin et al., 2012). Therefore, it has been argued that in an organization, to foster knowledge dissemination, the

managerial practices should be directed to individual employees. This ”knowledge-governance approach” (see Grandori, 1997, 2001; Foss, 2007) emphasizes that by doing so, intra-organizational knowledge flows will be enhanced even though the knowledge is embedded and dispersed in individuals. (Foss, 2010.) So far, knowledge sharing research has not been able to explain exactly how various knowledge governance practices affect individual-level knowledge sharing (Foss et al., 2010). Thus, the research gap is evident.

Recently, inspired by the research gap, there are a growing amount of studies that have focused on individual-level knowledge sharing (see Foss et al., 2010). Within this stream, scholars recognize individual motivation, opportunity, and the ability towards knowledge sharing (MOA framework) as the main drivers of actual knowledge sharing behaviour (e.g. Argote et al., 2003; Foss & Minbaeva, 2009; Minbaeva, 2013). However, not much attention has been paid to clarify the relationships between managerial actions and “individual knowledge sharing conditions” (see Foss et al., 2010). Few studies have focused on the relationships between individual factors and knowledge sharing behaviour, but there is still insufficient information on how individual’s motivation, opportunity, and the ability towards knowledge sharing affect behaviour in different knowledge-sharing situations and contexts. For example, knowledge sharing studies concerning the public sector and government organizations have been neglected even though there is a clear need for this (see Kim & Lee, 2006; Willem & Buelens, 2007).

To clarify the research gaps mentioned above, this thesis bites straight into the micro-foundations of renewal capability and investigates how individual-level knowledge sharing can be enhanced towards better directions, which could promote knowledge leveraging in an organization and eventually enhance its renewal.

1.1 OBJECTIVE

Based on previous, my objective is to understand how organizational knowledge governance mechanisms affect individual motivation, opportunity, and ability to share knowledge, and to analyze how these individual knowledge-sharing conditions affect actual knowledge sharing behaviour. I believe that by managing employee's knowledge sharing conditions, organizational renewal can be eventually achieved. On an individual level, knowledge sharing is seen as interaction between two or more employees, where they donate and receive work-related knowledge to perform their work tasks better. This study investigates knowledge sharing in a context of public organization.

1.2 THEORETICAL BACKGROUNDS

In the following few pages, I will give a brief overview of the theoretical backgrounds of this study. Base on this, in next sub-chapter, I will introduce the theoretical framework and research questions which were positioned to achieve objective stated above.

The knowledge-based view of organization and organizational renewal capability

The knowledge-based view of organization (e.g. Grant, 1996; Spender, 1996) has increased its popularity during the last two decades (Kianto, 2008). The view highlights knowledge as the most valuable resource of an organization. In addition, knowledge arises and develops through the interaction of members in an organization. Performance and sustainable competitive advantage are built on internal capabilities, which arise from the individuals of an organization. (Grant, 1996; Spender, 1996; Pöyhönen, 2004.) In an organization, transferring knowledge occurs as the interactional knowledge sharing between members and managing means enabling the operation (Tsoukas & Vladimirou, 2001). The competitive advantage mentioned above refers to a profit-seeking organization, but in a public,

non-profit organization capabilities can create a basis for many other organizational level outcomes.

This research is based on the trend of organizational renewal capability (see. e.g. Pöyhönen, 2004; Kianto, 2008; Junell & Ståhle, 2011). Renewal capability is a feature of an organization that allows it to maintain, multiply, develop, and modify its knowledge, functions, and strategies. With this capability, an organization has the ability to learn, innovate, and strengthen its operations. (Pöyhönen, 2004; Kianto, 2008.)

Pöyhönen (2004) divided renewal capability into three different research trends: knowledge management, strategic management, and intellectual capital. From the knowledge management's standpoint, knowledge is created in a dynamic and social process, while renewal capability is seen as a process of knowledge use, development, and creation. The strategic management's standpoint, in turn, sees organizational renewal capability as a dynamic capability, which allows competitive advantage. Therefore, renewal capability can be defined as creating and renewing unique organizational possibilities that concern a competitive advantage. The view of intellectual capital is focused on measuring and reporting intangibles. Within this view, renewal capability is seen as a static, measurable resource and as a dynamic dimension of intellectual capital. (Pöyhönen, 2004, 17, 127.)

Based on the above, renewal capability can be defined with two different approaches. It can be seen as organizational potential for renewal but, on the other hand, it can stand for functions that promote organizational renewal. The perspectives of strategic management and intellectual capital consider renewal capability as a collective and measurable potential of an organization. The view of knowledge management focuses more on the development of renewal capability. For example, organizations are renewed and their capabilities developed by different knowledge processes and their management. In other words, renewal capability can be seen as an ability to manage the kind of processes that promote organizational re-

newal. The division between these approaches is not straightforward but a blurred line. However, this helps to understand the main difference of the trends.

From the research trends introduced above, the knowledge management view seems to be suitable for my study. In comparison to the other views, the knowledge management perspective concentrates more on knowledge processes, which are considered as drivers of organizational renewal capability. The focus of this study is especially on knowledge sharing process. Collectively it is seen as the most important knowledge process affecting the development of organizational (collective) capabilities (see e.g. Argote & Ingram, 2000; Grant 1996; Kogut & Zander, 1992; Spender, 1996; Foss et al., 2010), like renewal capability.

In this study, organizational renewal capability is seen as a collective capability to renew and develop organizational functions and procedures through learning and innovations (see Pöyhönen, 2004; Kianto, 2008). Even though it is a collective quality by its nature, this paper will focus on its origins at the individual-level for two reasons. At first, as far as I know, there is no study that examines the micro-foundations of renewal capability. Secondly, as the knowledge-based view of organization assumes, knowledge creation is eventually an individual activity, hence, organizational knowledge and capabilities lie on individuals and their behaviour. Moreover, Foss et al. (2010) reviewed knowledge sharing studies showing that the available research on knowledge sharing has not focused sufficiently on the role of individuals and their behaviour. According to them the links between knowledge sharing and the performance outcomes at the collective level (like renewal capability) are quite well established. I will try to fill this research gap in my thesis.

Knowledge sharing

As it was discussed above, for the development of organizational renewal capability, knowledge sharing is the most important knowledge process, which, in turn, is rooted in interactions among the individuals of an organization. In an organization, the knowledge sharing process takes place at different levels, such as at the individual level, team level, and organizational level (see e.g. Grant, 1996; Inkpen & Dinur, 1998). However, like I explained previously, I will focus on knowledge sharing on an individual level.

Knowledge sharing is defined as an action where knowledge is made available to others within that organization. More specifically, it is a process where the knowledge holder is converting his or her knowledge into a form that can be understood, absorbed, and used by others. (Ipe, 2003, 341.) It is a social interaction between individuals including both knowledge donating and knowledge acquisition. Knowledge sharing between individuals may lead to individual learning, which, in turn, may contribute to organizational learning. (Ipe, 2003, 342–343.) This kind of internal knowledge creation process is a key for organizational renewal.

Knowledge content can also be assumed to affect the renewal of organization. Yang (2004) talks about job related knowledge, which is important for employees' performance in work tasks. Dixon (2000), in turn, discusses similar concept called "common knowledge". This is the knowledge employees learn from doing their tasks in the organization. To conclude, Yang's and Dixon's point of view, explains that shared knowledge can be, for example, an employee's experience based know-how about the organizational routines and procedures, as well as his or her ideas and insights of how to perform better. This knowledge is valuable for the organization.

An organization can learn and renew its procedures if employees share their valuable knowledge (Foss et al., 2010, 458). Furthermore, this

knowledge sharing process can be governed using several organizational knowledge governance mechanisms (Foss, 2007; Foss et al., 2010).

The micro-foundations of renewal capability

As mentioned, there has been insufficient research on organizational capabilities and knowledge sharing based on the roles of individuals and their behaviour (micro-foundations) whereas many studies have focused on the links between organizational antecedents and organizational outcomes (collective level) (Foss, 2007; Foss et al., 2010). As a result, it has been argued that capability research, as well as knowledge-sharing research should both focus more on individuals (see e.g. Grant, 1996; Felin & Foss, 2005; Foss, 2007; Felin et al., 2012), their heterogeneity (Felin & Hesterly, 2007) and their interaction (Argote & Ingram, 2000; Felin & Foss, 2005). In other words, the focus should be directed on the "micro-foundations" of collective capabilities and knowledge sharing, which will be focused in this thesis.

Nicolai Foss is a scholar who has emphasized the need of micro-level research. In his publications, the argument is based on James Coleman's (1990) ideas, especially, on the general model of social science explanation (Figure 1).

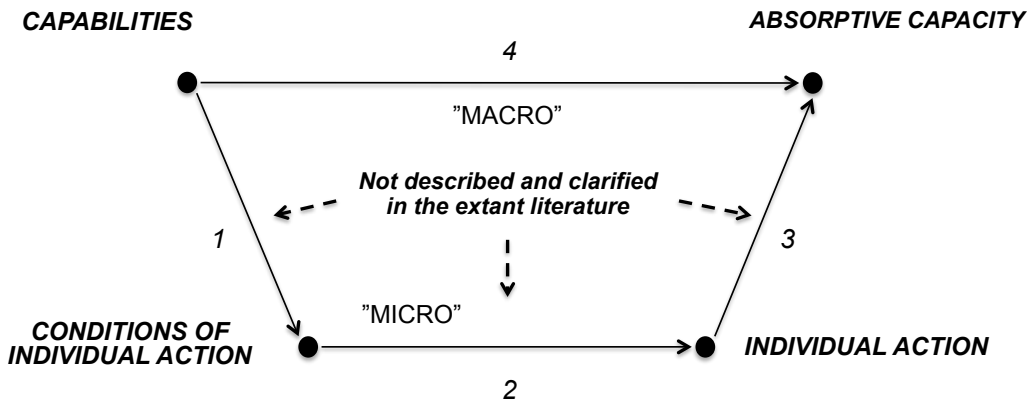


Figure 1: Capabilities as antecedents to absorptive capacity (Foss, 2007, 7).

The Figure 1 shows a distinction between micro-level and macro-level. The macro-level can be seen as an organizational level while the members of the organization constitute the micro-level. Foss (2007) uses this diagram to illustrate the problematic features of recent research based on capabilities and knowledge movement. In the figure above, Foss (2007, 7) argues that scholars usually post a direct relation between capabilities and competitive advantage (arrow 4) however; this explanation doesn't really represent the complex origins of these capabilities. Coleman's model postulates that the outcomes of capabilities should be explained through the conditions of individual action and through their actual behaviour (arrows 1, 2, and 3).

According to Elster (1989), individual conditions (Figure 1, the left lower corner) consist of individual internal perceptions, attitudes, and behavioural choices. Individual conditions are only partially influenced by macro-factors (Mäkelä et al., 2012, 1463) like, knowledge governance mechanisms. These conditions affect the extent to which an individual employee shares his or her knowledge with other employees (Figure 1, right lower corner) (Minbaeva et al., 2012, 389).

Based on the argument above, the micro-foundations of renewal capability are understood as individual conditions for knowledge sharing and his or her actual knowledge sharing behaviour. Based on the knowledge governance approach (KGA), I will investigate how certain organizational knowledge governance mechanisms affect individual conditions to share knowledge (Figure 1, arrow 1) and further, how individual conditions affect actual knowledge sharing behaviour (Figure 1, arrow 2). The link between individual knowledge sharing behaviour and organizational outcomes will be outside the scope of this thesis. All links (arrow 1, 2, and 3) will be hypothesized theoretically based on previous research, and two of them (arrow 1 and 2) will be further examined empirically.

Knowledge governance approach

Recent research trend in the field of organizational capabilities and knowledge sharing is called the knowledge governance approach (KGA). It is an interdisciplinary approach cutting thematically across the fields of knowledge management, human resource management, organization theory, and strategic management. KGA assumes that knowledge processes, like knowledge sharing, *"can be influenced and directed through the deployment of governance mechanisms."* (Foss, 2007, 1.) By appropriate mechanisms, organization can maximize the net benefits from the processes of sharing, transferring, and creating knowledge (Foss, 2007, 19), which can further lead to better performance outcomes (Foss et al., 2010, 456).

In this study, three knowledge governance mechanisms will be examined. I will hypothesize each of these mechanisms that are believed to affect employees' knowledge sharing conditions (arrow 1 in Figure 1) in organization, particularly, to their individual motivation, ability, and opportunities to share knowledge. The mechanisms investigated are performance-based feedback and rewards (Kim & Lee, 2006; Willem & Buelens, 2007), lateral coordination (Willem & Buelens, 2007), and personnel training and development (Prieto Pastor et al., 2010).

The conditions of individual knowledge sharing

Scholars often explain individual knowledge sharing (Figure 1, both lower corners) using the Theory of Planned Behaviour (TPB) (Ajzen, 1985, 1991) and the Theory of Reasoned Action (TRA) (Fishbein, 1967; Ajzen & Fishbein, 1973; Fishbein & Ajzen, 1975) (see e.g. Bock et al, 2005; Kwok & Gao, 2005; Lin, 2007a; Chatzoglou & Vraimaki, 2009; Tohidina & Mosakhani, 2009; Hau & Kim, 2011). Both are rooted on the basis of social psychology. However, recent research on individual-level knowledge sharing recognizes individual ability, motivation, and opportunity as antecedents of knowledge sharing behaviour. Studies within this stream are rooted onto the MOA framework (motivation-opportunity-ability framework), which was

first used in the knowledge-sharing context by McInnis and Jaworski (1989) and MacInnis et al. (1991).

In this study, MOA framework is adopted. I will examine the impact of the knowledge governance mechanisms (listed above) on individual employee knowledge sharing conditions, which are defined as motivation, ability, and opportunity to share knowledge. MOA framework is selected for three reasons. First, the growing amount of empirical knowledge sharing studies within this perspective indicate that the direction has become more and more popular in recent years (see e.g. Gruen et al., 2005; Siemsen et al., 2008; Prieto Pastor et al., 2010; Chen et al., 2013). Secondly, it has been argued by several scholars that MOA framework is appropriate to explain the conditions of individual knowledge sharing (e.g. Argote et al., 2003, 575; Lane et al., 2006, 859; Foss & Minbaeva, 2009, 18; Gan et al., 2012). Thirdly, recent empirical studies have shown that motivation, opportunity, and the ability to share knowledge, are all closely related to individual knowledge sharing behaviour (e.g. Siemsen et al., 2008). In my study, however, the MOA framework is constructed slightly different than the framework MacInnis and Jaworski (1989) constructed over two decades ago. I take into account especially the findings and the recommendations of more recent studies on individual knowledge sharing.

Generally, within MOA framework, motivation can be seen as the main push towards behaviour. Ability is the skills and capabilities requisite to the performance of behaviour. Opportunity, in turn, means contextual and situational constraints relevant to the performance of the behaviour. (McInnis et al., 1991.) In this study, MOA attributes represent the conditions of employee's knowledge sharing (the lower left corner in Figure 1). In other words, motivation, for example, represents specifically employee's motivation to share knowledge with his or her colleagues.

There are plenty of different motivation theories that can be used while examining individual-level knowledge sharing motivation. These theories can

be classified broadly into two different perspectives: content theories (e.g. Maslow's (1954) hierarchy of need categories; Alderfern's (1972) ERG theory; Herzberg's (1966) two factors theory) and process theories (e.g. Vroom's (1964) expectancy theory, and Locke's (1968) Goal setting theory). However, a modern motivation theory called the self-determination theory (SDT) by Deci and Ryan (1985) seems to be very useful when explaining employee motivation of knowledge sharing (see e.g. Gagné, 2009; Foss et al., 2009; Minbaeva, 2013). It provides a beneficial approach in understanding the motivational bases of effective organizational behaviour. Scholars have argued that SDT should be used as a theory of work motivation (Gagné & Deci, 2005, 356). By adopting principles and practices based on SDT it may provide a long-term value for organizational performance (Stone et al., 2008, 23).

In this study employee's knowledge sharing motivation will be examined based on SDT. In short, the theory argues that humans have three core psychological needs: competence, relatedness, and autonomy. Competence means that one has the ability to influence important outcomes. Relatedness is the feeling of having satisfying and supportive social relationships. Lastly, autonomy means the experience of acting with a sense of choice, free will, and self-determination. Supporting these conditions fosters the most and high quality forms of motivation and engagement for activities. (Stone et al., 2008, 4.)

In knowledge sharing literature, opportunity, as a part of MOA framework, is often defined on Blumberg and Pringle's (1982) theory of work performance (see e.g. Siemsen et al., 2008; Gan et al., 2012). I will adopt this view in my thesis as well. According to Blumberg and Pringle (1982, 565), "*opportunity consist of the particular configuration of the field of forces surrounding a person and his or her task that enables or contrains person's task performance and that are beyond the person's direct control.*" In other words, organization can impact employee's opportunities to share knowledge by en-

abling or constraining it. This can be done, by increasing time available for knowledge sharing activities within an organization.

In knowledge sharing context, “ability” can be defined as an individual attributes relevant to successful task performance (Minbaeva, 2013). Hughes (2007) describes these attributes as individual skills and capabilities needed to the performance of a behaviour. In knowledge sharing research, the ability to share knowledge is often defined as a knowledge self-efficacy, which is often defined based on Albert Bandura’s self-efficacy theory (Bandura, 1977). In this study, I examine knowledge sharing ability as knowledge self-efficacy and therefore, I adopt Banduras definition of self-efficacy. He defines it as the judgments of individuals regarding their capabilities to organize and execute courses of action required to achieve specific levels of performance (Bandura, 1994, 2). Here people self-assessments on their capabilities are seen as their perceptions about their capabilities to share valuable knowledge. These perceptions determine how one will feel, think, motivate oneself, and share knowledge. Research has shown that there is a clear relation between self-efficacy and behavioural results in a number of applied areas (see Bandura, 1997), and recent knowledge sharing research supports these findings (see e.g. Cabrera et al., 2006; Lin 2007a, 2007b; Liu & Liu, 2011).

1.3 THEORETICAL FRAMEWORK, RESEARCH QUESTIONS, AND METHODOLOGY

As mentioned, the objective of this study is to understand how organizational knowledge governance mechanisms affect individual motivation, opportunity, and the ability to share knowledge, and further, how individual knowledge-sharing conditions affect actual knowledge sharing behaviour. This objective was aimed in filling the gap in individual-level knowledge sharing research described in the previous sub-chapter. To fill this gap, the theoretical framework in Figure 2 (next page) was established and research questions below it were positioned.

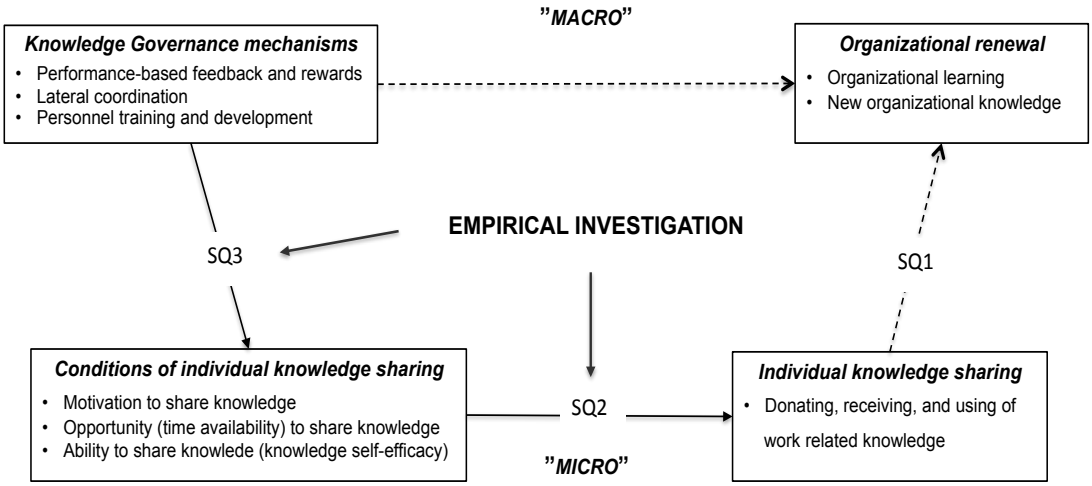


Figure 2: The theoretical framework.

The research question is:

- ***RQ:*** *How do the individual level conditions of knowledge sharing affect knowledge sharing behaviour and how can these conditions be managed using knowledge governance mechanisms?*

The sub-questions are:

- ***SQ1:*** *What is knowledge sharing and how is it related to organizational renewal? (Theory)*
- ***SQ2:*** *How does an individual's motivation, opportunity, and ability to share knowledge affect the individual's knowledge sharing behaviour? (Theory + Empirical investigation)*
- ***SQ3:*** *How does knowledge governance mechanisms affect individual motivation, opportunity, and ability to share knowledge? (Theory + Empirical investigation)*

To answer the research questions a literature review was conducted. Based on the literature review, a theoretical research model was constructed. Based on this the relationships between knowledge governance mechanisms, conditions of individual knowledge sharing, and individual knowledge sharing behaviour were hypothesized. The quantitative research strategy and design was adopted to examine empirically hypothesized rela-

tionships. The data collection was conducted using an internet-questionnaire survey. Data was collected from the Finnish Defence Forces (FDF) because an objective of the study was to understand the impact of knowledge governance practices on employees as well as their knowledge sharing behaviour in a hierarchical and bureaucratic organizational context. The structure of FDF is characterized by clear hierarchies that are deeply ingrained in the organizational culture and codified in the norms and regulations. The sample was narrowed to departments and units from FDF's military schools, whose main function is FDF's personnel education and teaching. All military schools included in the sample, were hierarchical and military-leaded (line and staff organizations). The sample size was 256 and the response rate 49%. The gathered data was analyzed using quantitative and multivariate analysis techniques (Exploratory Factor Analysis, Confirmatory Factor Analysis, Structural Equation Modeling). Finally, the research questions were answered based on the conducted literature review and empirical findings.

1.4 STRUCTURE OF THE STUDY

In Chapter 1, I describe the research gap, state the objective, establish the theoretical framework, position the research questions, and discuss how these questions were answered.

In Chapter 2, I find out what knowledge sharing is and how it affects organizational renewal in line with my first sub-question (SQ1). In this chapter knowledge and knowledge sharing will be defined for my subsequent empirical analyses.

In Chapter 3, the discussion focuses on individual knowledge sharing conditions that are motivation, opportunity, and the ability to share knowledge. In this chapter, MOA factors are discussed based on the theories introduced previously. In this chapter, I will position the hypotheses that will then be investigated during the subsequent empirical research.

Chapter 4 begins with an introduction of “the knowledge governance approach”. Next, the discussion will focus on three knowledge governance mechanisms introduced previously. In this chapter, I will hypothesize how these knowledge governance mechanisms affect individual motivation, opportunity, and the ability to share knowledge. These hypotheses are examined during the empirical research.

Chapter 5 gathers the hypothesized relationships in Chapter 3 and Chapter 4 that represent the theoretical research model. In Chapter 6, I present how this model was investigated empirically using multivariate data analysis techniques.

This study’s results are presented in Chapter 7. In this chapter, I test the hypotheses that were positioned in Chapter 3 and Chapter 4. Based on the study’s findings I answer the sub-questions 2 (SQ2) and 3 (SQ3). Finally, in Chapter 8, the conclusions are presented and the research question is answered.

Since there is not much literature dealing with knowledge sharing in hierarchical public/non-profit organizations, I will also utilize empirical findings from private organizations when hypothesizing the relationships between governance mechanisms, conditions of knowledge sharing, and knowledge sharing behaviour. It should be noted that in knowledge sharing context the main difference between public and private organizations is that in public organizations, managers face more organizational constraints, which could affect the ability to improve employee knowledge sharing capabilities (Kim & Lee, 2006). For example, in an organization with high hierarchy, its members are bonded together through internal controls and are governed by procedures. Formal rules, norms, and policies hold the organization together. (Cameron & Quinn, 2005.) The context effect on results will be assessed in detail when results are presented in Chapter 7 and when theoretical and managerial implications are proposed in Chapter 8.

2 INDIVIDUAL-LEVEL KNOWLEDGE SHARING

In this chapter, I will answer my first sub-question: *What is knowledge sharing and how is it related to organizational renewal.* I begin discussing the concepts of knowledge from an organizational renewal perspective, and to conclude I will define what kind of knowledge is essential for organizational renewal. After this, I will focus on individual-level knowledge sharing in public and hierarchical organizations, to understand how valuable work-related knowledge can be shared among the employees of organization. In this chapter, I will discuss that vital knowledge for organizational renewal includes information and knowledge relevant to employees, groups, work units, and the whole organization. For employees, the valuable knowledge carries a potential to take an action that is needed in work tasks. Sharing this kind of knowledge affects the individual positively towards the organization's performance and enhances organizational renewal.

2.1 NATURE OF KNOWLEDGE

Past research indicates that it is difficult to find a general definition for knowledge or knowledge sharing. Therefore, to be consistent, in this study, the definitions of knowledge and knowledge sharing will be both adopted in accordance to the theoretical choices described in the first chapter. From the standpoint of the knowledge-based view of organization, knowledge is constructed socially in practical situations (Kogut & Zander, 1992, 385; Tsoukas & Mylonopoulos, 2004, 3). As Tsoukas and Mylonopoulos (2004, 3) stated, knowledge are *"social processes and practices through which organizational knowledge is created"*. Therefore organizational knowledge depends on how its members interact to make knowledge (Tsoukas & Mylonopoulos, 2004, 4–5).

In previous knowledge management research, there are several categories and concepts (e.g. data, information, knowledge, wisdom, insight, and action) to describe knowledge and its various levels (see e.g. Davenport &

Prusak, 1998, 2). According to Tsoukas and Vladimirou (2001, 976), one commonly used concept is the distinction between data, information, and knowledge. Nonaka and Takeuchi (1995) as well as Davenport and Prusak (1998) are conceivably the most sited; they make the distinction mentioned above.

In their study, Davenport and Prusak (1998) defines data as *"a set of discrete, objective facts about events".* When data becomes information it makes a difference in its receivers outlook or insight. Knowledge, in turn, is a broader concept than data and information. They argue that knowledge originates from information. Thus, if information is to become knowledge individuals must do all the work. They recommend that it *"should be evaluated by the decisions or actions to which it leads".* From this perspective, knowledge includes some higher-order concepts such as wisdom and insights. Concepts such as resolve and action are set to the category they call *"the things you do with knowledge"*. (Davenport & Prusak, 1998, 1–7.)

Davenport and Prusak (1998, 5) suggests that:

> *"…knowledge is a fluid mix of framed experiences, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information. It originates and is applied in the minds of knower. In organisations, it often becomes embedded not only in documents or repositories but also in organisational routines, processes, practices and norms."*

Furthermore, Davenport and Prusak (1998, 7) acknowledge that knowledge is more valuable than data or information because it makes action possible. Knowledge can be used, for example, to make wiser decisions about actions needed to attain goals for an individual or an organization.

Nonaka and Takeuchi (1995, 58–59), in turn, define knowledge as a *"justified true belief"* and information as *"a flow of messages."* From this standpoint, knowledge is made by anchoring information into the beliefs of its

holder, which means that knowledge is essentially related to human action and is deeply rooted in an individual value system. In addition, they emphasize the contextual nature of information and knowledge, and explain how these are created in social interaction among individuals.

In their study, concerning individual knowledge sharing drivers, Siemsen et al. (2008) adopts the definition of knowledge from Nancy Dixon (2000). She defines knowledge in the context of "learning by doing at work". In her book, Dixon (2000) discusses "common knowledge". She emphasizes that this type of knowledge is just one of the many possible types of knowledge in an organization. She argues, however, that the sharing of common knowledge is extremely valuable for organizations because it has the potential to provide a competitive advantage. (Dixon, 2000, 11.)

> *"Common knowledge is knowledge that employees learn from doing the organization's task… It is generated internally, by talented employees in the act of accomplishing the organization's task in new and innovative ways… It is derived from action and it carries the potential for others to use it to take action."* (Dixon, 2000, 11–13.)

Knowledge can also be classified as explicit or tacit knowledge. Explicit knowledge usually refers to knowledge that can be expressed easily, for example, with words or by documents. In contrast, tacit knowledge is obscure and not easily or fully expressive. Michael Polanyi, Hungarian philosopher and chemist, was one of the first theorists, who introduced these knowledge types. Polanyi (1966) explained that explicit knowledge is transmittable in formal language whereas tacit knowledge is more personal and context specific to an individual. As a result, tacit knowledge is difficult to formalize and communicate. Therefore, tacit knowledge is subjective and explicit knowledge is objective. (Nonaka & Takeuchi, 1995, 59.)

Dixon (2000) describes different types of knowledge in accordance to Polanyi (1966). However, she emphasizes that most often knowledge consists

of both tacit and explicit elements. She further argues that experience based knowledge *“does not fall on either extreme end of the continuum but rather is a combination or falls at some more intermediate position.”* (Dixon, 2000, 27.)

As mentioned in the first chapter, from the knowledge management perspective, organizational renewal can be seen as the *“process of using, developing, and creating knowledge”* rooted in individuals and their interactions (Pöyhönen, 2004). Thus, it is essential to consider what kind of knowledge, in general, is valuable to use, develop, or create in the first place. Even though the definitions above make a clear distinction between “information” and “knowledge” (Davenport & Prusak, 1998, 1; Nonaka & Takeuchi, 1995, 58), it has been argued that there is not much practical utility to make any type of distinction in knowledge sharing research (see Bartol & Srivastava, 2002, 65; Wang & Noe, 2010, 117).

From this study’s standpoint, it doesn’t matter if it is data, information, or knowledge that has to be shared. It is more important to focus on the value of knowledge for the organization as whole, and on the interaction processes in which knowledge can be created (see Pöyhönen, 2004). Valuable knowledge is then something that supports the long-scale strategies of an organization (Pöyhönen, 2004), something that is unique to an organization, and that includes the potential to provide a competitive advantage (Dixon, 2000). Valuable knowledge is derived from the experience and action of organizational tasks. It can be either tacit, explicit knowledge, or a mix of both. (Nonaka & Takeuchi, 1995; Davenport & Prusak, 1998; Dixon 2000.) If an organization is seen as a dynamic knowledge system, which is a platform for knowledge integration, when knowledge moves only then it is valuable (Pöyhönen, 2004). Additionally, organizational knowledge is dependent on how its members interact to make knowledge (Tsoukas & Mylonopoulos, 2004, 7). Therefore, shared knowledge is more valuable to an organization than the knowledge that resides only in individuals.

Based on above, in this study knowledge is considered as a mix of information, ideas, experiences, and capable relevant in work tasks performed by individuals, groups, work units, and the organization as a whole. It carries the potential to take an action. It originates in the minds of knowers and is created among interactions between individuals. In an organization, it often becomes embedded in documents, repositories, organizational routines, processes, and norms. (See Davenport & Prusak, 1998; Dixon, 2000; Bartol & Srivastava, 2002.)

This is an appropriate definition for this study because it distinguishes between individual knowledge and organizational knowledge while it still emphasizes the individual's role as a key source of knowledge. The definition above also endorses the distinction between tacit knowledge and explicit knowledge. Some valuable (tacit) knowledge may be codified (explicit), but some of it will still remain tacit and needs face-to-face interaction to be shared (Nonaka & Takeuchi, 1995). As mentioned, most of the knowledge, that is important to organizations, includes both of these elements (Dixon, 2000).

2.2 INDIVIDUAL-LEVEL KNOWLEDGE SHARING

As described in first chapter, knowledge sharing among individuals is a key process enabling the use, creation, and development of knowledge, which further enables organizational renewal. Thus, the potential of renewal is embedded in the process of knowledge sharing. In knowledge sharing past research, "knowledge sharing" (e.g. Ipe, 2003; Van den Hoof & Van Weenen, 2004) and "knowledge transfer" (e.g. Argote & Ingram, 2000) seem to be the most commonly used terms to describe knowledge movement within the organization or among its members. However, these concepts differ from each other (see Wang & Noe, 2010). I will subsequently define knowledge sharing within the basis of this thesis.

The use of the terms “knowledge sharing” or “knowledge transfer” is usually related to the analysis level that is used in a research. Knowledge sharing is frequently used by authors whose focus is on the individual level while knowledge transfer is more frequently used when the focus is on groups or organizations (e.g. Ipe, 2003). On the other hand, in research the definitions of knowledge sharing vary based on different variations of donating and/or collecting. More specifically, some definitions merely include the idea of donating (or providing) or collecting, and occasionally both of these aspects (see Van den Hoof & Van Weenen, 2004).

Knowledge sharing process

According to Van den Hoof and van Weenen (2004) knowledge sharing can be seen as a two-folded concept: on one hand, it is the donating of knowledge and on the other hand it is the collecting of knowledge. Knowledge donating means that one individual communicates to another what one’s personal intellectual capital is. While knowledge collecting is seen as consulting people individually in order to get them to share their intellectual capital. The knowledge sharing process is the active process of sending and receiving knowledge. It is an interaction between the sender and receiver. (Van den Hoof & Van Weenen, 2004, 14.)

In addition, Van den Hoof and Van Weenen (2004) found that the more people collect knowledge from others the more people donate knowledge to others both within and outside of the department. Furthermore, Lin (2007b) found that employee willingness to donate and collect knowledge is significantly linked to firm innovation capability, which, is a close concept for renewal capability; both are dealing with capabilities in creating new knowledge. Based on the findings above knowledge sharing includes both the donating of knowledge and the collecting of knowledge. In line with the definition of knowledge mentioned above, it is assumed that knowledge is shared when it leads to some beneficial action in the work context.

Knowledge sharing in organizations

Scholars as well as empirical research have shown that an organization may improve its capabilities by leveraging the knowledge of others through knowledge sharing within and across organizations. Intra-organizational knowledge sharing signifies that the knowledge is shared among and between employees, workgroups, teams, and different units of the organization. (E.g. Argote & Ingram, 2000; Argote et al., 2000; Tsai, 2002; Van den Hoof & Van Weenen, 2004; Kim & Lee, 2006; Willem & Buelens, 2007.) Even though inter-organizational knowledge sharing (e.g. Easterby-Smith et al., 2008) or knowledge sharing with partners and clients is essential for organizations (e.g. Kim & Nelson, 2000), in this thesis I will only focus on intra-organizational knowledge sharing as noted previously.

In their study, Bartol and Srivastava (2002) identified four basic mechanisms for individual knowledge sharing in organizations. At first, employees can contribute their knowledge (ideas, information, expertise, etc.) to a database. Secondly, knowledge can be shared in formal interactions within teams and work units or between employees working in different teams or departments across the organization. This mechanism consists of formal periodical meetings and the usage of teams or intra-departmental working groups. The third mechanism is knowledge sharing in informal interactions within or across teams or work units. Here knowledge is shared in informal interaction between employees, that is, knowledge sharing takes place in everyday situations at the workplace. Informal sharing includes, for example, so called coffee-table conversations or knowledge sharing when an employee shares his expertise when other employee approaches him. The fourth mechanism is knowledge sharing within communities of practices (COP). These are informal arrangements among employees, where participants share the same interest, that is, they share knowledge they all find interesting. (Bartol & Srivastava, 2002, 65–73.) In this thesis, in accordance with Bartol and Srivastava (2002), it is assumed that knowledge sharing occurs in formal and informal situations in a workplace.

I will focus on three different knowledge-sharing situations, which I believe are important for the dissemination of employees' work-related knowledge in organizations. These are:

- employee–employee knowledge sharing within a department;
- employee–employee knowledge sharing between departments; and
- employee–superior knowledge sharing within a department.

Especially the first two situations might be crucial from the standpoint of organizational renewal. For example, sharing knowledge inside and between units allows individuals to learn through interaction, which further support the leverage of knowledge in an organization (e.g. Tsai, 2002). This enhances the organizational learning and positively affects the overall organizational performance (e.g. Ipe, 2003; Chennamaneni et al., 2012, 1097) and capabilities (e.g. Tsai, 2002, 189; Argote & Ingram, 2000; Grant, 1996; Kogut & Zander, 1992; Spender, 1996). In sum, knowledge sharing among employees within and outside of a department is an enabler of organizational outcomes and an enabler of organizational renewal.

The third knowledge sharing situation, employee–superior knowledge sharing, might be a necessary action in the public sector as these organizations are most often bureaucratic and formalized by their nature (see e.g. Willem & Buelens, 2007). In bureaucratic and formalized organizations, the chain of command and decision authority is usually strictly specified and therefore the implementation of new ideas and procedures might need top managements' mandate (see Kim & Lee, 2006; Yang & Maxwell, 2011, Friesl et al., 2011). Thus, knowledge sharing through the formal chain of command is definitely needed to implement valuable knowledge like experience-based practices widely in the organization.

Formal hierarchical structures may also hinder knowledge sharing between organizational units, which can be seen as a clear barrier for the exploitation of new knowledge in an organization. For example, Tsai (2002, 186) found that centralization (the locus of decision making) shows a negative

impact on intra-firm knowledge sharing. Thus, the more top management control perceived among employees is less knowledge shared between units. However, the formal chain of command still seems to be the natural way to share new knowledge in a hierarchical and bureaucratic organization (see Friesl et al., 2011). Mainly, employee–superior knowledge sharing might be the only opportunity to implement new ideas collectively. This view seems to be quite unique. As far as I know, there are no recent studies focusing specifically on knowledge sharing between employees and their superiors in a public organizational context. Therefore, this will be examined in the thesis.

Taken together, knowledge sharing includes both receiving and donating of knowledge. It takes place fundamentally at the individual level in a social interaction. An organization benefits in many ways when employees share knowledge that is valuable to an organization. Valuable knowledge can be information, ideas, experience, or expertise of relevant work tasks performed by employees, groups, work units, or the organization as a whole. Knowledge sharing is essential for organizational renewal through individual and organizational learning. The more valuable the knowledge is the more beneficial it is to share. In public organizations, there are at least three different knowledge-sharing situations, which play a crucial role in the dissemination of work-related valuable knowledge: employee–employee knowledge sharing within department, between departments, and employee–superior knowledge sharing. All these “knowledge-sharing channels” are crucial for an organization performance as they eventually determine if the valuable knowledge will impact to the work of only one employee or the whole organization.

3 THE CONDITIONS OF INDIVIDUAL KNOWLEDGE SHARING

Previous studies have identified a number of factors that are believed to influence knowledge sharing. The knowledge-based view of an organization assumes that knowledge sharing takes place in social interactions among humans. This assumption seems to be acknowledged collectively in past research. As mentioned, in organizations knowledge sharing take place at the individual level rather than the organizational level, and therefore managing it means the management of individuals. Since knowledge sharing is argued to be voluntary action (Dixon, 2002; Gagné, 2009) there is a need to investigate why individuals share knowledge in the first place. Cabrera et al. (2006) demonstrated that the differences in individual participation on knowledge sharing are significantly related to human psychological features and perceptions of the organizational environment and knowledge management systems. Especially, they highlight the importance of human factors in employees' knowledge sharing behaviour.

In this chapter, I will focus on the conditions of individual knowledge sharing, explicitly on individual's motivation, opportunity, and the ability to share knowledge. Especially, the link how these factors affect individual knowledge sharing behaviour will be researched to hypothesize the relationships between MOA variables and knowledge sharing behaviour for the subsequent empirical analysis.

3.1 THE MOTIVATION-OPPORTUNITY-ABILITY FRAMEWORK

Researchers have argued the importance of individual's motivation, opportunity, and the ability in investigating individual-level antecedents of knowledge sharing related behaviour (e.g. Argote et al., 2003, 575; Lane et al., 2006, 859; Foss & Minbaeva, 2009, 18; Gan et al., 2012). However, there are only a few recent empirical studies (e.g. Siemsen et al., 2008; Prieto Pastor et al., 2010; Chen et al., 2013) where the influence of these

individual psychological factors on knowledge sharing is investigated simultaneously. Foss and Minbaeva (2009, 26; see also Minbaeva, 2013) propose that future research should try to clarify the variation found in individual knowledge-related behaviour by examining the differences in individual motivation, abilities, and the use of interactive opportunities provided by the organization. Before discussing MOA attributes separately it seems essential to consider how these psychological factors are related to each other.

Over two decades ago, Blumberg and Pringle (1982, 565) argued that *"at the individual level, performance is determined by willingness* [motivation]*, opportunity, and capacity* [ability] *and, in turn, is partial determinant of each."* While performing a job task, for example, employee gains experience, which over time may improve his or her skills (ability). Furthermore, high job performance may increase an employee's job satisfaction and reduce his or her concerns about his or her performance (motivation). Excellent employee performance may inspire others to perform better, which, in turn, may encourage to higher their performance level. (Blumberg and Pringle, 1982, 563–565.) Based on this highly cited definition by Blumberg and Pringle (1982), it seems quite evident that employee performance, if seen as knowledge sharing, is related to motivation, opportunity, and the ability to share knowledge.

In accordance to Blumberg and Pringle (1982), Argote et al. (2003) emphasized the importance of interaction between MOA attributes to gain valuable performance outcomes. They claim that the "*ability and extra effort is more valuable when coupled with opportunity."* Due to the fact that motivation, opportunity, and ability are obviously interrelated constructs, it seems fruitful to examine not only their influence on knowledge sharing (or vice versa) but also their interrelationships. This enables us to explain how certain managerial actions affects knowledge sharing behaviour through these casual psychological factors. (Argote et al., 2003, 575.)

Blumberg and Pringle (1982, 565) argued that all of these attributes *"must be present in some degree for performance to occur."* Even though these attributes are claimed to be interrelated, there is no clear model that explains their interrelationships in knowledge sharing context. Some scholars argue, that motivation is the main trigger of behaviour. Originally, MacInnis and Jaworski (1989) integrated MOA attributes in a model that was intended to explain consumers' processing of brand information. In their model, they theorized ability and opportunity as moderators of motivation. Motivation had a direct effect on behaviour and it was moderated by ability and opportunity. In their model, motivation was a trigger because it launched the actual behaviour. However, it should be noted that motivation, by itself, does not necessarily lead to actual behaviour. (MacInnis & Jaworski, 1989, 3–7.)

In more recent research, Siemsen et al. (2008) presented a theoretical model and an empirical test to examine how motivation, opportunity, and ability simultaneously drive knowledge sharing. According to their paper, the proposed model was an alternative to the traditional multiplicative model that explains the link between MOA factors and individual knowledge sharing. Based on their findings, they noted that if there was the absence of any MOA variable, knowledge would not be shared. They further argued that ultimately the weakest factor determines if knowledge is shared or not. (Siemsen et al., 2008.)

As pointed above, there is a need to clarify the interrelationships of MOA attributes in knowledge sharing context. There are some empirical studies that might be useful when hypothesizing these relationships. Next, based on literature and the theories introduced in the first chapter, I will discuss MOA attributes and their influences on knowledge sharing separately. As argued above, if there is a reference about their interrelationships, these relationships are hypothesized, as well.

3.2 MOTIVATION TO SHARE KNOWLEDGE

As mentioned in Chapter 1, the self-determination theory (SDT) is useful when explaining employee's motivation of knowledge sharing (Gagné, 2009; Foss et al., 2009; Minbaeva, 2013). First, I will shortly introduce the theory. After this, based on recent empirical studies, I'll propose the hypotheses of how individual knowledge-sharing motivation drives his or her knowledge sharing behaviour.

The Self-determination theory

In short, the self-determination theory argues that humans have three core psychological needs: competence, relatedness, and autonomy. Competence means that one has the ability to influence important outcomes. Relatedness is the feeling of having satisfying and supportive social relationships. Lastly, autonomy is the experience of acting with a sense of choice, free will (volition), and self-determination. Supporting these conditions fosters the highest quality forms of motivation and engagement in activities. (Stone et al., 2008, 4.)

One of SDT's five sub-theories, called Organismic Integration Theory (OIT), describes the quality of individual motivation using terms such as autonomous and controlled motivation. The former involves acting with a sense of volition and having experience of choice while the latter means engaging in an activity because of an outside pressure. (Gagné & Deci, 2005.) Thus, individual behaviour can be characterized to the degree of how autonomous or controlled it is.

As shown in Figure 3, the self-determination theory divides motivation in three different categories and six different types of regulations that drive it.

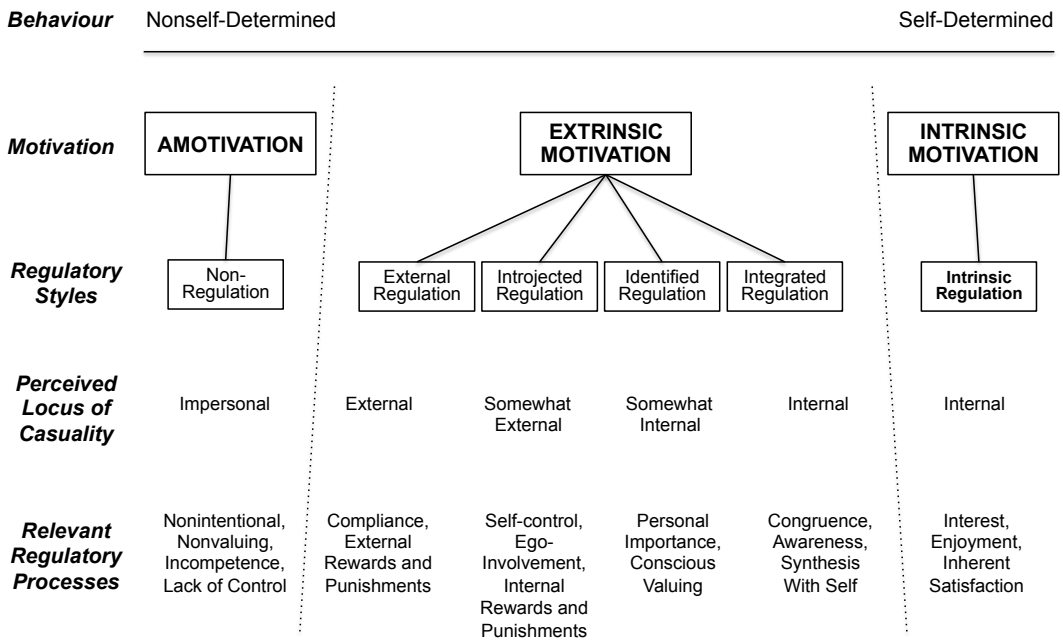


Figure 3: The self-determination continuum (Ryan & Deci, 2000).

Figure 3 illustrates the continuum of motivation, which ranges from “amotivation” to an “intrinsic motivation”. Furthermore, in Figure 3 you can see the different motivational types arranged from left to right based on the degree of their self-determination. According to Gagné and Deci (2005, 348), self-determination refers to the degree of how much an individual feels that behaviour is driven by his or her self-selected aims and purposes. In other words, it is the extent of how much motivation originates from the self (Ryan & Deci, 2000, 72). Amotivation, at the far left of the figure, refers to the lack of motivation and self-determination whereas intrinsic motivation, at the far right, means that the individual that is interested about his or her task finds satisfaction and enjoys doing it. The self-determination theory does not suggest that humans must move through all motivational stages in Figure 3 but it describes these points to the extent to which people have integrated behavioural regulation in general. (Gagné & Deci, 2005, 335–336.)

In knowledge sharing research, the different types of motivations are classified as either intrinsic motivation or extrinsic motivation (Gan et al., 2012). In SDT, however, intrinsic motivation is variantly self-determined and extrinsic motivation can vary to which it is autonomous versus controlled (Ryan & Deci, 2000). This typology is important to understand human behaviour more comprehensively

In Figure 3, the most autonomous type of motivation is intrinsic regulation whereas the most controlled one is external regulation. Putting this in knowledge sharing context, it could be said that external regulation drives knowledge sharing if an individual shares knowledge only when his or her superior is around hoping for a reward or to avoid some undesired consequences. When, in turn, knowledge is shared to gain internal rewards, such as self worth, the knowledge sharing behaviour reflects the introjected regulation. If knowledge sharing behaviour is driven by an identified regulation, the sharer identifies his or her knowledge to others and therefore shares it. This type of extrinsic motivation is somewhat internal as it is based on self worth and self-selected goals. The fourth type of extrinsic motivation is called integrated regulation. This is the most internal type of extrinsic motivation. The knowledge is shared because one finds it important to share with others or it feels important for their own sake. In this case, the knowledge sharer has acknowledged that knowledge sharing is an integral part of who he or she is and therefore sharing comes naturally and feels self-determined. However, sharing is still instrumentally important for personal goals. When the knowledge sharer is intrinsically motivated he or she shares knowledge for the feeling of satisfaction, pleasure, enjoyment, and interest. (See Gagné & Deci, 2005, 334–335.)

Even though SDT seems very appropriate to explain employee knowledge sharing motivation, recently only Foss et al. (2009) have used it in this context as a theoretical framework for empirical investigation. However, plenty of empirical studies have focused on knowledge sharing motivation but within a variety of the background motivational theory (see e.g. Lin, 2007a,

2007b; Chang & Chuang, 2011; Hung et al., 2011; Minbaeva et al., 2012; Hau et al., 2013; Chen et al., 2013). Commonly, most of these studies examine the extrinsic and intrinsic dimensions of motivation. I will later introduce a few recent studies that are all quite cited in recent knowledge sharing literature. It should be noted that possible differences of their empirical findings could be derived from the diversion of used motivational theories, as well as their differentiated constructs to measure knowledge sharing motivation.

Hypotheses development

In their study, Foss et al. (2009) examined the extent of how employee extrinsic, introjected, and intrinsic motivation relate to shared knowledge. All measured motivational factors were defined and operationalized with the self-determination theory. They found that extrinsic, introjected, and intrinsic motivation all have strong effects on sending and receiving of knowledge. In general, the three types of motivation affects the extent of how much knowledge is sent to others. Particularly, intrinsic motivation was the strongest and most significant driver of employee knowledge sharing behaviour, whereas introjected motivation had only a significant positive effect on sending of knowledge. Extrinsic motivation was negatively related to the extent of knowledge sent to others. However, statistically the negative effect was marginally insignificant. In sum, their findings suggests that individual knowledge sharing motivation, in general, explains a large portion of the knowledge sharing behaviour. (Foss et al., 2009.)

Foss et al. (2009) tested additional research models and found that some motivational factors correlate closer together than others. Their statistical tests showed that introjected motivation influenced external motivation more than intrinsic motivation whereas; the correlation between external motivation and intrinsic motivation was insignificant. (Foss et al., 2009, 888.) The strong correlation between introjected and extrinsic motivation might be a reflection of similar constructs. From SDT's standpoint, the external regulation and introjected regulation are the most controlled types of

motivation (see Figure 3), and therefore it could be justifiable to examine these two regulations as a one combined factor as well.

Lin (2007a, 2007b) has also examined the link between employee motivation and knowledge sharing. Her construct of intrinsic motivation in both studies included two separate factors: “enjoyment of helping others” and “knowledge self-efficacy” (the latter will be discussed in the next subchapter when individual knowledge sharing ability is defined). The construct measuring employee’s gratification of helping others was adapted from Wasko and Faraj (2005). It is noteworthy that as this construct was designed to measure the employee’s enjoyment (toward knowledge sharing) it is therefore in accordance with SDT’s definition of intrinsic motivation as well (see e.g. Ryan & Deci, 2000). From this standpoint Lin’s results are partially comparable to Foss et al.’s (2009) results discussed above.

In general, Lin’s studies showed that intrinsic motivation was significantly and positively associated with employee knowledge sharing attitude and intention (Lin, 2007a) as well as knowledge collecting and donating (Lin, 2007b). According to her results, however, extrinsic motivators (like expected rewards) correlate only slightly with employee knowledge sharing attitude and intention (Lin, 2007a) and their impact on knowledge donating and collecting was only marginal (Lin, 2007b).

Summarizing the findings above, it seems that intrinsic motivation correlates positively with both the donating and receiving of knowledge. Extrinsic motivation, in turn, seems to be negatively correlated with knowledge sharing or there can be no correlation at all. There are few studies that support the positive impact between extrinsic motivation and knowledge sharing. In their study, Minbaeva et al. (2012) examined the relationship between individual motivation and knowledge exchange across employee–group margins. They defined intrinsic motivation as a commitment to a task, in which knowledge sharing is driven by internal satisfaction. Extrinsic motivation, in turn, reflected how employees would like to become rewarded for transfer-

ring or for reusing knowledge in future. According to their results both motivation types were positively and significantly related to employees' knowledge exchange.

In this thesis, two types of motivation will be examined: extrinsic motivation and intrinsic motivation. Extrinsic motivation represents controlled motivation that includes both external regulation and introjected regulation of motivation (see Figure 3). Intrinsic motivation will reflect the most autonomous aspects of motivation. In accordance with SDT, I assume that externally motivated employees share knowledge to satisfy an external demand or reward contingency (external motivation) and they are concerned with maintaining and enhancing feelings of worth and acceptance in their organization (introjected motivation) (Ryan & Deci, 2000). Externally motivated behaviour is driven by the possibility to get praise from colleagues or to receive organizational rewards and promotions for the potential to feel proud or to look competent "in others' eyes" (Foss et al, 2009, 881). Intrinsically motivated employees find the knowledge sharing itself interesting and enjoy or feel inherent satisfaction when sharing knowledge (Ryan & Deci, 2000). Intrinsically motivated employees share knowledge because they feel it as an important part of the job (Foss et al, 2009, 881).

Based on the self-determination theory and previous empirical findings, I expect that extrinsic motivation and intrinsic motivation toward knowledge sharing are both positively related to employee knowledge sharing. I therefore hypothesize the following:

> ***Hypothesis 1a–c****: The more intrinsically motivated an employee is toward knowledge sharing the more knowledge he or she shares a) with colleagues within his or her department, b) with his or her superior, and c) with colleagues working in other departments.*

Hypothesis 2a–c: *The more extrinsically motivated an employee is toward knowledge sharing, the more knowledge he or she shares a) with colleagues within his or her department, b) with his or her superior, and c) with colleagues working in other departments.*

3.3 ABILITY TO SHARE KNOWLEDGE (KNOWLEDGE SELF-EFFICACY)

Several scholars have argued that an individual's ability has a positive effect on individual knowledge-related behaviour like knowledge sharing (e.g. Argote et al., 2003; Minbaeva, 2013; Chen et al., 2013). These arguments are supported by recent empirical findings. For example, Cho et al. (2007) and Siemsen et al. (2008) found that "ability" is positively related to knowledge sharing and Chen et al. (2013) showed a positive link between ability and knowledge sharing intention. Ability can further enhance the effects of knowledge sharing motivation and opportunity (Argote et al., 2003). In this study, it is reasonable to assume that ability is an enabler of employees' knowledge sharing behaviour.

In knowledge sharing context, ability can be defined as an individual attributes that are relevant for the successful performance of a task (Minbaeva, 2013). Hughes (2007) describe these attributes as *"individual skills and capabilities needed to the performance of a behaviour."* However, it seems that in recent knowledge sharing studies, ability is defined in multiple ways, like an individual's self-perceived expertise (Cho et al., 2007), sense of self worth (Bock et al., 2005), or self-efficacy (Cho et al., 2007; Cabrera & Cabrera, 2005; Cabrera et al., 2006). All of these definitions are somewhat convergent as they assume that the ability to share knowledge consists of one's belief about his or her skills and the competence relevant for knowledge sharing. One commonly used theory explains the relationship of peoples' self-assessment, their capabilities, and their task performance; this is Albert Bandura's Self-efficacy theory. Therefore, I will introduce the basics of the self-efficacy theory, as well as some recent research results

concerning the knowledge sharing ability. After this, I will hypothesize how this ability impacts employee knowledge sharing behaviour.

The Self-efficacy theory

Self-efficacy is a key concept in Albert Bandura's (1986) social-cognitive theory, which is further rooted in the basis of the social learning theory. In his article, Bandura (1977) examined the construct of self-efficacy and hypothesized the relationship between perceived self-efficacy and behavioural changes. Afterwards, research has shown that there is a clear relationship between self-efficacy and behavioural results in a number of applied areas (Bandura, 1997). Furthermore, the self-efficacy theory is actually quite similar to the self-determination theory, because both theories see individual competence as an important component of motivation.

Bandura (1994, 2) defines self-efficacy as judgments of individuals regarding their capabilities to organize and execute courses of action that are required to achieve specific levels of performance. Self-efficacy beliefs determine how one will feel, think, motivate oneself, and behave. It relates to a person's perceptions about his or her ability to reach a goal. When people believe in their capabilities they most likely approach difficult tasks as challenges that are to be mastered rather than a threats that is to be avoided. This foster intrinsic interest in activities and people naturally set challenging goals and maintain strong commitment to them. People with a strong sense of self-efficacy recover quickly from failures and setbacks. In contrast, people with a weak sense of self-efficacy avoid challenging tasks. They believe that difficult tasks and situations are beyond their capabilities. They mostly focus on personal failings and negative outcomes, which can quickly lose their confidence and personal abilities as well. (Bandura, 1994, 2.)

Individuals develop self-efficacy from four sources. When people perform their tasks successfully it strengthens their sense of self-efficacy. Creating self-efficacy through these mastery experiences is the most effective way to develop it. However, if people cannot deal with their tasks adequately, it

might undermine the perceived self-efficacy. (Bandura 1994, 2.) The second way of strengthening self-efficacy beliefs is by observing the performance of others. According to Bandura (1994, 3) *"seeing people similar to oneself succeed by sustained effort raises observers' beliefs that they too possess the capabilities master comparable activities to succeed."* The third way is social persuasion (reassuring and encouraging). People can be convinced to believe that they have the skills and capabilities to succeed. Verbal encouragement from other individuals can strengthen people's beliefs of their self-efficacy. The fourth way to develop self-efficacy is by our own responses and emotional reactions to certain situations. For example, mood, emotional state, or stress level can impact how a person feels about his or her personal abilities in a particular situation. (Bandura, 1994, 3.)

To summarize, people who have high perceptions about their self-efficacy will be more likely to perform related behaviour than those with low self-efficacy beliefs. People will judge their expected outcomes before taking actions and this can bridge the belief of personal efficacy and the expectations of outcomes. For example, if employees believe they will be able to share new knowledge to their colleagues with great ability, they may be more likely to expect positive outcomes than those who doubt their abilities to do so.

Bandura's Self-efficacy theory introduced above is obviously a comprehensive theory that explains an employee's ability to share knowledge. As argued, the self-efficacy to share knowledge should predict the actual knowledge sharing behaviour (Endres et al., 2007) and it can be treated as a major factor of a self-motivational source for knowledge sharing (Bock & Kim, 2002; Lin, 2007a, 2007b). When people are confident in their ability to provide valuable knowledge to other employees and organization, they are highly motivated to do so (Cho et al., 2007).

Hypotheses development

Cho et al. (2007) studied how individual factors effect on knowledge sharing. They defined self-efficacy according with Bandura's self-efficacy theory introduced above. Based on their empirical findings, they concluded that self-efficacy, as *"the degree to which one believes that one can improve the organization's performance through one's knowledge sharing"*, significantly influences individual knowledge sharing. When people are confident in their ability to provide useful knowledge to the organization, they are highly motivated to do so. (Cho et al., 2007.) These findings indicate that there is a positive relationship between one's self-efficacy beliefs and one's knowledge sharing motivation.

Bock et al. (2005) examined the antecedents of individual's knowledge sharing intentions. One of the measured constructs, that was hypothesized to have a positive effect on individual attitude towards knowledge sharing, was an individual's sense of his or her self worth. They defined the "sense of self worth" as the extent to which employees sees themselves as valuable for their organization through their knowledge sharing. It is the amount of how individuals like themselves and the focus is mostly on their competencies, power, or efficacy regarding their actions. Even though the "self worth" is not described in the terms of the self-efficacy theory, their definition is somewhat similar to Bandura's definition introduced earlier. For example, the sense of self worth captures the idea that the more competent people believe they are, the more valuable the knowledge sharing is believed to be (see Bock et al., 2005, 107). Their empirical results showed only a slight correlation between the sense of self worth and knowledge sharing attitude; therefore they rejected their hypothesis. (Bock et al., 2005.)

Liu and Liu (2011) explored the relationships between human resource practices and individual knowledge sharing in Taiwan's high-tech industries. In their study, perceived self-efficacy implied personal motivation as one's confidence in his or her cognitive resources and anticipated course of

action. They hypothesized that the perceived self-efficacy towards knowledge sharing has had a positive influence on knowledge sharing behaviour. In their measures, they assumed that perceived self-efficacy on knowledge sharing depended on the individuals' assessment of their ability, the individuals' confidence of their skills in knowledge sharing, and their ability to overcome difficulties. As we can see, the construction captures the main idea of Bandura's definition of self-efficacy. Liu and Liu (2011) found that perceived self-efficacy had a strong and positive relationship with knowledge sharing behaviour.

Lin (2007a, 2007b) examined the link between motivational factors and knowledge sharing which was discussed in Sub-chapter 3.2.2. In her studies, one of the constructs that measured intrinsic motivation was "knowledge self-efficacy". It was defined *"as the judgments of individuals regarding their capabilities to organize and execute courses of action required to achieve specific levels of performance"*. (Lin, 2007b, 319; see also Lin, 2007a, 139.) She adopted the definition from Bandura (1986). Lin's results showed that self-efficacy positively correlates with knowledge sharing intentions, knowledge sharing attitudes (Lin, 2007a), knowledge donating, and knowledge sharing (Lin, 2007b). Furthermore, Lin (2007a, 139) argued that based on several scholars, self-efficacy can help motivate employees towards knowledge sharing.

Cabrera et al. (2006) studied individual engagement in intra-organizational knowledge sharing. They measured "role breadth self-efficacy" as one factor that affects knowledge sharing. Sample items they used to measure it were reflected on employee confidence towards knowledge sharing. Based on their empirical findings, they argued that a sense of personal competence and confidence might be a requirement for a person to engage in knowledge exchange (Cabrera et al., 2006, 259).

In my study, I use Lin's (2007a, 2007b) self-efficacy construct to measure employee's ability to share knowledge. Lin adopted this measurement con-

struct from Spreitzer (1995), who used it to measure competence as a factor affecting psychological empowerment in the workplace. Spreitzer (1995) defined competence as an individual's belief in his or her capabilities to perform skilled. However, Lin's construct differs slightly from the construct that Spreitzer (1995) used. According to Lin (2007b), her construct assesses employees' judgment of their capability to share valuable knowledge to the organization. In other words, if employees are confident on their abilities to provide valuable knowledge to others, they will believe in their expertise on the subject and therefore, they will be more self-confident toward knowledge sharing. Thus, this construction represents knowledge self-efficacy in the same way that it has been seen in the self-efficacy theory and in most of the empirical studies introduced above.

Based on the self-efficacy theory and empirical findings, it is reasonable to expect that knowledge self-efficacy (ability) affect employee knowledge sharing behaviour positively. I therefore hypothesize:

> ***Hypothesis 3a–c:*** *The individual ability (knowledge self-efficacy) to share knowledge is positively related with the extent of knowledge he or she shares a) with colleagues within his or her department, b) with his or her superior, and c) with colleagues working in other departments.*

Moreover, knowledge self-efficacy seems to be related with motivational factors as well. As argued above, when people are confident in their ability to provide valuable knowledge to others or to an organization, they are usually highly motivated to do so (Cho et al., 2007). It seems that high self-assessment with the capability to share knowledge fosters the intrinsic interest towards knowledge sharing (see Bandura, 1994). Finally, in the self-determination theory (see Sub-chapter 3.2) competence is seen as a belief that one has the ability to influence important outcomes. By satisfying the need of competence an increase of autonomous motivation might be created. The arguments above lead to my following hypotheses:

Hypothesis 4: *The individual ability (knowledge self-efficacy) to share knowledge is positively related to intrinsic motivation towards knowledge sharing.*

Hypothesis 5: *The individual ability (knowledge self-efficacy) to share knowledge is more related to intrinsic motivation than to extrinsic motivation towards knowledge sharing.*

3.4 OPPORTUNITY TO SHARE KNOWLEDGE (TIME AVAILABILITY)

Recent research suggests "opportunity" as an antecedent of individual knowledge sharing behaviour (Argote et al., 2003; Siemsen et al., 2008; Minbaeva, 2013; Chen et al., 2013). In knowledge sharing research, "opportunity" is a part of the MOA framework, which is usually defined on Blumberg and Pringle's (1982) model of work performance. The model suggests that motivation, opportunity, and ability are the main drivers of work performance. In their paper, Blumberg and Pringle (1982, 565) define that opportunity consist of a particular configuration of the field of forces surrounding a person and his or her task that enables or constrains a person's task performance and that are beyond the person's direct control. Furthermore, Siemsen et al. (2008) defines opportunity based on the above definition but they do it in a knowledge-sharing context. According to them, the opportunity to share knowledge is *"the combination of direct and, at least in the short run, uncontrollable factors surrounding the employee and the task environment that inhibit or enable her sharing of knowledge with her coworkers."* (Siemsen et al., 2008, 433.)

It is important to note that the opportunity to perform a task or to share knowledge is by nature contextual. This means that certain factors may affect employee's behaviour in different working environments as well as, within different types of job-related actions. Therefore, I will present some recent studies to clarify how opportunity is seen as an antecedent of

knowledge sharing in public and private working-organizations. As defined earlier, I treat knowledge sharing as a social interaction; thus, it is essential to focus on the factors enabling or constraining employees' interaction (Minbaeva, 2013).

Time availability to share knowledge

Siemsen et al., (2008) examined "opportunity" as the time available for knowledge sharing. They defined time availability as the degree to how much time an employee has to share knowledge at work, which is the most important operational factor affecting an employee perceived opportunities to share knowledge. Based on their empirical findings, they argued that if an employee does not have enough time to share knowledge with others, this could become a barrier, which can negatively affect motivation and the ability toward knowledge sharing. One important implication of their study was the constraining factor model (CFM) they proposed. CFM's basic idea is to find a bottleneck that constrains the knowledge sharing in certain context. If an opportunity is the bottleneck to share knowledge then, managers should identify it and manage it, because investments aimed at "not constraining" MOA factors are less likely to be effective. By doing this in an organization it is possible to enhance employee opportunities to share knowledge as well as, decreasing negative influences that constrain employee motivation and ability. (Siemsen et al., 2008.)

In context of the Taiwanese service industry, Chen et al. (2013) examined how employees' relation-based motivation, structural opportunities, and cognitive abilities affected their intentions to share knowledge. Chen et al. (2013), partially in line with Siemsen et al. (2008), measured structural opportunity using two variables: reasonable job loading (time availability) and the virtual and physical networks that enable individual employees to increase communication opportunities to help them share knowledge. In their study, opportunity was defined as "*the degree of virtual networks, physical networks, and time availability of individual worker in* [an] *organization regarding knowledge sharing"* (Chen et al., 2013, 97). They found empirical

evidence that “opportunity” correlates significantly and positively with the intention to share knowledge (Chen et al., 2013, 103).

Few scholars have studied how time availability affects knowledge sharing in public organizations. Sandhu et al. (2011) researched knowledge sharing behaviour with employees from a public sector in Malaysia. Their results suggest that key individual barriers that affect knowledge sharing are lack of time and the lack of interaction. Lack of interpersonal skills was also identified to affect employees’ knowledge sharing behaviour. Seba et al. (2012) investigated factors affecting public sector employees’ (mainly police officers) attitudes and intentions towards knowledge sharing. Their findings favoured the results suggested by Sandhu et al. (2011) by having more empirical evidence that time available for knowledge sharing is significantly related to employees’ attitudes towards knowledge sharing. To be specific, their results indicated that if there is time to share knowledge, time to discuss with colleagues, and time to attend formal work-related meetings or, in general, time to engage in knowledge sharing, it influences employees’ attitudes to share knowledge with others.

Hypotheses development

Based on both private and public sector studies it seems essential to examine opportunity as an antecedent of employee’s knowledge sharing behaviour. In this study the “opportunity to share knowledge” is defined in accordance with Blumberg and Pringle (1982) and Siemsen et al. (2008). Consequently, opportunity is seen as the combination of direct and mostly uncontrollable factors surrounding an employee and the task environment that enables or constrains an employee’s knowledge sharing with colleagues (Blumberg & Pringle, 1982, 565; Siemsen et al., 2008, 433). Time availability impacts the effectiveness of an employee job performance (Blumberg & Pringle, 1982, 562–564) and several empirical studies have found that the time for social interaction and knowledge sharing enables or constrains employees knowledge sharing (Siemsen et al., 2008; Sandhu et

al., 2011; Seba et al., 2012; Chen et al., 2013), I therefore hypothesize the following:

Hypothesis 6a–c: *The individual opportunity (time availability) to share knowledge is positively related with the extent of knowledge he or she shares a) with colleagues within his or her department b) with his or her superior, and c) with colleagues working in other departments.*

4 GOVERNING KNOWLEDGE SHARING

A recent research trend in the field of organizational capabilities and knowledge sharing is called the knowledge governance approach (KGA). Researchers that use this approach assume that knowledge processes, like knowledge sharing, *"can be influenced and directed through the deployment of appropriate governance mechanisms."* (Foss, 2007, 1.) It is argued that by better managing knowledge processes organizational performance outcomes can be achieved (Foss et al., 2010, 456).

In this chapter, I will discuss knowledge governance in general. After this, I will focus on three knowledge governance mechanisms ("performance-based feedback and rewards", "personnel training and development", and "lateral coordination"). Finally, it is hypothesized how these three knowledge governance mechanisms are related to individual motivation, opportunity, and ability to share knowledge.

4.1 GOVERNING INDIVIDUAL-LEVEL KNOWLEDGE SHARING

In their paper, Fang et al. (2004) emphasize the need of an effective design of knowledge governance to create organizational knowledge. They argue that, *"through the function of knowledge governance, intra-organizational knowledge transfer and flow will be facilitated even under the fact that knowledge is embedded and dispersed in individuals or departments."* (Fang et al., 2004, 1.) Moreover, in their review, Foss et al. (2010) noted that knowledge sharing research collectively addresses an extensive number of potential organizational antecedents known for knowledge sharing. They state that basically any antecedent (e.g. job description, corporate culture, etc.) can affect individual knowledge sharing behaviour and organizational-level outcomes. They further argue on a lack of systematic empirical work aimed to uncover the contributions of different organizational antecedents for knowledge sharing (see also Foss, 2007). However, there are still plenty of empirical studies that expands the effectiveness of knowledge

governance in general and of the relationships between potential knowledge governance mechanisms and knowledge sharing (see e.g. Tsai, 2002; Bock & Kim, 2002; Kim & Lee, 2006; Cabrera et al., 2006; Lin 2007a, 2007b; Siemsen et al., 2008; Minbaeva, 2008; Foss et al., 2009; Prieto Pastor et al., 2010; Fong et al., 2011; Hung et al., 2011; Cao & Xiang, 2012; Hau et al., 2013; Chen et al., 2013).

For example, Cao and Xiang (2012) found empirical support for both formal and informal knowledge governance mechanisms that affect intra-organizational knowledge sharing. In the context of private multinational corporations, Minbaeva et at. (2012) showed that human resource management (HRM) practices affect knowledge sharing through employee motivation. They divided HRM practices in two categories: practices affecting extrinsic motivation (e.g. performance-based rewards or monetary rewards) and practices affecting intrinsic motivation (e.g. job design or flexible working arrangements). Based on their results only practices belonging to an extrinsic category were found to significantly affect employee knowledge sharing while the intrinsic category did not correlate with knowledge sharing significantly. In the context of the automotive industry, Prieto Pastor et al. (2010) found that HRM practices had a positive influence on employees' intra-organizational knowledge sharing, which was positively related to knowledge creation.

These empirical findings announce the importance of knowledge governance in organizations. However, in past knowledge sharing research, there is no consensus of how these mechanisms are related knowledge sharing conditions on an individual level. This thesis will try to clarify this research gap.

4.2 KNOWLEDGE GOVERNANCE MECHANISMS

In organizations, knowledge governance is associated with the adoption of formal and informal practices (mechanisms) to influence the using, sharing, integration, and creation of knowledge in a preferred direction and towards

preferred levels (Foss et al., 2010). Both formal and informal mechanisms are essential for successful knowledge governance (e.g. Foss, 2007; Cao & Xiang, 2012). These formal mechanisms consist of organizational structure, information systems, communication tools, reward systems, and standard operating procedures, whereas mechanisms like organizational culture and social networks are called informal mechanisms (Foss, 2007).

In this study, the focus will be directed on three different knowledge governance practices, which are believed to impact the conditions of individual knowledge sharing (MOA factors). These practices are:

- performance-based feedback and rewards (Kim & Lee, 2006; Willem & Buelens, 2007);
- lateral coordination (Willem & Buelens, 2007); and
- training and development (Prieto Pastor et al., 2010).

The practices above have been selected for this thesis for three reasons. Firstly, to state that there has been little agreement on how different the incentives impact individual knowledge sharing. Some scholars support the positive impact (Kwok & Gao, 2005; Kim & Lee, 2006; Cabrera et al., 2006; Willem & Buelens, 2007; Lin 2007a; Prieto Pastor et al., 2010; Chen et al., 2013) while others support the negative impact (Bock & Kim, 2002; Bock et al., 2005; Lin, 2007b; Hau & Kim, 2011; Hau et al., 2013) or no impact at all (Fong et al., 2011; Hung et al., 2011; Seba et al., 2012). The divergence among these results might be caused, by the fact, that knowledge sharing is, after all, a human behaviour. Therefore, individual motivation, opportunity, and ability can play a crucial role between managerial practices and actual behaviour.

Secondly, knowledge sharing takes place in interactions between individuals. Therefore, lateral coordination might be useful managerial practice to enable co-operative actions and episodes in the workplace. Several empirical studies in several different contexts have shown a positive correlation between collaborative practices and knowledge-related behaviour. For ex-

ample, Tsai (2002, context: private multiunit organization) and Kim and Lee (2006, context: public and private organizations) found that social networks are positively related to intra-organizational knowledge sharing whereas Prieto Pastor et al. (2010, context: private automotive industry organization) found that employees collaboration positively affect intra-organizational knowledge sharing. Fong et al. (2011, context: private Malaysian industry), in turn, showed a positive relation between teamwork and both inter- and intra-organizational knowledge sharing. Furthermore, Willem and Buelens (2007, context: public organization) found that both lateral and informal coordination positively correlates with knowledge sharing effectiveness and intensity. Consequently, it seems that lateral coordination might have a positive impact on MOA attributes as well.

Thirdly, formal training and development programs create opportunities for employees knowledge sharing or collaborative behaviour. On the other hand, training and development might enhance employees' abilities (e.g. knowledge self-efficacy) through learning. Task specific training for example, might lead to employees' learning, which further helps them to work more efficiently. The more one learns the more he or she has to share valuable knowledge to others. If employees believe in their capabilities to offer valuable knowledge to others, they are more likely to share knowledge with each other. The argumentation above is also supported empirically. For example, Fong et al. (2011) found that training and development is positively related to inter- and intra-organizational knowledge sharing and Chen et al. (2013) found that it positively affect the intention of individual knowledge sharing.

In sum, previous knowledge governance research does not take into account the possible intermediating role of individual motivation, ability, and opportunity (the conditions of individual knowledge sharing) between managerial practices and knowledge sharing behaviour. This study will provide additional insights on how the three managerial practices affect individual

motivation, opportunity, and the ability to share knowledge, also how these further affect knowledge sharing.

4.3 PERFORMANCE-BASED FEEDBACK AND REWARDS

Kim and Lee's (2006) empirical findings indicate that the performance-based reward systems in public and private organizations are positively associated with employee knowledge sharing. Furthermore, performance-based feedback and rewards (such as performance-based promotions and compensations) are argued to increase employee's knowledge sharing motivation. The two questions are: 1. How does feedback and rewards affect various types of motivation to share knowledge? 2. What kind of feedback or reward motivates employees to share knowledge? To answer these questions we need to return to the basis of the self-determination theory introduced earlier. It advices how to appraise and reward human behaviour in general (Gagné, 2009).

Based on empirical findings from several studies, Gagné and Deci (2005, 354) argued that the effect of rewards depends on how rewards are administered in the first place. Supportive managerial methods promote basic need satisfaction, intrinsic motivation, and a full internalization of extrinsic motivation (Gagné & Deci, 2005, 346). This, in turn, might lead to effective individual performance. When rewards are administered in an autonomy-supportive atmosphere they are less likely to reduce intrinsic motivation and it can sometimes be enhanced (Gagné & Deci, 2005, 354). If rewards, on the other hand, affect employees in a controlling way, they will feel increasing pressure from outside and will most likely result in external or introjected motivation (Gagné & Deci, 2005, 352). As described in Chapter 3, these are the most extrinsic types of motivation.

For example, a performance-based monetary reward system might enhance intrinsic motivation when it is administered in a way that supports the feeling of autonomy (when compared to a no reward system). Rewards are

used to acknowledge competence that might positively affect individual motivation, if the ambiance is autonomy supportive. (Gagné & Deci, 2005, 354) When managers pay attention to employees' perspectives and ideas, it provide them with a greater choice, and encourage their self-initiation thus, the work climate is more likely to be autonomy supportive (Gagné & Deci, 2005, 355). Furthermore, when rewards are simply obtained by engaging in behaviour or completing a task, there can be greater detrimental effects than if the rewards are obtained by attaining a specific level of performance (Gagné & Forest, 2011, 3). On the other hand, the use of salient extrinsic rewards might be damaging to intrinsic motivation. However, extrinsic rewards can be used in a way that is not detrimental to intrinsic motivation. The key is that extrinsic motivation can become autonomous; conjointly together with intrinsic motivation it is related to performance, satisfaction, trust, and well being in the workplace. (Gagné & Deci, 2005, 356.)

Similarly, feedback can be given in two different ways: a supportive way or a controlling way. According to Hackman et al., (1975, 59) feedback means the degree to which an employee receives information about the effectiveness of his or her efforts on work tasks. They argue that the most powerful feedback is job-provided feedback which is more immediate than, for example, superior-supplied feedback, because it increases the employee's personal control over his work (Hackman et al., 1975, 65). In general, developmental performance-based appraisal or feedbacks are believed to increase an employee's willingness to share knowledge in safe and non-judgmental organizational operation (Cabrera & Cabrera, 2005; Gagné, 2009). SDT provides specific advice on how rewards and feedback should be given (Gagné, 2009, 580)

Autonomous motivation has lead to better behavioural outcomes than controlled ones (Ryan & Deci, 2000; Gagné & Deci, 2005; Stone et al., 2008), therefore it becomes essential to support an employees' core needs to enhance their knowledge sharing. Satisfying employees' needs, will lead to a higher degree of autonomous motivation and sustainability which could

eventually lead to organizational benefits (Stone et al., 2008, 4). By taking into account the different types of motivation, accurate insights of motivational factors that are related to knowledge sharing are discovered and therefore, managers can tailor their knowledge governing activities to the specific need of a particular job (Foss et al., 2009, 874).

From the self-determination theory's standpoint, feedback and rewards, need to support employees' competence, autonomy, and relatedness to enhance the intrinsic motivation of knowledge sharing.

Hypotheses development

In this study, performance-based feedback explains that employee receive information about his or her job performance, personal characteristics, and personal development (Prieto Pastor et al., 2010). Performance-based rewards, in turn, involve non-monetary incentives that are used to reward employees for their well-performed job. In this study, these include promotions and fair career opportunities that are granted based on employees' competence and performance (Kim & Lee, 2006).

In general, the self-determination theory's standpoint points out that performance-based feedback and rewards affect individual knowledge sharing motivation, but the effect might be either collaborative or detrimental. Recent empirical findings support the positive link between feedback and individual extrinsic motivation toward knowledge sharing (see Foss et al., 2009). In turn, the effect rewards have on motivation depends mostly on the type of the reward. Employees might perceive each reward differently and therefore their effect on motivation varies. Consequently, rewards might affect positively or negatively both extrinsic and intrinsic motivations. (Gagné & Forest, 2011, 3–4.)

As mentioned above, when an employee receives a certain reward in an autonomy supportive way their feedback is developmental not controlling thus, an employee might be more intrinsically motivated. In this case, the

employee does not share knowledge because of the probability he or she might receive positive feedback or rewards. This kind of feedback and rewards support an employee satisfaction about his or her work in general (see Gagné, 2009). Therefore, if an employee perceives knowledge sharing as an important part of his or her work, the received performance-based feedback and rewards are positively related to an employee's intrinsic motivation towards knowledge sharing. Based on SDT and Foss et al.'s (2009) findings, it seems that performance-based feedback and rewards affects positively on both intrinsic and extrinsic motivation toward knowledge sharing. I therefore hypothesize the following.

> ***Hypothesis 7:*** *The more performance-based feedback and rewards an individual considers an organization provides, the more he or she will be extrinsically motivated to share knowledge.*

> ***Hypothesis 8:*** *The more performance-based feedback and rewards an individual considers the organization provides, the more he or she will be intrinsically motivated to share knowledge.*

When an employee receives performance-based feedback he or she can become more self-conscious about his or her competence to conduct work tasks (Gagné & Forest, 2011). Similarly, performance-based rewards can work as feedback. For example, when an employee feels that he or she is chosen for a better task because of his or her competencies this positively affects his or her self-confidence. Consequently, it is reasonable to assume that performance based feedback and rewards may enhance an employee's perceptions about his or her knowledge self-efficacy (see Liu & Liu, 2011, 993). I therefore hypothesize the following:

Hypothesis 9: *The more performance-based feedback and rewards an individual considers the organization provides, the greater perception of his or her ability (knowledge self-efficacy) to share knowledge is.*

4.4 PERSONNEL TRAINING AND DEVELOPMENT

An employee's abilities can be managed by means of knowledge management (Argote et al., 2003). Bock and Kim (2002, 20) argues, that when employees believe in their ability to contribute positive improvements to an organizational performance their attitudes towards knowledge sharing will be better. It seems obvious that organizations should give an effort to promote and develop its employees' abilities in order to foster intra-organizational knowledge sharing.

In an organization, one way to foster individuals' abilities is by providing employees with a formal educational programmes and task specific training. It is argued that these should help develop the general level of self-efficacy among organizational employees. When employees' are confident on their abilities they will more likely share knowledge with others. (Cabrera & Cabrera, 2005; Cabrera et al., 2006.)

Hypothesis development

In this study, "personnel training and development" is defined as how much an organization provides formal training programs, job rotation, and mentoring programs to develop employees' skills and to help increase their promotability. (Prieto Pastor et al., 2010.) Training and development is an important practice that assist employees in the learning process of job related competencies, such as task-specific skills, that are vital for employee job performance. It helps prepare employees for the future. (Noe et al., 2008.)

Training and development activities can enhance employee self-efficacy (Cabrera & Cabrera, 2005; Cabrera et al., 2006) and cognitive abilities

(Chen et al., 2013) towards knowledge sharing. As discussed in Chapter 3, the self-efficacy theory offers several ways to develop individual self-efficacy. The most influential creation of self-efficacy is through the mastery experiences (Bandura, 1994, 2). It can be concluded that when an employee receives task-specific training he or she can learn to accomplish more in his or her job and therefore employee feelings of self-efficacy will be enhanced.

Furthermore, Chen et al. (2013) found that the more investments are made in training for knowledge senders and knowledge recipients, the greater the level of employees' cognitive ability will be. Based on the self-efficacy theory and past research I can assume a positive correlation between personnel training and development activities and employee knowledge self-efficacy. Therefore, I hypothesize below.

> ***Hypothesis 10:*** *The more training and development an individual considers the organization provides, the greater the perception of his or her ability (knowledge self-efficacy) to share knowledge is.*

Fong et al.'s (2011) studies found that training and development positively impacts knowledge sharing. According to them, training is important especially in motivating knowledge sharing because it provides a knowledge-sharing platform for employees. Consequently, training and development provides opportunities for knowledge sharing (see also Ipe, 2003, 349) by offering more time with other employees to knowledge share. Therefore, I hypothesize as follows.

> ***Hypothesis 11:*** *The more training and development an individual considers the organization provides, the more opportunities (time availability) to share knowledge he or she perceives there is.*

4.5 LATERAL COORDINATION

Willem and Buelens (2007) define lateral coordination as a formal but unplanned coordination mechanism that coordinate employees' tasks and make cooperative episodes possible. Lateral coordination is used when needed during task execution by means of teamwork, liaison roles, task groups, and mutual adjustment. Lateral coordination includes actions that help employees participate from different units to have joint decision-making. (Willem & Buelens, 2007.) It can be said that through lateral coordination the distance between each employee can be reduced.

Hypotheses development

In an organization, providing opportunities for social interaction can enhance the flow of knowledge. When organizational units interact with each other socially they are more likely to share knowledge with each other. (Tsai, 2002, 187.) Lateral coordination create opportunities for employees to meet each other and develop personal relationships (Willem & Buelens, 2007, 597). If an organization uses lateral coordination methods, such as teamwork, task groups, and meetings, employees have more time to share knowledge due to the fact that they work together. The environment is generally more collaborative. Willem and Buelens' (2007) empirical study indicates that the use of lateral coordination methods can increase the intensity of knowledge sharing.

In consequence, this indicates that lateral coordination creates more time for knowledge sharing and therefore the following hypothesis below is proposed:

> ***Hypothesis 12:*** *The more lateral coordination methods individual perceives the organization uses, the more opportunities (time availability) to share knowledge he or she perceives there is.*

Based on Liu and Liu's (2011) findings it can be concluded that face-to-face communication can have positive effects on perceived employees knowledge self-efficacy. Since lateral coordination creates opportunities for face-to-face communication it might also affect employees' knowledge self-efficacy. Furthermore, work design that enhances the autonomy and participation in decision-making might have a positive effect on employee self-efficacy (Cabrera et al., 2006). Based on above, I hypothesize as follows.

> ***Hypothesis 13:*** *The more lateral coordination methods an individual perceives the organization uses, the greater his or her perception of ability (knowledge self-efficacy) to share knowledge is.*

5 RESEARCH MODEL AND HYPOTHESES

The theoretical research model for subsequent empirical analyses is presented in Figure 4 below.

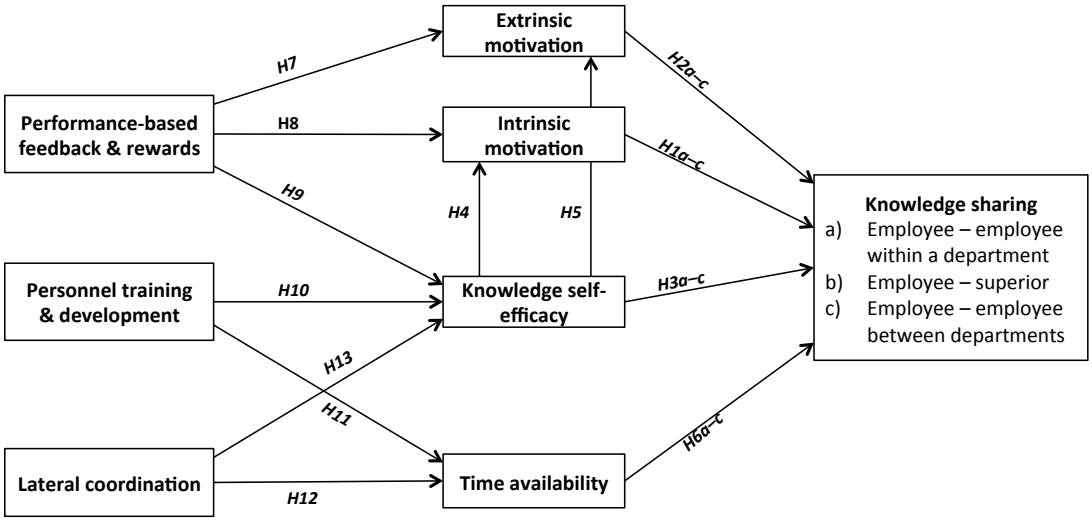


Figure 4: Theoretical research model.

In Figure 4, the three knowledge governance mechanisms at the far left of the picture represents the organizational level (macro) practices that are hypothesized to have an impact on individual intrinsic motivation, extrinsic motivation, knowledge self efficacy (ability), and time availability (opportunity) towards knowledge sharing. In the center of the figure are the MOA factors that represent individual conditions of knowledge sharing, and are further hypothesized to have an impact on individual knowledge sharing behaviour in three different knowledge sharing situations (see Chapter 2).

The model above summarizes theoretical hypotheses, which were positioned based on knowledge sharing, knowledge governance research, self-determination theory, self-efficacy theory, and the theory of work performance. The hypotheses summary is shown in the next page in Table 1 and definitions of each construct in Table 2.

Table 1: Summary of the hypotheses.

No.	*Hypotheses*
H1a-c	The more intrinsically motivated an employee is toward knowledge sharing the more knowledge he or she shares a) with colleagues within his or her department, b) with his or her superior, and c) with colleagues working in other departments.
H2a-c	The more extrinsically motivated an employee is toward knowledge sharing, the more knowledge he or she shares a) with colleagues within his or her department, b) with his or her superior, and c) with colleagues working in other departments.
H3a-c	The individual ability (knowledge self-efficacy) to share knowledge is positively related with the extent of knowledge he or she shares a) with colleagues within his or her department, b) with his or her superior, and c) with colleagues working in other departments.
H4	The individual ability (knowledge self-efficacy) to share knowledge is positively related to intrinsic motivation towards knowledge sharing.
H5	The individual ability (knowledge self-efficacy) to share knowledge is more related to intrinsic motivation than to extrinsic motivation towards knowledge sharing.
H6a-c	The individual opportunity (time availability) to share knowledge is positively related with the extent of knowledge he or she shares a) with colleagues within his or her department b) with his or her superior, and c) with colleagues working in other departments.
H7	The more performance-based feedback and rewards an individual considers an organization provides, the more he or she will be extrinsically motivated to share knowledge.
H8	The more performance-based feedback and rewards an individual considers the organization provides, the more he or she will be intrinsically motivated to share knowledge.
H9	The more performance-based feedback and rewards an individual considers the organization provides, the greater perception of his or her ability (knowledge self-efficacy) to share knowledge is.
H10	The more training and development an individual considers the organization provides, the greater the perception of his or her ability (knowledge self-efficacy) to share knowledge is.
H11	The more training and development an individual considers the organization provides, the more opportunities (time availability) to share knowledge he or she perceives there is.
H12	The more lateral coordination methods individual perceives the organization uses, the more opportunities (time availability) to share knowledge he or she perceives there is.
H13	The more lateral coordination methods an individual perceives the organization uses, the greater his or her perception of ability (knowledge self-efficacy) to share knowledge is.

Table 2: Constructs and their definitions.

Construct	***Definition***
Knowledge sharing	The extent of an employee's self-reported work-related knowledge given to and received from colleagues in an organization. Knowledge sharing includes the using of knowledge in work tasks.
Intrinsic motivation	An employee shares knowledge because he or she finds knowledge sharing interesting, enjoys doing it, and feels inherent satisfaction to share knowledge.
Extrinsic motivation	An employee shares knowledge to satisfy an external demand or reward contingency (extrinsic) or to maintain and enhance his or her feelings of worth and acceptance in his or her organization (introjected).
Ability ***(knowledge self-efficacy)***	An employee's perception regarding his or her capabilities to share valuable knowledge with his or her organization or colleagues.
Opportunity ***(time availability)***	An employee's perception of the time available to share knowledge with colleagues.
Performance-based feedback and rewards	An employee's perception regarding the extent of how much feedback an organization provides and at what extent rewards are based on his or her job performance, personal development, and competencies.
Personnel training and development	An employee's perception regarding the extent of how much an organization provides formal training programs, job rotation, and mentoring programs to develop an employee's skills and increasing promotability.
Lateral coordination	An employee's perception regarding the extent of how much an organization coordinates employees' tasks to enable cooperative episodes and to participate them in joint decision-making.

6 EMPIRICAL RESEARCH

Based on the review of existing literature I've mentioned in previous chapters, I have developed a theoretical model. This chapter describes the overall design of the empirical study that was conducted to examine the theoretical model empirically and to answer the hypotheses positioned in previous chapters. In this chapter, I will discuss the study's methodology: the survey design, data collection, data analysis, and the results of data analysis, respectively. Hypotheses will be answered in next chapter.

6.1 METHODOLOGY

In this thesis, a quantitative research strategy was adopted and quantitative methods were positioned to answer the hypotheses. Figure 5 illustrates the structure of the study's empirical research process.

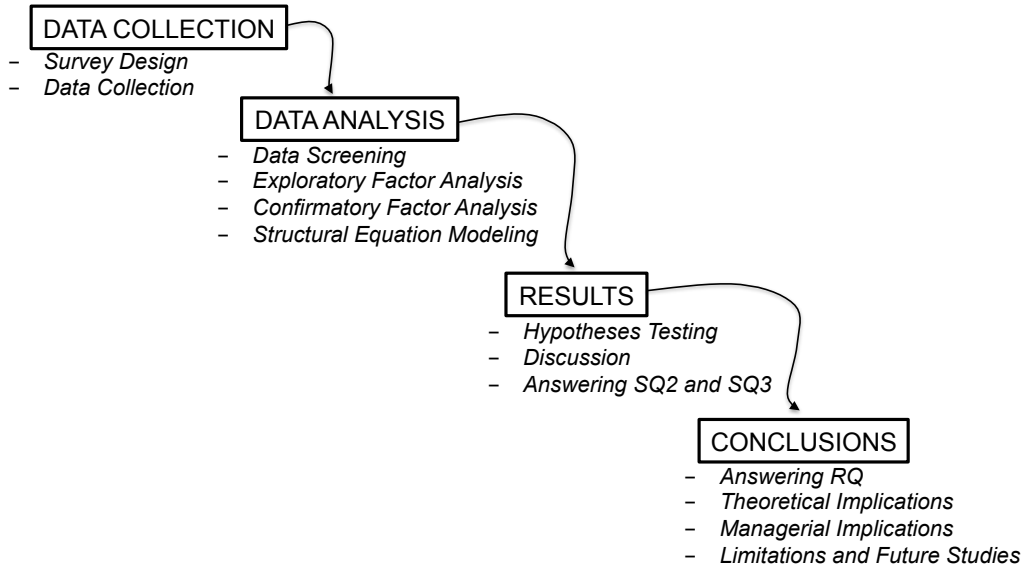


Figure 5: Empirical research process.

The theoretical model and the hypotheses for the empirical investigation were developed based on literature review. The questionnaire used in the data collection was developed based on previous knowledge sharing re-

search. The data collection was conducted using an internet-questionnaire survey. Data was collected from the Finnish Defence Forces (FDF) because one objective of the study was to understand the impact of knowledge governance practices on employees as well as, the knowledge sharing behaviour in a hierarchical and bureaucratic organizational context. The sample was narrowed to departments and units from FDF's military schools, whose main function is FDF's personnel education and teaching. All military schools included in the sample, were hierarchical and military-leaded (line and staff organizations). In some schools the organizational structure and functions follows a matrix of the organization's principles.

The data was analyzed using quantitative and multivariate analysis techniques in accordance with Hair et al.'s (2010) book called *Multivariate Data Analysis*. The analysis process included four phases:

1. "Data screening" phase included tests of univariate (e.g. normality and outliers) and multivariate assumptions (e.g. linearity and multicollinearity) (Hair et al., 2010). The multivariate assumptions were tested after the third phase.
2. "Exploratory Factor Analysis" (EFA) was used to identify the underlying relationships of the measured items (see Hair et al., 2010, 94), that is, to make sure that within this sample the factor structure was assumed as it was in the theoretical research model.
3. "Confirmatory Factor Analysis" (CFA) was conducted to test whether the gathered data fit the theory (Schreiber et al., 2006) by assessing the model's fit, reliability, and validity of the theoretically hypothesized measurement models.
4. "Structural Equation Modeling" (SEM) was used to examine the interrelated dependence relationships among the latent variables in the structural models, which were composed based on CFA results (see Hair et al., 2010, 634). SEM results are the empirical results of this study, which were used to answer the hypotheses.

For the most parts, the Data screening and Exploratory Factor Analysis (phase 2) were conducted using IBM SPSS Statistics (version 21). IBM SPSS Amos (version 21) was used for the Confirmatory Factor Analysis and the Structural Equation Modeling. In the next sub-chapters, I will present how this process was executed step-by-step. The results are presented and discussed in next chapter (Chapter 7).

6.2 SURVEY DESIGN

The first step in the survey's design process was to develop a comprehensive questionnaire that would gather sufficient empirical data to test the research model introduced in Chapter 5. All latent variables in the research model were defined based on previous knowledge governance and knowledge sharing research. The measure instruments were developed using previously validated questionnaires.

Independent variables

As the study's theoretical model states, all three knowledge governance mechanisms were measured as independent variables. The first construct, "Performance-based feedback and rewards", was operationalized using six items (presented in the Table 3). Two of items (*PerfoFeedback_1*, *PerfoFeedback_2*) measure employee's perception regarding the degree of how much feedback an organization provides based on his or her performance. These items were adapted from Prieto Pastor et al. (2010). The rest of the items (*PerfoRewards_1–PerfoRewards_4*) measure the extent of how much employees feel that rewards in an organization are based on employees' competencies and performance. These items were adapted from Kim and Lee (2006). The construct also captures employee's perception toward the fairness of how these rewards are provided in an organization.

Table 3: The construct of performance-based feedback and rewards.

Construct ID	Item ID	Item
Feed-backAndRewards	***PerfoFeed-back_1***	Employees in this organization obtain a feedback based on their job performance.
	PerfoFeed-back_2	Employees in this organization obtain a feedback based on their personal development.
	PerfoRe-wards_1	I feel that employees are promoted to higher positions not for years of work but for competencies and performance.
	PerfoRe-wards_2	Individual or team-based performance is measured with fairness.
	PerfoRe-wards_3	This organization provides me with fair opportunities for advancement.
	PerfoRe-wards_4	The rewards based on job performance are provided with fairness.

"Personnel training and development" was measured using five items (*TrainingDevelopment_1–TrainingDevelopment_5*) from Prieto Pastor et al. (2010). These are presented in Table 4 below. These items measure employee's perception regarding how much training, job rotation, and mentoring an organization provide to develop his or her work-related skills and abilities to increase employee's promotability.

Table 4: The construct of personnel training and development.

Construct ID	Item ID	Item
TrainingAndDe-velopment	***TrainingDevelop-ment_1***	Formal training programs are offered to employees in this organization in order to increase their specific abilities.
	TrainingDevelop-ment_2	The organization uses job rotation to expand the skills of employees.
	TrainingDevelop-ment_3	The organization provides training focused on team building and teamwork skills training.
	TrainingDevelop-ment_4	The organization has a mentoring system to help develop employees.
	TrainingDevelop-ment_5	Employees in this organization go normally through formal training programs every few years.

"Lateral coordination" was operationalized using five items (*LateralCoordination_1–LateralCoordination_5*) modified from Willem and Buelens (2007) study. This construct, presented in the Table 5, measures employee's perception regarding the extent of how much an organization coordinates the

tasks to enable cooperative episodes and to participate employees in joint decision-making.

Table 5: The construct of lateral coordination.

Construct ID	***Item ID***	***Item***
	LateralCoordination_1	Interunit workgroups are set up to allow units to engage in joint decision-making.
	LateralCoordination_2	There are people with a coordinating role whose specific job it is to coordinate the efforts of several departments for purposes of a specific project.
LateralCoordination	***LateralCoordination_3***	Task forces (work groups) are set up to facilitate interunit collaboration on a specific project.
	LateralCoordination_4	Decision making in our organization is characterized by participative, cross-functional discussions in which different departments, functions, or divisions get together.
	LateralCoordination_5	Information and experiences are often shared in meetings or during teamwork.

Dependent variables

In the theoretical model, there are four latent variables ("intrinsic motivation", "extrinsic motivation", "knowledge self-efficacy", and "time availability") that represent the conditions of individual knowledge sharing. In the questionnaire, "Intrinsic motivation" to share knowledge was operationalized with five items. Three of these (*IntMot_1–IntMot_3*) were adapted from Foss et al. (2009) to measure the degree of how much an employee's knowledge sharing is driven by his or her inherent satisfaction whereas, two items (*IntMot_4* and *IntMot_5*) from Lin's (2007a, 2007b) study will capture the feeling of enjoyment towards knowledge sharing. "Extrinsic motivation towards knowledge sharing" was measured using six items from Foss et al. (2009). Three of these items (*ExtMot_1–ExtMot3*) will capture the introjected dimension of knowledge sharing motivation while the others (*Ext_Intro_Mot_1–Ext_Intro_Mot_3*) focus on the external dimension. The extrinsic motivation construct measures the extent of how much an employee shares knowledge to satisfy an external demand or reward contingency (extrinsic) and also to enhance his or her feeling of worth and acceptance (introjected) in an organization. The motivational constructs are presented in Table 6 (next page).

Table 6: The constructs of motivation.

Construct ID	Item ID	Item
IntrinsicMotivation		***I share knowledge with other employees because…***
	IntMot_1	… I think it is an important part of my job.
	IntMot_2	… I find it personally satisfying.
	IntMot_3	… I like sharing knowledge.
	IntMot_4	… sharing my knowledge with colleagues is pleasurable.
	IntMot_5	… I enjoy helping colleagues by sharing my knowledge.
ExtrinsicMotivation		***Why do you share knowledge with other employees?***
	ExtMot_1	I want my supervisor(s) to praise me.
	ExtMot_2	I want my colleagues to praise me.
	ExtMot_3	I might get a reward.
	Ext_Intro_Mot_1	I feel proud of myself.
	Ext_Intro_Mot_2	I want my superior to think I am a good employee.
	Ext_Intro_Mot_3	I want my colleagues to think I am competent.

The "Self-efficacy" construct was adopted from Lin (2007a, 2007b) to measure an employee's ability towards knowledge sharing. All items (*SelfEfficacy_1–SelfEfficacy_4*) in this construct are focused on the employee's perception regarding his or her capability to share valuable knowledge to other employees in an organization. The construct and its items are presented in Table 7. "(R)" at the end of the item means that the current item is reversed coded.

Table 7: The construct of knowledge self-efficacy.

Construct ID	Item ID	Item
SelfEfficacy	***SelfEfficacy_1***	I am confident in my ability to provide knowledge that others in my company consider valuable.
	SelfEfficacy_2	I have the expertise required to provide valuable knowledge for my company.
	SelfEfficacy_3	It does not really make any difference whether I share my knowledge with colleagues (R).
	SelfEfficacy_4	Most other employees can provide more valuable knowledge than I can (R).

In this study, the opportunity to share knowledge was defined as an employee's time available for knowledge sharing. The construct of "Time availability" presented in Table 8 below, was adopted from Siemsen et al. (2008) and Seba et al. (2012). The construct measures if there is enough time available for knowledge sharing in an organization. All items within this construct are reverse coded.

Table 8: The construct of time availability.

Construct ID	***Item ID***	***Item***
TimeAvailability	***TimeAvailability_1***	I have little free time to allocate during work (R).
	TimeAvailability_2	I am usually under high time pressure at work (R).
	TimeAvailability_3	There is no time to share my knowledge with my colleagues due to pressure of work in this organization (R).
	TimeAvailability_4	This organization does not create time for discussion with our colleagues (R).
	TimeAvailability_5	I am too busy to attend training courses or workshops in my department (R).

As the theoretical model suggested, employee's knowledge sharing is examined as the dependent variable. The construct contains three separate factors, which all consists of the four same items adopted from Foss et al. (2009) and Minbaeva et al. (2012). All constructs measure the extent of how much an employee donates, receives, and uses work related knowledge in order to conduct work tasks better. The first construct (*KS_Emp_Emp_1–KS_Emp_Emp_4*) investigates the amount of knowledge one shares with colleagues working in the same department whereas, the second construct (*KS_Emp_Sup_1–KS_Emp_Sup_4*) examines knowledge sharing between subordinate and his or her superior. The third construct (*KS_Emp_EmpUnit_1–KS_Emp_EmpUnit_4*) concentrates on knowledge sharing between employees from different departments. The three constructs measuring employee knowledge sharing are introduced in Table 9 (next page).

Table 9: The constructs of knowledge sharing.

Construct ID	*Item ID*	*Item*
		In last month, to what extent have…
KSEmpEmp	***KS_Emp_Emp_1***	…you gained work-related knowledge from colleagues in your own department?
	KS_Emp_Emp_2	…you used work-related knowledge gained from colleagues in your own department to perform or develop your work task?
	KS_Emp_Emp_3	…colleagues in your own department gained work-related knowledge from you?
	KS_Emp_Emp_4	…colleagues in your own department used work-related knowledge gained from you to perform or develop their work task?
KSEmpSup	***KS_Emp_Sup_1***	…you gained work-related knowledge from your superior?
	KS_Emp_Sup_2	…you used work-related knowledge gained from your superior to perform or develop your work task?
	KS_Emp_Sup_3	…your superior gained work-related knowledge from you?
	KS_Emp_Sup_4	…your superior used work-related knowledge gained from you to perform or develop his or her work task?
KSEmpUnit	***KS_Emp_EmpUnit_1***	…you gained work-related knowledge from colleagues in other departments?
	KS_Emp_EmpUnit_2	…you used work-related knowledge gained from colleagues in other departments to perform or develop your work task?
	KS_Emp_EmpUnit_3	…colleagues in other departments gained work-related knowledge from you?
	KS_Emp_EmpUnit_4	…colleagues in other departments used work-related knowledge gained from you to perform or develop their work task?

In this study, the analysis unit was an individual employee. The gathered data represents employee self-reports about their perceptions toward the measured constructs. All independent latent variables ("performance-based feedback and rewards", "personnel training and development", and "lateral coordination") and the four dependent latent variables (MOA) were measured using a 7-point Likert-type scale with anchors ranging from 1 (strongly disagree) to 7 (strongly agree). Three dependent latent variables ("employee–employee knowledge sharing within a department", "employee–superior knowledge sharing", and "employee–employee knowledge sharing between departments") were measured using scale ranging from 1 (little or no extent) to 7 (very large extent). Multiple items and reverse coded items were used to increase the measurement accuracy.

6.3 THE QUESTIONNAIRE SURVEY AND DATA COLLECTION

The first step in building the questionnaire was to translate the adopted items into the Finnish language to make sure that the questions could be understood as much as possible among respondents. Both the English and Finnish versions of the questionnaire were then introduced to the supervisors to ensure that the items were sufficient. Based on their feedback, few questions from the Finnish version questionnaire were further improved.

The second step was the pre-test phase where the Finnish questionnaire was pre-tested with five employees from the target organization. One of the participants was a unit leader and the other four were subordinates from two different departments. The main purpose of the pre-test was to ensure that the questionnaire's language was suitable for the target organization and that the questionnaire's overall format was understandable. All participants were asked to answer the questionnaire and to make notes if they noticed some unclear items, definitions, or general issues. All notes were then discussed through to make sure that the test group understood the questions as it was intended. The questionnaire was further developed based on the test group´s feedback.

The final version of the questionnaire included 14 background variables such as gender, age, personnel group, experience in an organization, their current task, the respondent's role in the department, and the respondent's main task. For the most parts, the final questionnaire dealt with the respondent's perceptions about knowledge governance mechanisms, individual knowledge sharing conditions (MOA attributes), and knowledge sharing behaviour. The total number of variables in the questionnaire was 62.

The research data was collected in the form of a survey, with data being gathered via the Webropol questionnaire in autumn 2013 from Finnish Defence Forces (FDF). The specific target group was personnel working in the military schools and who were somewhat involved in the FDF's personnel

training. Departments and units were selected in co-operation with a representative from each military school. The total number of included schools was 11, which together included a total of 44 departments/units.

At first, a formal information letter was sent to the organization's internal e-mail system. In this letter, all respondents were informed about the forthcoming study. Two days later a personalized survey link was sent to 539 respondents via e-mail. Respondents were recommended no to reply to the questionnaire if they haven't been working in their unit recently. In FDF, it is quite common that personnel are temporarily off duty; for example, if they are participating in international peacekeeping forces, they can usually take 6–12 months off. From all the sent emails there were three delivery errors and 12 dropped out because of the reason mentioned above.

The questionnaire was open from 13.8.2013 to 4.9.2013. A reminder e-mail was sent to 361 employees who had not answered the survey in the first two weeks. Of the 539 surveys sent out for to participate in the survey, a total of 259 questionnaires were filled. Three respondents were excluded from the study because they didn't belong to the target group. There was no missing data, so the total amount of acceptable answers was 256, which gives a response rate of 49%. Thus, the sample represents approximately 49% percent of the target group, that is, military schools personnel who are involved in the FDF's personnel training. A general concern of the sample size is that minimally the sample should have at least five times as many observations as the number of variables that are to be analyzed (Hair et al., 2010, 102). Based on Hair et al.'s (2010) thumb rule, the sample size was sufficient for all multivariate techniques used in this study.

It should be noted that I did not execute a pilot study to gather pilot samples due to the strict study time schedule. The research data was also gathered in one questionnaire even though, it is recommended not to do so. This may cause, for example, a common method variance in the sample. However, all items were carefully selected from previous knowledge sharing

and knowledge governance research. The common method bias was tested during the data analysis process. The test indicated that the data was not biased.

Descriptive statistics of the sample

As mentioned previously, the whole sample size was 256 respondents. From these, 85,5% were male and 14,5% were female. The gender distribution is quite typical coming from a military organization. The age distribution within the sample was as follows: 6,6% were between 21–30, 40,2% were between 31–40 years, 39,5% were between 41–50 years, 12,9% were between 51–60 years and two respondents (0,8%) were over 60 years old. The personnel group distribution of respondents was as follows: 44,5 % were officers, 19,9% were institute officers, 6,6% were special officers, 2,7% were non-commissioned officers, and 26,2% were civilians. From demographic data in Table 10 (next page), we can see that 73,8% of respondents were soldiers, and almost half of the respondents were officers. In the Finnish Defence Forces, officers have a unique career planning system compared to other personnel groups. It is quite common that each officer is transferred every three or four years to a new position. The means and standard deviations of all other variables are shown in Appendix 1.

Table 10: Demographic characteristics.

Demographic characteristics	***Number of responses***	***Percentage***
Military Education		
Non-Commissioned Officer	11	5,8
Institute Officer	53	28,0
Master of Military Science	49	25,9
Senior Staff Officer Course	32	17,0
General Staff Officer Course	30	15,9
Other	14	7,4
Total number	*189*	*100*
Civil Education (soldiers included)		
Comprehensive School	2	0,8
Upper Secondary or Vocational School	148	57,8
Polytechnic	39	15,2
University	46	18,0
Doctorate degree	18	7,0
Other	3	1,2
Experience in Finnish Defence Forces		
< 3 years	10	3,9
3-5 years	15	5,9
5-10 years	56	21,9
10-15 years	50	19,5
15-20 years	41	16,0
> 20 years	84	32,8
Task		
Management and Administration	51	19,9
Teaching	103	40,2
Teaching support	12	4,7
Planning	5	2,0
Expert	43	16,8
Research and Development	42	16,4
Experience in task		
< 1 year	42	16,4
1-2 years	64	25,0
2-4 years	61	23,8
4-6 years	31	12,1
6-8 years	17	6,6
8-10 years	12	4,7
> 10 years	29	11,3
Role in department		
Top Management	40	15,6
Middle Management	27	10,5
First-Line Manager	36	14,1
Worker	153	59,8

6.4 DATA ANALYSIS

As mentioned, the data was analyzed in four phases. The first phase, “Data screening”, included the univariate tests (e.g. normality and outliers) and multivariate assumptions (e.g. linearity and multicollinearity) (Hair et al., 2010). In practice, the multivariate assumptions were tested after the third phase. During the second phase, “Exploratory Factor Analysis” (EFA) was used to identify the underlying relationships of the measured items (see Hair et al., 2010, 94) to make sure that the factor structure within this sample was as it was assumed in the theoretical research model. The third phase was the “Confirmatory Factor Analysis” (CFA). During this stage, several tests were conducted to see whether the gathered data fit the theory (Schreiber et al., 2006) by assessing model fit, reliability, and the validity of theoretically hypothesized measurement models. In the last phase, the Structural Equation Modeling (SEM) was used to examine the interrelated dependence relationships among latent variables in the structural models, which were composed on the CFA results (see Hair et al., 2010, 634). SEM results are the results of this study, thus, posited hypotheses were answered based on results from this phase.

6.4.1 Data screening

I started the data analysis with the univariate data screening that included the examination of unengaged responses, items normality, and the detection of possible outliers. There were no missing data in the sample.

Unengaged responses

At first, the standard deviation was tested on each respondent to identify responses with no variance. A low standard deviation may indicate, for example, that the respondent has answered each question with same value without reading the question. There was enough standard deviation on the answers of each respondent and no “careless responses” were detected. The lowest deviation was 0,76 and the second lowest was over 1,03. After I

confirmed that there were no unengaged responses, I recoded all the reverse coded items so that the higher scores could indicate higher levels of agreement.

Normality

The second step in the univariate data screening was the examination of the normality of the items. To do this, I calculated the skewness and kurtosis values of the items and compared them with the "rule of thumb values" of +/-1 and +/-2, respectively. Variables *IntMot_1*, *IntMot_4*, *IntMot_5*, *SelfEfficacy_1*, and *SelfEfficacy_3* were kurtoded. The value was positive and higher than the threshold, which indicated that the respondents answered these questions quite similarly.

Kolmogorov-Smirnov and Shapiro-Wilks tests for normality were used to calculate the probability that the sample was drawn from a normal population. The hypotheses used in these tests are:

- ***H0:*** *The sample data are not significantly different than a normal population.*
- ***H1:*** *The sample data are significantly different than a normal population.*

The *p*-value in both tests was less than 0,05, so these both tests reject H0. Meaning that according to these tests the distribution of responses of all items was significantly different from normal. However, with larger sample sizes, normality parameters become more restrictive and it becomes harder to state that the items are normally distributed (see Hair et al., 2010, 72). As Hair et al. (2010, 74) suggest, *"the researcher should always use both the statistical tests and graphical plots to assess the actual degree of departure from normality."* Based on my observations on the histograms and the box plots, most of the items seemed to be normal enough to further analyze.

However, the same items that caused the kurtosis issues were left skewed as well, which means that most of their observed values concentrated on the right of the mean, with extreme values to the left (see Hair et al., 2010). Based on the examination of the items normality in *IntrinsicMotivation* and *SelfEfficacy*, constructs were squared to fix the skewed distribution. Moreover, all of these items were flagged for potential future issues in subsequent analysis. For example, they might have low communality values.

Outliers

Outliers refer to scores that have a substantial difference between actual and predicted values of the observations (Hair et al., 2010). I examined the items' box plots to detect outliers. I found several respondents whose answers were different from the average respondents. Two of these items were reverse-coded (*SelfEfficacy_3* and *SelfEfficacy_4*), which may explain some of the divergence in the responses. It should be noted, that all of these variables were measured on an ordinal Likert-type scales with seven intervals, where extreme value outliers do not exist. However, I later examined the possible outliers more closely and observed that there was no reason to believe that these were incorrect answers. I also didn't have theoretical basis for removing them.

The data screening concerning the multivariate assumptions was carried out in phase 3, during CFA, and therefore the results for the linearity and multicollinearity tests will be introduced in Sub-chapter 6.4.3.

6.4.2 Exploratory Factor Analysis

As described earlier, all items in this study were defined based on previous research. However, some constructs are mixtures of items adapted from two different scholars. Therefore, in this study, EFA was conducted to see if the chosen variables loaded on latent factors as expected, were adequately correlated, and met the criteria of reliability and validity within this sample.

Three different models were analyzed. These models are comprised of three different knowledge-sharing situations as explained in Chapter 2. The models are:

- Model 1, *KSEmpEmp* (employee–employee knowledge sharing within a department);
- Model 2, *KSEmpSup* (employee–superior knowledge sharing within a department); and
- Model 3, *KSEmpUnit* (employee–employee knowledge sharing between departments)

All of these models include three independent latent constructs (*FeedbackAndRewards*, *TrainingAndDevelopment*, and *LateralCoordination*) and five dependent latent constructs (*ExtrinsicMotivation*, *IntrinsictMotivation*, *SelfEfficacy*, *TimeAvailability*, and *KSEmpEmp* / *KSEmpSup* / *KSEmpUnit*).

As mentioned, the sample size (n = 256) was sufficient for EFA (see Hair et al., 2010, 102). The extraction method used in EFA was the “maximum likelihood” based on eigenvalues (> 1). This estimation was chosen for several reasons. Firstly, the method is appropriate to determine the unique variance among items and the correlation between factors. Secondly, the subsequent confirmatory factor analysis was conducted using IBM SPSS Amos, which uses the maximum likelihood estimation. Thirdly, maximum likelihood is the most commonly used estimation procedure in Structural Equation Modeling (see Hair et al., 2010, 661). Finally, Maximum likelihood estimation provides the goodness-of-fit test for the factor solution.

I conducted the EFA using the “promax” factor rotation method because it consents the correlation between factors. This method, like all oblique rotation methods, is useful when the goal is to obtain several theoretically and meaningful factors (Hair et al., 2010, 116), like in this study.

During the EFA, adequacy, reliability, validity, and the normed Chi-square of all three models was examined. The results of EFA are described in detail next.

Adequacy

The Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) and the Bartlett's test of sphericity show how the data suits the EFA in general. In KMO, values over 0,8 indicate that included variables are "meritoriously" predicted without error by other variables. In turn, the Bartlett's test of sphericity indicates that there exist sufficient correlations among the variables to then proceed if the *p*-value is significant (< 0,05). (Hair et al., 2010, 104.) Based on KMO and Bartlett's thresholds, Model1, Model2 and Model3 were all adequate for the EFA with the values of 0,856, 0,857, and 0,859, respectively.

The next values EFA provides are the communality values of measured variables. The communality means the total amount of variance that the original item shares with all other items that are included in analysis (Hair et al., 2010, 92). In this study, the cut-off value for communalities was 0,3, that is, all items below it were dropped. Only *SelfEfficacy_4* with the values ranging between the models from 0,188 to 0,211 was below the limit and therefore it was dropped. All other variables achieved acceptable communality levels.

Reliability

Cronbach's alpha (α) values were examined to access the reliability of the extracted factors. These are shown in Table 11 (next page). In all latent variables the alpha were above the suggested threshold of 0,70 (Nunnally, 1978). It can be assumed that all factors were reflective because their indicators were highly correlated and because the removal of an item wouldn't change the underlying construct (Freeze & Raschke, 2007).

Table 11: The reliability of extracted factors.

Factor label	***Cronbach's alpha (α)***
FeedbackAndRewards	0,859
TrainingAndDevelopment	0,832
LateralCoordination	0,894
ExtrinsicMotivation	0,899
IntrinsicMotivation	0,833
SelfEfficacy	0,742
TimeAvailability	0,855
KSEmpEmp	0,841
KSEmpSup	0,854
KSEmpUnit	0,917

Validity

Convergent validity means that the variables within a single extracted factor are highly correlated. With a sample size of 256 individuals, the minimum recommended factor loading required for significance is 0,35 (Hair et al., 2010, 117). In three analyzed models, *SelfEfficacy_3* was the only item below this threshold (see pattern matrices in Appendix 2). However, it was retained for further analysis due to the factor's reliability (α = 0,742) that was still above the threshold, its communality value was sufficient, and thus it loaded adequately on the theoretically alleged factor.

Discriminant validity refers to the extent to which factors are distinct and uncorrelated (see Hair et al., 2010, 117, 689). Four items, namely *PerfoRewards_3*, *LateralCoordination_2*, *TrainingAndDevelopment_4*, and *IntMot_2* were dropped because they correlated strongly with several factors. Consequently, in the final three models, single items did not have detrimental cross loadings with items in other factors and, thus there were no problematic correlations between the factors.

Within the final three models, the included variables loaded their factors as was theoretically expected. This demonstrates a good nomological validity (see Hair et al., 2010, 126), which means that all factors in the final EFA models work accordingly as it was theoretically assumed.

Goodness-of-fit

As mentioned, maximum likelihood estimation provides the goodness-of-fit statistics by calculating a Chi-square value. It is argued that the Chi-square test is sensitive for a sample size thus researchers often use the normed Chi-square values (”Chi-square” divided by ”degrees of freedom”) to minimize the impact of the sample size. According to Tabachnick and Fidell (2007) the value of the Normed Chi-square should be lower than 2. In the final models, the normed Chi-square values were all below this threshold indicating good fits. It should be noted, however, that all models failed the actual goodness-of-fit test.

The summaries of EFA results are shown in Table 12 below. The final model pattern matrices are presented in Appendix 2.

Table 12: The summary of EFA results.

Measure	***Model1, KSEmpEmp***	***Model2, KSEmpSup***	***Model3, KSEmpUnit***
KMO and Bartlett’s	0,856 (0.000)	0,857 (0.000)	0,859 (0.000)
Communalities	0,392–0,843	0,386–0,809	0,387–0,865
Number of factors (eigenvalue > 1)	8	8	8
Total variance explained	61,8%	62,3%	63,2%
Chi-square	629,174	634,782	631,440
Degrees of freedom (df)	343	343	343
Goodness-of-fit test, *p*-value	0,000	0,000	0,000
Normed Goodness-of-fit	1,83	1,85	1,84

6.4.3 Confirmatory Factor Analysis

The next step in my data analysis process was the Confirmatory Factor Analysis (CFA). The main difference in CFA to EFA is that in EFA all the items are allowed to correlate freely with all the other items whereas in CFA the items are forced to belong to the theoretically assumed latent constructs. At the beginning of CFA, I constructed three measurement models based on final EFA models. Basically, the factor structure of each model

was the same as it was theoretically assumed and subsequently confirmed during EFA.

Modifying the measurement models' model fit

The first step in CFA was to examine the measurement models' model fit. This was done using basic goodness-of-fit statistics. Hair et al. (2010) categorizes these "fit measures" in three categories: absolute fit indices, incremental fit indices, and parsimonious fit indices. According to them absolute fit indices measure the overall fit of the measurement model whereas incremental fit indices indicate how well the current model fits relative to a null model (null model is a comparison standard that is used most commonly). Parsimonious fit measures, in turn, are measures of overall goodness-of-fit representing the degree of model fit per estimated coefficient. Parsimonious fit indices tend to be the best when comparing several developed models for a sample data, in order to choose which model represents best that data. (Hair et al., 2010, 664–669.)

Hair et al. (2010) suggest that the measurement model's fit should be evaluated by using at least one absolute and one incremental fit index. I used six absolute fit measures (Chi-square and it's *p*-value, normed Chi-square, RMSEA, PCLOSE, SRMR, GFI, AGFI), two incremental fit measures (TLI, CFI), and a single parsimony fit index (AFI) to evaluate, if the measurement models were sufficient for further analysis. The thresholds for most indices were taken from Hair et al. (2010, 672).

The goodness-of-fit tests showed that all measurement models needed some respecifications to sufficiently fit with the empirical data. CFA provides model diagnostics that may suggest how the model should be improved to achieve an adequate fit. However, changes, in general, are not recommended to solely be based on empirical criteria. Researchers should use these as guidelines for model improvements that can theoretically be justified. (Hair et al., 2010, 711, 733.) In order to determine if there was an opportunity to improve the models, I examined the items' factor loadings,

the modification indices between the items' error terms, and the estimated covariances between the items' standardized residuals.

In all three models, single items loaded their factors sufficiently, because most of the loadings were clearly over the threshold of 0,5 (Hair et al., 2010, 713). All single loadings were also statistically significant. However, in all three models, *SelfEfficacy_3* had a somewhat low loading (0,50–0,51) on its factor. I didn't remove it because, at first, the factor had only three items, which is suggested to be the minimum (see Hair et al., 2010) and, secondly, the loading was still above the threshold and statistically significant. It should be noted, that in all factors in all models, the average loading of the items on their factors (including *SelfEfficacy*) was evidently above 0,7.

However, the observation of modification indices and standardized residuals suggested that all models could be further improved. Accordingly, I covaried some error terms and dropped three items from each model. Covaried error terms are listed in Table 13. These covariances were justified because the items wording was exceedingly similar and some cross-loadings were theoretically justifiable. For example, it is theoretically rationale that receiving knowledge and using knowledge are related; therefore their error terms were covaried in all measurement models, as well. *Ext_Intro_Mot_3*, *TimeAvailability_2*, and *TrainingAndDevelopment_2* were dropped from all measurement models because the modification indices and standardized residuals indicated insufficiently high cross-loadings with multiple items from multiple factors.

Table 13: Correlated error terms.

Model	***Correlated error terms***		
Model 1, *KSEmpEmp*	*ExtMot_1*	—	*Ext_Intro_Mot_1*
	PerfoFeedback_1	—	*PerfoFeedback_2*
	KS_Emp_Emp_1	—	*KS_Emp_Emp_2*
	KS_Emp_Emp_3	—	*KS_Emp_Emp_4*
Model 2, *KSEmpSup*	*ExtMot_1*	—	*Ext_Intro_Mot_1*
	PerfoFeedback_1	—	*PerfoFeedback_2*
	KS_Emp_Sup_1	—	*KS_Emp_Sup_2*
	KS_Emp_Sup_3	—	*KS_Emp_Sup_4*
Model 3, *KSEmpUnit*	*ExtMot_1*	—	*Ext_Intro_Mot_1*
	PerfoFeedback_1	—	*PerfoFeedback_2*
	KS_Emp_EmpUnit_1	—	*KS_Emp_EmpUnit_2*
	KS_Emp_EmpUnit_3	—	*KS_Emp_EmpUnit_4*

All modifications described above, remarkably improved the models' goodness-of-fit statistics. During this process the three items were dropped and therefore each measurement model consisted of only two "just-identified" factors (*SelfEfficacy* and *TrainingAndDevelopment*), that is, these had only three observed variables left. According to Hair et al. (2010, 699) this means that these constructs have just *"enough degrees of freedom to estimate all free parameters".* According to them, however, this is acceptable if most of the constructs are still "overidentified", that is, they include at least four items, as in my study.

In the final three models most of the standardized residuals covariances were sufficiently below the suggested threshold of |2,5|[1]. However, in all models, approximately half of the items from the independent latent variables (*FeedbackAndRewards*, *TrainingAndDevelopment*, *LateralCoordination*) had standardize residual values between |2,5| and |4,0| with *SelfEfficacy_3*. According to Hair et al. (2010, 713) these kinds of values deserve some attention, but they do not suggest any changes to the model. In Model 1, two pairs of items, explicitly *SelfEfficacy_3* & *PerfoRewards_2* and *TimeAvailability_1* & *PerfoFeedback_1* had insufficient residuals with the values 4,026 and -4,064, respectively. These are slightly over the recom-

[1] In IBM SPSS Amos the residual covariance between two items is the difference between the sample covariance and the model-implied covariance.

mended threshold of |4|, thus suggesting the deletion of an item. As the *SelfEfficacy* factor was already "just identified", *SelfEfficacy_3* was decided to retain. However, during the EFA and CFA the item has turned out to be insufficient and therefore this is a limitation that needs to be noticed when evaluating the results. Because *TimeAvailability_1* and *PerfoFeedback_1* had no inadequate residuals between other items, they were also retained.

Standard errors of some items were slightly high. However, these usually vary inversely with the sample size and the estimation method may also affect on them (Kline, 2011, 33–34)[2]. The Final models' item loadings, their significance, and standard errors are presented in Appendix 3, correlation matrices and descriptive statistics in Appendix 4, and the goodness-of-fit statistics are shown in Table 14 below.

Table 14: Measurement models' goodness-of-fit statistics.

Type of fit measure	***Index***	***Model 1, KSEmp-Emp***	***Model 2, KSEmp-Sup***	***Model 3, KSEmp-Unit***	***Accepta-ble level***
Absolute	Chi-square (χ^2)	656,508	650,197	638,950	-
	Degrees of freedom	432	432	432	-
	p-value	0,000	0,000	0,000	> 0,05
	Chi-square / df	1,520	1,505	1,479	< 3
	RMSEA	0,045	0,045	0,043	< 0,08
	90% conf.int.	,038–,052	,037–,051	,036–,050	< 0,08
	PCLOSE	0,876	0,904	0,942	> 0,05
	SRMR	0,068	0,067	0,066	< 0,08
	GFI	0,864	0,868	0,869	> 0,90
Incremental	TLI	0,942	0,944	0,950	> 0,90
	CFI	0,950	0,952	0,956	> 0,90
Parsimony	AIC	848,508	842,197	830,950	Lowest

With the χ^2 goodness-of-fit test in CFA and SEM, it is looked for a relatively small χ^2 values and large *p*-values. If the *p*-value is greater than 0,05 then the theoretical and estimated covariance matrices are statistically similar, indicating a good fit (see Hair et al., 2010, 666). As we can see from Table

[2] "*The standard error is the standard deviation of a* ***sampling distribution****, which is a probability distribution of a statistic based on all possible random samples, each based on the same number of cases. A standard error estimates* ***sampling error****, the difference between sample statistics and the corresponding population parameter."* (Kline, 2011, 33)

14, all models failed this test ($p < 0,05$). As noticed previously, some of the measured items deviated from normality, which may be a reason for the rejection. As all variables were measured using the Likert-type scales, the skewness shouldn't be an issue and the kurtosis issues were mostly fixed during EFA.

Due to the generally argued restrictiveness of the Chi-square test, researchers have used the normed Chi-square test to assess model fit (Hooper et al., 2008). This is a commonly used test in knowledge sharing studies using SEM techniques with widely ranging sample sizes (see e.g. Lin, 2007b (n = 172); Tohidinia & Mosakhani, 2009 (n = 502); Prodromos & Vraimaki, 2009 (n = 1276); Seba et al., 2012 (n = 319); Kuo, 2012 (n = 563)). In this study, I will ignore the results of the Chi-square test and count on the results of the normed Chi-square test (Chi-square / df) instead. The normed Chi-squares in Table 14 are all at the acceptable level.

Root Mean Square Error of Approximation (RMSEA) is the most popular measure of model fit. It estimates how sufficiently the model fits in a population rather than just a sample (Hu & Bentler, 1999). All RMSEAs in the Table 14 are at the acceptable level. The confidence intervals (90% conf.int.) indicate that RMSEA is below 0,52 in all models with 90 % of confidence. Furthermore, in all models, the close-fit hypothesis is not rejected (PCLOSE > 0,05) thus the fit of all models is "close".

As we can see, the Standardized Root Mean Square Residual (SRMR) indicates also a good model fit. Goodness of Fit Index (GFI) is slightly below the recommended value in all models but the incremental fit measures (Tucker-Lewis Index (TLI) and Comparative Fit Index (CFI)) are both above the suggested threshold. Even though GFI was slightly less than the threshold, it is concluded that as a whole the goodness-of-fit statistics indicate that three measurement models fit the data at a commonly acceptable level.

Reliability and validity

After sufficient measurement models were achieved, I investigated more the reliability and the validity issues. Reliability was measured to examine if the latent factors in all models were sufficiently and internally consistent with their measurements. To test these, I calculated Composite Reliability (CR) values (see e.g. Raykov, 1997) for all the factors in all three models. In all cases the CR was above the minimum threshold of 0,7 (Hair et al., 2010), indicating sufficient reliability in all factors.

To test convergent validity, I calculated the Average Variance Extracted (AVE). In all factors, the AVE was above the recommended 0,5 (Hair et al., 2010) except for *KSEmpEmp* in Model 1, which was just marginally below the threshold (0,496). AVE values indicate that all items explained more than 50% of the variance of their factors whereas *KSEmpEmp* factor, in Model 1, just slightly less.

To examine discriminant validity, I compared the square root of the AVE to all inter-factor correlations. In all models, the factor AVE square roots were greater than the correlations, thus, all factors (including *KSEmpEmp*) demonstrated adequate discriminant validity. In addition, I compared the factors' Maximum Shared Variances (MSV) and Average Shared Variances (ASV) values with their AVE values. All MSV and ASV values were less than their AVE values, which further indicates good discriminant validity (Hair et al., 2010). Thus, in all three models, the factors were mostly explained by their own items and not by the items of the other factors.

As the AVE of *KSEmpEmp* factor was just slightly above the threshold and there was no discriminant validity or reliability issues, the factor was still admissible for further analysis. CR, AVE, MSV, and ASV were calculated using the Stats Tools Package (Gaskin, 2012). The results of reliability and validity measures are presented in Tables 15, 16, and 17. The bolded values in the tables (diagonal) are the square root values of the AVE.

Table 15: The reliability and validity measures of measurement model 1.

	α	CR	AVE	MSV	ASV	1	2	3	4	5	6	7	8
1	0,809	0,822	0,611	0,430	0,149	**0,782**							
2	0,882	0,897	0,640	0,021	0,009	0,031	**0,800**						
3	0,859	0,850	0,534	0,491	0,193	0,656	0,098	**0,731**					
4	0,894	0,896	0,684	0,491	0,182	0,598	0,059	0,701	**0,827**				
5	0,838	0,840	0,570	0,063	0,038	0,250	-0,108	0,222	0,219	**0,755**			
6	0,833	0,846	0,580	0,268	0,127	0,277	0,131	0,374	0,339	0,207	**0,761**		
7	0,841	0,796	0,496	0,233	0,127	0,301	0,144	0,390	0,389	0,123	0,476	**0,705**	
8	0,742	0,772	0,544	0,268	0,106	0,147	0,044	0,275	0,328	0,182	0,518	0,483	**0,738**

Note: *1.TrainingAndDevelopment, 2.ExtrinsicMotivation 3. FeedbackAndRewards, 4.LateralCoordination, 5.TimeAvailability, 6.IntrinsicMotivation, 7.KSEmpEmp, 8. SelfEfficacy. Diagonal values (bolded) are the square root values of the AVE.*

Table 16: The reliability and validity measures of measurement model 2.

	α	CR	AVE	MSV	ASV	1	2	3	4	5	6	7	8
1	0,809	0,823	0,612	0,430	0,150	**0,782**							
2	0,882	0,898	0,640	0,017	0,008	0,031	**0,800**						
3	0,859	0,850	0,535	0,491	0,213	0,656	0,098	**0,731**					
4	0,838	0,840	0,570	0,064	0,042	0,252	-0,109	0,223	**0,755**				
5	0,894	0,896	0,685	0,491	0,196	0,598	0,059	0,701	0,221	**0,827**			
6	0,833	0,846	0,579	0,271	0,102	0,277	0,132	0,373	0,208	0,339	**0,761**		
7	0,854	0,809	0,523	0,294	0,110	0,310	0,090	0,542	0,208	0,498	0,224	**0,723**	
8	0,742	0,772	0,543	0,271	0,079	0,148	0,046	0,278	0,186	0,330	0,521	0,184	**0,737**

Note: *1.TrainingAndDevelopment, 2.ExtrinsicMotivation 3.FeedbackAndRewards, 4.TimeAvailability, 5.LateralCoordination, 6.IntrinsicMotivation, 7.KSEmpSup, and 8. SelfEfficacy. Diagonal values (bolded) are the square root values of the AVE.*

Table 17: The reliability and validity measures of measurement model 3.

	α	CR	AVE	MSV	ASV	1	2	3	4	5	6	7	8
1	0,809	0,823	0,612	0,430	0,150	**0,782**							
2	0,882	0,898	0,641	0,017	0,007	0,031	**0,800**						
3	0,917	0,896	0,684	0,161	0,069	0,319	0,049	**0,827**					
4	0,859	0,850	0,535	0,491	0,190	0,656	0,098	0,360	**0,732**				
5	0,838	0,840	0,571	0,063	0,036	0,250	-0,109	-0,009	0,221	**0,756**			
6	0,894	0,897	0,685	0,491	0,183	0,597	0,059	0,401	0,701	0,219	**0,828**		
7	0,833	0,846	0,579	0,274	0,096	0,276	0,132	0,101	0,373	0,207	0,339	**0,761**	
8	0,742	0,772	0,543	0,274	0,086	0,149	0,048	0,280	0,281	0,186	0,330	0,523	**0,737**

Note: *1.TrainingAndDevelopment, 2.ExtrinsicMotivation 3.KSEmpUnit, 4.FeedbackAndRewards, 5.TimeAvailability, 6.LateralCoordination, 7.IntrinsicMotivation, and 8.SelfEfficacy. Diagonal values (bolded) are the square root values of the AVE.*

Common method bias

If the data is affected by common-method bias it might suffer from false correlations and therefore the results might be incorrect. In this study, the common method bias was tested using Harman's single-factor test, which indicates that the majority of the variance can be explained by a single factor. To conduct the test, all items were included in a principal components factor analysis with "varimax" rotation where the number of factors extracted was constrained to be one. The data would have a common method bias if a single factor accounts for the majority of the variance in the model. (See Podsakoff et al., 2003.) In the three tested measurement models, the total variance explained was around 25 percent. Thus, it can be assumed that the common method bias is not an issue in this data. Even though it is argued that the test does not completely rule out the possibility of bias (Podsakoff et al., 2003, 889) it still provides statistical support for the absence of such bias in this study's findings.

Linearity and multicollinearity

As mentioned in Sub-chapter 6.4.1, the multivariate data screening was conducted during the CFA after the three sufficient measurement models were developed. Linearity was tested between all latent variables within the model using IBM SPSS's curve estimation. The three relationships were not sufficiently linear. These were: 1) *ExtrinsicMotivation* → *KSEmpUnit*, 2) *SelfEfficacy* → *ExtrinsicMotivation*, and 3) *FeedackAndRewards* → *ExtrinsicMotivation*. This is a limitation, which should be noted when analyzing SEM results. However, the majority of relationships were sufficiently linear for SEM analysis.

Multicollinearity between latent variables was examined using SPSS's collinearity statistics. If the Variable Inflation Factor (VIF) is higher than three, then there might be multicollinearity issues. This means that latent variables are too highly correlated with each other. (See Hair et al., 2010, 205.) In all measurement models the VIF values of latent factors were lower than

three. Therefore it can be assumed that there are no multicollinearity issues among the latent variables.

The affect of dropped items on theory

During the EFA and CFA a total of eight items were dropped (see Table 18) because of the previously mentioned reasons. It is notable, that even though the eight items were dropped, the only factors that suffered changes in their definitions were *TrainingAndDevelopment* and *LateralCoordination*.

Table 18: The dropped items during EFA and CFA.

Item ID	***Item***
PerfoRewards_3	This organization provides me with fair opportunities for advancement.
TrainingAndDevelopment_2	The organization uses job rotation to expand the skills of employees.
TrainingAndDevelopment_4	The organization has a mentoring system to help develop employees.
LateralCoordination_2	There are people with a coordinating role whose specific job it is to coordinate the efforts of several departments for purposes of a specific project.
IntMot_2	I share knowledge with other employees because I find it personally satisfying.
Ext_Intro_Mot_3	Why do you share knowledge with other employees? I want my colleagues to think I am competent.
TimeAvailability_2	I am usually under high time pressure at work.
SelfEfficacy_4	Most other employees can provide more valuable knowledge than I can (reversed coded).

Originally, *TrainingAndDevelopment* factor embodied three separate but related concepts: the extent of formal training programs, job rotation, and the existence of a mentoring system in an organization to develop employees' specific task abilities. After the two items were dropped, the factor focused only on formal training programs.

After items were dropped, the *LateralCoordination* factor measures straightforwardly the extent of how much employees perceive that an organization uses cooperation-supportive practices (e.g. work groups) to enable inter- and intra-departmental collaboration and joint decision-making. *FeedbackAndRewards*, *IntrinsicMotivation*, *ExtrinsicMotivation*, *TimeAvailability*, and *SelfEffiacy* factors are still in accordance with their definitions introduced previously.

6.4.4 Structural Equation Modeling

The last phase of the data analysis process was the Structural Equation Modeling (SEM). In CFA's measurement models, there are no distinctions concerning the casual relationships of latent factors whereas in SEM the distinction between independent latent variables and dependent latent variables must be made (Hair et al., 2010, 733). During the SEM phase, I examined the theoretically hypothesized interrelated dependence relationships among the latent variables in three different recursive[3] structural models.

I began the SEM phase by imputing the final and validated CFA models into composites using IBM SPSS Amos, mainly because this simplifies the handling of complex structural models. Basically, this process created three new IBM SPSS datasets, which now all included eight latent factors created using CFA's factor scores. After this, using IBM SPSS Amos and the imputed datasets, I specified the structural models by drawing latent factors, error terms, and direct paths as I hypothesized in the theoretical model (see Chapter 5). All independent variables were covaried as it is suggested (Hair et al., 2010).

Five background variables were used as "control variables" to balance their effects on knowledge sharing during the SEM analyzes. These were: 1)

[3] All models were recursive models, as they didn't include any "feedback loops" (Hair et al., 2010, 734).

gender, 2) personnel group, 3) experience in Finnish Defence Forces, 4) current task, and 5) experience in the current task. In addition, the impact of experience (both in FDF and in task) on self-efficacy was controlled due to it affects on employees competence (see e.g. Argote et al., 2003; Kim & Lee, 2006; Cho et al., 2007). The impact of respondents current task on time availability was also controlled due to influence on knowledge sharing opportunities (see Sub-chapter 3.4; see also Minbaeva et al., 2012). Furthermore, gender affects knowledge sharing, as women may be more responsive to social interaction cultures (Connelly & Kelloway, 2003; Vallerand & Bissonnette, 1992; in Minbaeva et al., 2012, 399). The affect of personnel group was controlled to control the heterogeneity of respondents' backgrounds.

After the three structural models were specified, each of them was estimated and assessed. During this process the emphasis was mainly put on the model fit. Each structural model was investigated separately using the same goodness-of-fit statistics that were used in CFA. For all models, the respecification opportunities were examined based on the residuals and modification indices. Just as in CFA, SEM also requires a strong theoretical and empirical support for all model improvements (Hair et al., 2010, 747).

Model fit investigations revealed that all structural models could further be improved by allowing a direct impact from one or several governance practices to knowledge sharing. These supplemental paths were not hypothesized in my theoretical model. However, because these were theoretically logical and provided profound information on the intermediating role of MOA attributes, some of these direct paths were added. These enhancements improved the models' fit to the data remarkably. Next, I will present the validity assessments of each model separately. Finally, I will examine whether the structural relationships are consistent with the theoretical expectation or not. (See Hair et al., 2010, 744.)

Structural model 1, KSEmpEmp

The first examined structural model was one that estimated employee–employee knowledge sharing within a department. The initial structural model fitted the data sufficiently, but as mentioned, the goodness-of-fit statistics indicated that there was an opportunity to improve the model fit. Modification indices for the direct paths of *FeedbackAndRewards* → *KSEmpEmp* (13,113), *TrainingAndDevelopment* → *KSEmpEmp* (9,694), and *LateralCoordination* → *KSEmpEmp* (10,869) showed that all of these had relatively high values. Because all these paths seemed theoretically rationale and indicated that the hypothesized full mediation might be partial instead, I investigated every possible model variation using these paths to see how they affected the goodness-of-fit statistics. Like modification indices above already suggested, the most adequate model fit was achieved when the direct relationship between *FeedbackAndRewards* and *KSEmpEmp* was allowed. As standardized residuals were all below |2,5| there was no need for further specifications and the respecified model was accepted. Table 19 summarizes the goodness-of-fit statistics of Structural model 1 and Structural model 1R (R=respecified).

Table 19: The goodness-of-fit statistics of Structural model 1.

Type of fit measure	***Index***	***Structural model 1***	***Structural model 1R***	***Acceptable level***
Absolute	Chi-square (χ^2)	58,676	40,832	-
	Degrees of freedom	30	29	-
	p-value	0,001	0,071	> 0,05
	Chi-square / df	1,956	1,408	< 3
	RMSEA	0,061	0,040	< 0,08
	90% conf.int.	0,037-0,084	0,000-0,067	< 0,08
	PCLOSE	0,199	0,702	> 0,05
	SRMR	0,047	0,038	< 0,08
	GFI	0,968	0,978	> 0,90
Incremental	TLI	0,935	0,972	> 0,90
	CFI	0,975	0,990	> 0,90
Parsimony	AIC	180,676	166,750	Lowest

Looking at Table 19, we can see that both models are adequate when these are compared to commonly used thresholds. However, the respecified structural model fit the empirical data more sufficiently as its Chi-square

test's *p*-value is acceptable and other fit measures achieve better values than the initial model. The standardized path coefficients and their significance levels are presented in Table 20. The unstandardized estimates, standard errors, and two-tailed *t*-values are shown in Appendix 5.

Table 20: SEM results, Structural model 1.

Hypotheses				***Path coefficient Model 1***	***Path coefficient Model 1R***
H1a	*IntrinsicMotivation*	→	*KSEmpEmp*	**0,307*** **	**0,240*** **
H2a	*ExtrinsicMotivation*	→	*KSEmpEmp*	**0,119*** **	**0,099** **
H3a	*SelfEfficacy*	→	*KSEmpEmp*	**0,361*** **	**0,343*** **
H4	*SelfEfficacy*	→	*IntrinsicMotivation*	**0,500*** **	**0,500*** **
H5	*SelfEfficacy*	→	*ExtrinsicMotivation* [a]	0,017	0,017
H6a	*TimeAvailability*	→	*KSEmpEmp*	0,013	-0,025
H7	*FeedbackAndRewards*	→	*ExtrinsicMotivation*	**0,107***	**0,107***
H8	*FeedbackAndRewards*	→	*IntrinsicMotivation*	**0,266*** **	**0,266*** **
H9	*FeedbackAndRewards*	→	*SelfEfficacy*	**0,183***	**0,183***
H10	*TrainingAndDevelop.*	→	*SelfEfficacy*	**-0,198** **	**-0,198** **
H11	*TrainingAndDevelop.*	→	*TimeAvailability*	**0,217*** **	**0,217*** **
H12	*LateralCoordination*	→	*TimeAvailability*	0,102	0,102
H13	*LateralCoordination*	→	*SelfEfficacy*	**0,345*** **	**0,345*** **
-	*FeedbackAndRewards*	→	*KSEmpEmp*	**-**	**0,218*** **

Note: *Bolded coefficient values are significant at the levels * p < 0,1; ** p < 0,05; *** p < 0,01.*
[a] H5 is comparative hypothesis (see Table 1 in Chapter 5).

Two of the control variables had significant impacts on controlled variables in both structural models. The impact of employees' current task affected on knowledge sharing and employees' experience in the Finnish Defence Forces affected their knowledge self-efficacy. These are also reported in Appendix 5 in detail.

Mediation was tested following Baron and Kenny's (1986) approach mainly because the data analysis indicated a partial mediation between *FeedbackAndRewards*, MOA attributes, and knowledge sharing. As Baron and Kenny's (1986) approach suggests, there is no mediation, if the measured direct impact remains significant and remains unchanged once the mediators are included in the analysis. If, in turn, direct effect reduces but still remains significant, this indicates that there is a partial mediation among the measured latent variables. Full mediation is supported when the significant

direct mediation reduces to non-significant once the mediators are included.

We can see by looking at the statistics of the initial model in Table 20, that all individual paths between *FeedbackAndRewards* and *KSEmpEmp* through the mediators (*ExtrinsicMotivation*, I*ntrinsicMotivation*, *SelfEfficacy*) are statistically significant, even though two of these paths (*FeedbackAndRewards* → *ExtrinsicMotivation* and *FeedbackAndRewards* → *SelfEfficacy*) are only marginally significant (p < 0,1). The direct effect from *FeedbackAndRewards* to *KSEmpEmp* without mediators was significant (coefficient: 0,223, p < 0,01) as well. By looking at the statistics of the re-specified model in Table 20, the direct impact of *FeedbackAndRewards* to *KSEmpEmp* reduced slightly when mediators were added but still remains significant (coefficient: 0,218, p < 0,01). Table 21 below shows that even though the total indirect effects do decrease, they are still significant and represents a prominent portion of the total effects.

Table 21: The mediation tests of Structural model 1.

Effects of FeedbackAndRewards → KSEmpEmp	***Structural model 1***	***Structural model 1R***
Total effects	0,189***	0,377***
Direct effects	0,000	0,218***
Indirect effects	0,189***	0,159***

Note: *Values in the table represents standardized effects.*
*Significance levels (Bootstrap, two-tailed significance): * p < 0,1; ** p < 0,05; *** p < 0,01.*

Based on mediation tests, partial mediation is supported. (See Hair et al. 2010.) Further analysis showed that the paths from *FeedbackAndRewards* to knowledge sharing mediated by *IntrinsicMotivation* and *SelfEfficacy* explained a large portion (0,149, p < 0,01) of the indirect effects shown in Table 21. However, as we look at the individual paths from *FeedbackAndRewards* to *Self-efficacy*, we can notice that it is only marginally significant. Therefore, intrinsic motivation seems to be the main mediator within this path.

Finally, the R^2 values of the factors are shown in Table 22. The values suggest how well the structural model explains the observed covariance matrix.

Table 22: The *R*-squared values, Structural model 1.

Latent factor	***Structural model 1 (R^2)***	***Structural model 1R (R^2)***
ExtrinsicMotivation	0,01	0,01
IntrinsicMotivation	0,40	0,40
SelfEfficacy	0,17	0,17
TimeAvailability	0,09	0,09
KSEmpEmp	0,46	0,50

Structural model 2, KSEmpSup

The second examined structural model was the one that estimated employee–superior knowledge sharing within a department. The initial structural model didn't fit the data even though the previous model (Structural model 1) did. This indicates that the causal relationships between latent variables in different knowledge sharing context differ. Therefore, I consulted goodness-of-fit statistics to see if there was an opportunity to improve the model fit.

Modification indices for the direct paths of *FeedbackAndRewards* → *KSEmpSup* (59,207), *TrainingAndDevelopment* → *KSEmpSup* (13,688), and *LateralCoordination* → *KSEmpSup* (45,168) showed that all of these had very high values. Since all these paths seemed theoretically rationale in this knowledge-sharing situation, I investigated every possible model variation using these paths to see how they affected goodness-of-fit statistics. The most adequate model fit was achieved when all direct relationships from independent variables to *KSEmpSup* were allowed. The residuals were again all below |2,5|, so there was no further specifications needed and the respecified model was accepted.

Table 23 (next page) summarizes the goodness-of-fit statistics of Structural model 2 and Structural model 2R (R=respecified).

Table 23: The goodness-of-fit statistics of Structural model 2.

Type of fit measure	*Index*	*Structural model 2*	*Structural model 2R*	*Acceptable level*
Absolute	Chi-square (χ^2)	152,850	38,989	-
	Degrees of freedom	30	27	-
	p-value	0,000	0,064	> 0,05
	Chi-square / df	5,095	1,444	< 3
	RMSEA	0,127	0,042	< 0,08
	90% conf.int.	0,107-0,147	0,000-0,069	< 0,08
	PCLOSE	0,000	0,660	> 0,05
	SRMR	0,076	0,037	< 0,08
	GFI	0,927	0,979	> 0,90
Incremental	TLI	0,714	0,969	> 0,90
	CFI	0,890	0,989	> 0,90
Parsimonious	AIC	274,850	166,983	Lowest

We can see by looking at Table 23 that only the respecified model is adequate based on the thresholds. The standardized coefficient paths and their significance levels are presented in Table 24. The unstandardized estimates, standard errors, and two-tailed *t*-values are shown in Appendix 5.

Table 24: SEM results, Structural model 2.

Hypotheses			*Path coefficient Model 2*	*Path coefficient Model 2R*
H1b	*IntrinsicMotivation*	→ *KSEmpSup*	**0,122***	-0,031
H2b	*ExtrinsicMotivation*	→ *KSEmpSup*	**0,133***	0,055
H3b	*SelfEfficacy*	→ *KSEmpSup*	0,101	-0,015
H4	*SelfEfficacy*	→ *IntrinsicMotivation*	**0,505*****	**0,505*****
H5	*SelfEfficacy*	→ *ExtrinsicMotivation* [a]	0,019	0,019
H6b	*TimeAvailability*	→ *KSEmpSup*	**0,208*****	**0,126*****
H7	*FeedbackAndRewards*	→ *ExtrinsicMotivation*	**0,107***	**0,107***
H8	*FeedbackAndRewards*	→ *IntrinsicMotivation*	**0,262*****	**0,262*****
H9	*FeedbackAndRewards*	→ *SelfEfficacy*	**0,186***	**0,186***
H10	*TrainingAndDevelop.*	→ *SelfEfficacy*	**-0,198****	**-0,198****
H11	*TrainingAndDevelop.*	→ *TimeAvailability*	**0,216*****	**0,216*****
H12	*LateralCoordination*	→ *TimeAvailability*	0,104	0,104
H13	*LateralCoordination*	→ *SelfEfficacy*	**0,344*****	**0,344*****
-	*FeedbackAndRewards*	→ *KSEmpSup* [b]	-	**0,587*****
-	*TrainingAndDevelop.*	→ *KSEmpSup* [b]	-	**-0,280*****
-	*LateralCoordination*	→ *KSEmpSup* [b]	-	**0,268*****

Note: *Bolded coefficient values are significant at the levels * p < 0,1; ** p < 0,05; *** p < 0,01.*
[a] *H5 is comparative hypothesis (see Table 1 in Chapter 5).*
[b] *Relationship was not hypothesized in theoretical model. Relationship was added to improve the model fit.*

In Structural model 2R, the two control variables had a significant impact on the controlled variables. Employee gender was affected significantly but very slightly on *KSEmpSup* (coefficient: -0,073, $p < 0,01$) and similarly to the first knowledge sharing situation, employees' experience in the Finnish Defence Forces affected their "knowledge self-efficacy" (coefficient: 0,143, $p < 0,01$). Controls are reported in Appendix 5 in detail.

As mentioned, Baron and Kenny's (1986) approach was used to investigate the mediation. The direct effect from all the independent variables to *KSEmpSup* without the mediators was strong and significant:

- *FeedbackAndRewards* → *KSEmpSup* (coefficient: 0,568, $p < 0,01$);
- *TrainingAndDevelopment* → *KSEmpSup* (coefficient: -0,279, $p < 0,01$); and
- *LateralCoordination* → *KSEmpSup* (coefficient: 0,269, $p < 0,01$).

If the above direct coefficients are compared with the mediators (see Table 24, Structural model 2R) we notice that they are stagnant and that they are still statistically significant. Therefore, mediation is not supported with the hypothesized mediators (see theoretical model in Chapter 5) within employee–superior knowledge sharing context. However, independent variables still directly affect MOA attributes (and most of these relationships are at least marginally significant because $p < 0,1$) even though the direct paths to knowledge sharing were added.

Table 25 (next page) confirms that most of the total effects from the independent variables to knowledge sharing can be explained with the direct effects whereas the indirect effects are minor.

Table 25: The mediation tests of Structural model 2.

Effects of	***Structural model 2***	***Structural model 2R***
FeedbackAndRewards → KSEmpEmp		
Total effects	0,074	0,579***
Direct effects	0,000	0,587***
Indirect effects	0,074	-0,008
TrainingAndDevelop. → KSEmpEmp		
Total effects	0,013**	-0,246***
Direct effects	0,000	-0,280***
Indirect effects	0,013**	0,033*
LateralCoordination → KSEmpEmp		
Total effects	0,078***	0,271***
Direct effects	0,000	0,268***
Indirect effects	0,078***	0,002

Note: *Values in the table represents standardized effects.*
*Significance levels (Bootstrap, two-tailed significance): * p < 0,1; ** p < 0,05; *** p < 0,01.*

The R^2 values of the factors are shown in Table 26. The values suggest how well the structural model explains the observed covariance matrix. Evidently, when comparing the two models, knowledge governance mechanisms explain a large portion of the knowledge sharing.

Table 26: *R*-squared values, Structural model 2.

Latent factor	***Structural model 2 (R^2)***	***Structural model 2R (R^2)***
ExtrinsicMotivation	0,01	0,01
IntrinsicMotivation	0,41	0,41
SelfEfficacy	0,18	0,18
TimeAvailability	0,09	0,09
KSEmpSup	0,15	0,46

Structural model 3, KSEmpUnit

The third structural model was one that assessed employee–employee knowledge sharing between departments. The third initial structural model didn't fit the data by confirming that the causal relationships between latent variables in different knowledge sharing context vary. I examined the goodness-of-fit statistics to find a way to improve the model fit.

Modification indices for the direct paths of *FeedbackAndRewards* → *KSEmpUnit* (28,325), *TrainingAndDevelopment* → *KSEmpUnit* (26,728), and *LateralCoordination* → *KSEmpUnit* (28,325) revealed that the third model could be improved by allowing some of the direct impacts. The direct impacts seemed theoretically rationale in this knowledge-sharing situation. Again, I investigated every possible model variation using these paths to see how they would affect the goodness-of-fit statistics. The most adequate model fit was achieved when the *TrainingAndDevelopment* and *LateralCoordination* were both allowed affecting directly *KSEmpUnit.* In the respecified structural model, the standardized residuals and the modification indices were at the acceptable level so the model was accepted. Table 27 summarizes the goodness-of-fit statistics of Structural model 3 and Structural model 3R (R=respecified).

Table 27: The goodness-of-fit statistics of Structural model 3.

Type of fit measure	***Index***	***Structural model 3***	***Structural model 3R***	***Acceptable level***
Absolute	Chi-square (χ^2)	92,401	41,196	-
	Degrees of freedom	30	28	-
	p-value	0,000	0,052	> 0,05
	Chi-square / df	3,080	1,471	< 3
	RMSEA	0,090	0,043	< 0,08
	90% conf.int.	0,70-0,112	0,000-0,069	< 0,08
	PCLOSE	0,001	0,636	> 0,05
	SRMR	0,067	0,038	< 0,08
	GFI	0,951	0,977	> 0,90
Incremental	TLI	0,846	0,965	> 0,90
	CFI	0,941	0,987	> 0,90
Parsimonious	AIC	214,401	167,196	Lowest

Based on the goodness-of-fit statistics, the respecified structural model is sufficient and fits the empirical data. The standardized path coefficients and their significance levels are presented in Table 28. The unstandardized coefficients estimates, standard errors, and two-tailed *t*-values are shown in Appendix 5.

Table 28: SEM results, Structural model 3.

Hypotheses				***Path coefficient Model 3***	***Path coefficient Model 3R***
H1c	*IntrinsicMotivation*	→	*KSEmpUnit*	**-0,120***	**-0,228*****
H2c	*ExtrinsicMotivation*	→	*KSEmpUnit*	0,060	0,033
H3c	*SelfEfficacy*	→	*KSEmpUnit*	**0,370*****	**0,324*****
H4	*SelfEfficacy*	→	*IntrinsicMotivation*	**0,507*****	**0,507*****
H5	*SelfEfficacy*	→	*ExtrinsicMotivation* [a]	0,021	0,021
H6c	*TimeAvailability*	→	*KSEmpUnit*	-0,052	**-0,150*****
H7	*FeedbackAndRewards*	→	*ExtrinsicMotivation*	**0,108***	**0,108***
H8	*FeedbackAndRewards*	→	*IntrinsicMotivation*	**0,259*****	**0,259*****
H9	*FeedbackAndRewards*	→	*SelfEfficacy*	**0,198****	**0,198****
H10	*TrainingAndDevelop.*	→	*SelfEfficacy*	**-0,201****	**-0,201****
H11	*TrainingAndDevelop.*	→	*TimeAvailability*	**0,216*****	**0,216*****
H12	*LateralCoordination*	→	*TimeAvailability*	0,102	0,102
H13	*LateralCoordination*	→	*SelfEfficacy*	**0,340*****	**0,340*****
-	*TrainingAndDevelop.*	→	*KSEmpUnit* [b]	-	**0,209*****
-	*LateralCoordination*	→	*KSEmpUnit* [b]	-	**0,293*****

Note: *Bolded coefficient values are significant at the levels * p < 0,1; ** p < 0,05; *** p < 0,01.*
[a] *H5 is comparative hypothesis (see Table 1 in Chapter 5).*
[b] *Relationship was not hypothesized in theoretical model. Relationship was added to improve the model fit.*

In Structural model 3R only one of the control variables had a significant impact on the controlled variables. Employees' experience in the Finnish Defence Forces affected their "knowledge-self-efficacy" (coefficient: 0,143, $p < 0,01$). Also these controls are reported in Appendix 5 more in detail.

The direct effect from two independent variables to *KSEmpUnit* without the mediators were strong and significant:

- *TrainingAndDevelopment* → *KSEmpUnit* (coefficient: 0,207, $p < 0,01$); and
- *LateralCoordination* → *KSEmpUnit* (coefficient: 0,292, $p < 0,01$).

If the direct coefficients are compared with the mediators (see Table 28, Structural model 3R) we can notice that the change is negligible. However, the investigation of indirect effects in Table 29 indicates that there might be partial mediation between *LateralCoordination* and *KSEmpUnit*. As this direct effect is significant, it adds considerable total effects, and constitutes the majority of the total effects a partial mediation can be supported. Further investigations showed that the mediating variables were *SelfEfficacy* and *IntrinsicMotivation* whereas the path through *TimeAvailability* was not significant.

Table 29: The mediation tests of Structural model 3.

Effects of	***Structural model 3***	***Structural model 3R***
TrainingAndDevelop. → KSEmpUnit		
Total effects	-0,074**	0,134
Direct effects	0,000	0,209***
Indirect effects	-0,074**	-0,074***
LateralCoordination → KSEmpUnit		
Total effects	0,100***	0,349***
Direct effects	0,000	0,293***
Indirect effects	0,100***	0,055**

Note: *Values in the table represents standardized effects.*
*Significance levels (Bootstrap, two-tailed significance): * p < 0,1; ** p < 0,05; *** p < 0,01.*

The R^2 values of the factors are shown in Table 30. The values suggest how well the structural model explains the observed covariance matrix.

Table 30: *R*-squared values, Structural model 3.

Latent factor	***Structural model 3 (R^2)***	***Structural model 3R (R^2)***
ExtrinsicMotivation	0,01	0,01
IntrinsicMotivation	0,41	0,41
SelfEfficacy	0,18	0,18
TimeAvailability	0,09	0,09
KSEmpUnit	0,15	0,30

As we can see, the values in Table 30 indicate that *LateralCoordination* and *TrainingAndDevelopment* conjointly explain half of the shared variance of *KSEmpUnit*.

7 RESULTS AND DISCSSION

To answer the research questions positioned in Chapter 1 a theoretical framework and a set of hypotheses were developed in Chapters 2–5. The execution of the empirical study and its main outputs were reported in Chapter 6. In this chapter, I test the hypotheses using SEM outputs and answer sub-questions 2 and 3.

Table 31 summarizes the empirical results of this study. The logic in hypotheses 4, 5, and 7–13 is that if in all models the standardized estimated path coefficients were statistically significant and affected like hypothesized they were supported. Hypotheses 1a–c, 2a–c, 3a–c, and 6a–c were examined separately. These were accepted or rejected model by model. For example, H1a is supported, but H1b and H1c were rejected based on their estimates in specific knowledge sharing situation.

Table 31: Summary of SEM results.

Hypotheses		***Structural model 1R***	***Structural model 2R***	***Structural model 3R***	***Remarks***
H1a-c	IM →KS	**0,24*** **	-0,03	**-0,23*** **	H1a supported
H2a-c	EM →KS	**0,10** **	0,06	0,03	H2a supported
H3a-c	SE →KS	**0,34*** **	-0,02	**0,32*** **	H3a, H3c supported
H4	SE →IM	**0,50*** **	**0,51*** **	**0,51*** **	Supported
H5	SE →EM [a]	**0,02**	**0,02**	**0,02**	Supported
H6a-c	TA →KS	-0,03	**0,13*** **	**-0,15*** **	H6b supported
H7	PFR →EM	**0,11***	**0,11***	**0,11***	Rejected
H8	PFR →IM	**0,27*** **	**0,26*** **	**0,26*** **	Supported
H9	PFR →SE	**0,18***	**0,19***	**0,20** **	Rejected
H10	TD →SE	**-0,20** **	**-0,20** **	**-0,20** **	Rejected
H11	TD →TA	**0,22*** **	**0,22*** **	**0,22*** **	Supported
H12	LC →TA	0,10	0,10	0,10	Rejected
H13	LC →SE	**0,35*** **	**0,34*** **	**0,34*** **	Supported
-	PFR →KS [b]	**0,22*** **	**0,59*** **	-	
-	TD →KS [b]	-	**-0,28*** **	**0,21*** **	
-	LC →KS [b]	-	**0,27*** **	**0,29*** **	

Note: *IM = IntrinsicMotivation, EM= ExtrinsicMotivation, SE=SelfEfficacy, TA=TimeAvailability, PFR = FeedbackAndRewards, TD=TrainingAndDevelopment, LC=LateralCoordination, KS=KSEmpEmp / KSEmpSup / KSEmpUnit. The significance of coefficient: * p < 0,1; ** p < 0,05; *** p < 0,01.*
[a] H5 is comparative hypothesis (see the summary of hypotheses in Chapter 5).
[b] Relationship was not hypothesized in theoretical model.

7.1 KNOWLEDGE GOVERNANCE MECHANISMS

In this sub-chapter I will answer my third sub-question:

> SQ3: *How does knowledge governance mechanisms affect individual motivation, opportunity, and ability to share knowledge?*

Performance-based feedback and rewards

Performance-based feedback and rewards were hypothesized to have a positive impact on both extrinsic motivation (Hypothesis 7) and intrinsic motivation (Hypothesis 8). The standardized estimated path coefficient to extrinsic motivation was 0,11 in all three models but it was only marginally significant ($p < 0,1$). In the first model, the path coefficient to intrinsic motivation was 0,27 and in the second and third model 0,26; all of these were significant ($p < 0,01$). Therefore hypothesis 7 is not supported whereas hypothesis 8 had support.

According to these results performance-based feedback and rewards are positively and significantly related to intrinsic motivation towards knowledge sharing but its effect on extrinsic motivation was insignificant. These findings do not support Foss et al.'s (2009) findings that suggest a significant positive relationship between feedback and extrinsic motivation towards knowledge sharing. The reason for this can be the difference in measurement constructs. Foss et al. (2009) focuses the influence of performance based feedback on extrinsic motivation towards knowledge sharing while my research also includes performance based rewards. However, my results suggest that the correlation between performance-based feedback and rewards is greater with intrinsic motivation towards knowledge sharing than with extrinsic motivation. This can be explained by the self-determination theory. As mentioned in Sub-chapter 4.2, there has been little agreement on how the incentives impact individual knowledge sharing. The self-determination theory suggests that the effect might be either corroborative or detrimental. When an employee perceives the received re-

wards in an autonomy supportive way, or if the feedback is developmental rather than controlling, they might be more intrinsically motivated (see Subchapter 4.3). My findings suggest that if the feedback concerns the employee's job performance and personal development, and if rewards are granted with fairness, then employee experience is more corroborative rather than detrimental. In other words, these correlate more positively with employee's intrinsic motivation, as they did in my study's context.

In hypothesis 9, performance-based feedback and rewards was assumed to have a positive impact on employee's knowledge self-efficacy. The path coefficient was significant in the third model (coefficient: 0,20, $p < 0,01$) whereas, in the two other models it was only marginally significant (Model 1R, coefficient: 0,18, $p < 0,1$; Model 2R, coefficient: 0,19, $p < 0,1$). Accordingly, performance-based feedback and rewards do not have statistically significant impact on employee's knowledge self-efficacy and therefore hypothesis 9 is not supported. However, in Models 1R and 2R the exact *p*-value was 0,07, thus the hypothesis 9 was very close to acceptance. The results indicate that performance-based feedback and rewards is only slightly related to self-efficacy feelings towards knowledge sharing. However, this does not rule out the possibility that when employees receive performance-based incentives they might become more self-conscious concerning their competencies to conduct work tasks (Gagné & Forest, 2011). This might contribute to self-efficacy towards knowledge sharing as well.

As mentioned, in the respecified model, performance-based feedback and rewards had a positive and direct impact on employee–employee knowledge sharing within a department (coefficient: 0,22, $p < 0,01$) as well as, knowledge sharing between subordinate and superior (coefficient: 0,59, $p < 0,01$). These results are noteworthy even though, these paths were not hypothesized in the theoretical model. These results confirm Kim and Lee's (2006) findings, which indicated a positive relationship between performance-based reward systems and employee knowledge sharing in public and private organizations. As we can see, in my results, the correlation be-

tween “performance-based feedback and rewards” and “employee–superior superior sharing” is remarkably strong compared to employee–employee knowledge sharing. A possible explanation for this might be that in an organization superiors are most often responsible for formal performance appraisals. Usually in these kinds of situations, superior and subordinate discuss the subordinate’s possibilities to develop their task performance, that is, work-related valuable knowledge will most often be exchanged.

Personnel training and development

Personnel training and development was hypothesized to have a positive impact on knowledge self-efficacy (Hypothesis 10) and time availability to share knowledge (Hypothesis 11). In all cases, the impact on time availability was positive and statistically significant (coefficient: 0,22, $p < 0{,}01$) thus supporting hypothesis 11. Unexpectedly, the impact on knowledge self-efficacy was significantly negative (coefficient: -0,20 and $p < 0{,}05$); therefore hypothesis 10 is not supported.

The positive link between training and development and time availability is often proposed in knowledge sharing literature (see e.g. Ipe, 2003; Siemsen et al., 2008). However, empirical investigations are focused on the link between time availability and knowledge sharing (see e.g. Siemsen et al., 2008; Chen at al., 2013) rather than examining how time available for knowledge sharing could be increased. From this standpoint, my results are encouraging. However, personnel training and development together with lateral coordination explained only a slight portion of the time availability factor ($R^2 = 0{,}09$).

Furthermore, the strong negative and statistically significant correlation between training and development and knowledge self-efficacy (hypothesis 10) is worth to notice, because of previous knowledge sharing research, as far as I know, there is no explanation of this relationship. As mentioned in Sub-chapter 4.4, Chen et al. (2013) found a positive relationship between ”the investments in training” and ”employee cognitive capabilities”. On the

other hand, Liu and Liu (2011) couldn't find a significant correlation between "training and development activities" and "perceived self-efficacy" and therefore suggested that employees might consider formal training as a substitute for their personal knowledge-sharing activities. I believe that the contradictory results above (including my results), may be due to the differences in their contexts. In my sample, over 58 percent of respondents were officers. Usually officers advance fast in their career and after formal career courses they are positioned in new and more demanding tasks. These training programs are not very task specific. The task specific expertice is most often acquired by spending time in the specific task. Military personnel career advancement is quite fast and they are sometimes transferred into positions regardless their functional expertice or skills.[4] These might lead to a situation, where employees are not confident in their abilities in these tasks thus affecting their knowledge self-efficacy negatively. It is obvious, that these matters will need future research in a different context.

Moreover, personnel training and development was found to have direct effects on knowledge sharing, which were not hypothesized in the initial theoretical model. According to my results, personnel training and development was negatively related to employee-superior knowledge sharing (coefficient: -0,28, $p < 0,01$). On the contrary, the affect on inter-departmental knowledge sharing between employees was positive (coefficient: 0,21, $p < 0,01$). These results line up with Chen et al.'s (2013) findings that detected that training and development affects knowledge sharing intention positively. The results are also partially in agreement with Fong et al.'s (2011) findings, which suggest that training and development correlates positively with knowledge sharing. My results deepen this insight by showing that training and development affects positively especially on inter-

[4] Friesl et al. (2011) investigated the dynamics involved in knowledge sharing in knowledge intensive heterogeneous teams of the German Federal Armed Forces (GAF). They noted that in GAF career planning resulted so that people were transferred to positions regardless their functional background or expertise. This might be typical feature in military organizations in general.

departmental knowledge sharing between employees, but it can also reduce the knowledge sharing between superior and subordinate.

There is a rational reason for the negative effect mentioned above. Usually, in an organization, superiors and subordinates do not take part in same training programs if the training is focused on task specific skills. Thus, the more a subordinate or superior participate in the task specific trainings the less opportunities they might have in seeing each other, and therefore there is no opportunities to share knowledge in the first place.

Lateral coordination

In all knowledge sharing situations, the lateral coordination had a strong, significant, and positive impact on employee's knowledge self-efficacy (coefficient: 0,34–0,35, $p < 0,01$). Therefore hypothesis 13 is supported. The lateral coordination had an insignificant and weak impact on time availability thus hypothesis 12 is rejected.

The strong impact of lateral coordination on knowledge self-efficacy was expected. It is argued that work design that enhances the autonomy and helps employees participate in decision-making might have positive effects to employee self-efficacy (Cabrera et al., 2006). The above results support this argumentation because the "lateral coordination" construct measured how much an organization coordinates their tasks to make co-operative episodes possible and help employees participate in joint decision-making. My results indicate that if employees are participated in decision-making, their personal knowledge becomes more valuable for their organization and therefore they will become more confident about their abilities (knowledge self-efficacy). Furthermore, Liu and Liu (2011) found that face-to-face communication was positively related to employees perceived knowledge self-efficacy. Thus, some of the positive effects between lateral coordination and knowledge self-efficacy can be explained with the opportunities of face-to-face communication that lateral coordination creates.

Lateral coordination also had a positive and statistically significant direct impact on employee–superior knowledge sharing (coefficient: 0,27, $p < 0,01$) and on inter-departmental employee–employee knowledge sharing (coefficient: 0,29, $p < 0,01$). These paths were not hypothesized in the theoretical model. These results are consistent with those of Willem and Buelens (2007) who found that lateral coordination resulted in higher knowledge-sharing intensity and in higher effectiveness of inter-departmental knowledge sharing. The strong impact on employee–superior knowledge sharing is also rational. Lateral coordination helps employees participate in decision-making and therefore create possibilities for employee–superior knowledge sharing. In hierarchical line organizations, the superiors usually have the overall responsibility for making decisions. In military organizations, employee's participation in joint decision-making can enhance their knowledge self-efficacy and knowledge sharing if employee feels that higher ranked superior trusts his or her judgments (see Friesl et al., 2011). Furthermore, Tsai (2002) found that organizational units that interact with each other socially are more likely to share knowledge with each other and thus social interaction is an effective coordination mechanism. Therefore, my results support Tsai's findings.

7.2 THE CONDITIONS OF KNOWLEDGE SHARING AND KNOWLEDGE SHARING BEHAVIOUR

In this sub-chapter I will answer my third sub-question:

> *SQ2: How does an individual's motivation, opportunity, and ability to share knowledge affect the individual's knowledge sharing behaviour?*

The impact of motivation, opportunity, and ability on knowledge sharing

Intrinsic motivation (coefficient: 0,24, $p < 0,01$), extrinsic motivation (coefficient: 0,10, $p < 0,05$), and knowledge self-efficacy (coefficient: 0,34, $p <$

0,01) were all positively related to the extent of how much employees shared knowledge with other employees in a department. Hypotheses H1a, H2a, and H3a are therefore supported. However, the estimated coefficient path between time availability and employee–employee knowledge sharing within a department was negligible and non significant thus hypothesis 6a was not supported.

Employee–superior knowledge sharing showed opposite results compared to employee–employee knowledge sharing. In this situation, the time availability was only MOA factor that had a significant influence on employee–superior knowledge sharing, whereas intrinsic motivation, extrinsic motivation, and knowledge self-efficacy didn't have a notable effect. Therefore hypotheses H1b, H2b, and H3b are all rejected. As mentioned, time availability had a positive and significant effect on how much knowledge was shared between employees and their superiors (coefficient: 0,13, $p < 0,01$) supporting the hypothesis 6b.

The influence of employee's motivation, opportunity, and the ability to share knowledge with employees in other departments differed from the other two knowledge-sharing situations. Unexpectedly, intrinsic motivation (coefficient: -0,23, $p < 0,01$) and time availability (coefficient: -0,15, $p < 0,01$) affected significantly but also negatively on inter-departmental knowledge sharing between employees, whereas extrinsic motivation had no effect (coefficient: 0,03). Knowledge self-efficacy was the only MOA factor that had a positive and significant effect (coefficient: 0,32, $p < 0,01$) on inter-departmental knowledge sharing. Thus hypotheses H1c, H2c, and H6c are rejected whereas H3c is supported.

Motivation and knowledge sharing

The results concerning the impact of motivational factors on employee–employee knowledge sharing within a department are in accordance with Minbaeva et al.'s (2012) and Lin's (2007a, 2007b) findings. My results suggest that extrinsic and intrinsic motivation affects employee–employee work-related knowledge sharing within a department positively. However, my results differ to some extent from Foss et al.'s (2009) results. They align with my results that intrinsic motivation affects knowledge sharing, but conversely to my results, they found extrinsic motivation to have a negative impact on knowledge sharing (sending) (only marginally significant, $p < 0{,}1$). It should also be noted that in structural model 1, extrinsic motivation explained only a small portion of knowledge sharing. Accordingly, intrinsic motivation seems to be the main motivational antecedent of employee–employee knowledge sharing within a department.

Moreover, my results show that the effect of individual motivational factors on knowledge sharing differs depending on the knowledge-sharing situation. The motivational factors do not affect knowledge sharing between subordinate and superior but when knowledge sharing takes place between employees from different departments intrinsic motivation seems to affect it negatively. The negligible effect in the former situation (subordinate-superior) may be a specific feature within the context of a military organization, or more generally, line organization with high hierarchy. If knowledge sharing is considered to be a voluntary based action (see e.g. Dixon, 2002; Gagné, 2009), then participation in knowledge sharing is significantly driven by psychological features (Cabrera et al., 2006), like motivation or self-efficacy. In a line organization, subordinate–superior work-related knowledge sharing might happen on formal work situations (e.g. meetings, performance appraisal, etc.) and therefore employees might feel knowledge sharing as a part of their regular work assignments. In other words, formal governance mechanisms (e.g. performance appraisals, joint-decision making, etc.) may have positive effects on work-related knowledge sharing between subordinate and superior in general (see Foss et al., 2010). It seems

rational that in formal working situations, the work-related knowledge is not shared because employees or superiors are motivated precisely towards knowledge sharing but rather because they might be motivated towards their work or they might consider knowledge sharing as a part of their daily tasks. In these cases, an adequate job design, for example, not only makes opportunities for knowledge sharing, but it might also affect individual work motivation positively when it support his or her three psychological needs: autonomy, competence, and relatedness. These might further have an indirect positive influence on knowledge-sharing motivation. (See Gagné, 2009, 579, 583.) The possible interrelationship between individual knowledge sharing motivation and work motivation clearly need further investigations, especially in the context of subordinate–superior knowledge sharing.

The result concerning the negative relationship between intrinsic motivation towards knowledge sharing and inter-departmental knowledge sharing gains no support from any previous similar studies. One explanation to this divergent result might be the hierarchical line organization. Most often, inter-departmental knowledge sharing needs organizational operations. Within these situations, for example, informal and lateral coordination mechanisms create more opportunities for knowledge sharing between departments than formal mechanisms (Willem & Buelens, 2007). Nonetheless, results from Friesl et al. (2011) suggest that in military organizations, the hierarchy and the effect of line-organization is hard to avoid even if cross-organizational teams are designed to work in an informal way when the hierarchy itself should not be a problem. A hierarchical organization structure is often acknowledged as a barrier to knowledge sharing (Riege, 2005). This indicates that even if the created work-groups are meant to work in an “informal way” they probably can’t operate because of the strong hierarchy and unsupportive organizational structure. The openness of the atmosphere within these groups might also suffer. This can have negative effects on interactions among employees (Alavi et al., 2006). Due to the perceived “control” employees might not be willing to put all their effort to share their

knowledge (Willem & Buelens, 2007, 586). In other words, employees might notice the cross-departmental task groups to be rather formal than informal, and therefore the knowledge-sharing situation, in general, is perceived to be more controlled than autonomous. Tsai (2002) found that formal hierarchical structures (represented by centralization) showed a negative impact on intra-firm knowledge sharing. According to Tsai (2002) the willingness to share knowledge between departments was affected negatively by the headquarters control. As mentioned in Sub-chapter 3.2, this could have detrimental effects on intrinsic motivation towards knowledge sharing, like my results suggest (see also Foss et al., 2010).

To sum up, in highly hierarchical organizations, intrinsic motivation is a key driver of knowledge sharing behaviour in situations, which are more informal (e.g. employee–employee knowledge sharing within a department) and the knowledge sharing between departments might take place mainly in formal situations. Formal situations could have a detrimental effect on employee's intrinsic motivation.

Knowledge self-efficacy and knowledge sharing

The results concerning the relationship between knowledge self-efficacy and knowledge sharing are strongly supported through previous research (Cabrera et al., 2006; Cho et al., 2007; Lin 2007b; Liu & Liu, 2011) and are also in accordance with the self-efficacy theory (see Chapter 3.3). My results support the idea that knowledge self-efficacy might be a requirement in order a person to engage in knowledge exchange (see Cabrera et al., 2006, 259). However, knowledge self-efficacy didn't affect subordinate–superior knowledge sharing. The reason for this might be the same as mentioned above: subordinate–superior knowledge sharing might happen mostly on formal situations, which are part of employees' regular work tasks. Thus, it doesn't really matter if one is confident about his or her abilities to share knowledge (see also discussion in Sub-chapter 7.2 concerning the role of governance mechanisms in employee-subordinate knowledge sharing).

Time availability and knowledge sharing

According to my results, the effect of time availability on knowledge sharing differs between the three knowledge-sharing situations. These findings are in accordance with the previous studies (e.g. Siemsen et al, 2008; Sandhu et al., 2011) because they support the idea that factors that may affect employee's behaviour might vary in different working environments as well as within different types of job-related actions. I found that time availability was not a crucial driver of employee–employee knowledge sharing. However, it positively affected subordinate–superior knowledge sharing whereas the affect on inter-departmental knowledge sharing was negative.

In this study, *TimeAvailability* construct measured if there was enough 1) time for discussion and knowledge sharing with colleagues and 2) free time to attend interactional situations (e.g. workshops). In a line organization, the formal work relationships are usually documented with job descriptions and strict vertical organizational charts. Therefore, opportunities for interacting within a department are usually written in the norms and regulations and become part of employees' normal working tasks. Hence, if employees are "busy" with their regular tasks, this doesn't rule out the possibility for interaction with coworkers within a department, but it might effect on knowledge sharing between departments.

As mentioned, my results suggest that time availability affects inter-departmental knowledge sharing inversely, that is, the more time there is for knowledge sharing the less knowledge is shared between employees from different departments. At first, this might sound a bit "irrational", but in the context of hierarchical line organization there is a logical explanation for this result. In a military organization, formal structures are usually not horizontal and job descriptions do not require cross co-operation between employees from different departments during daily work tasks. In other words, organizational structure do not help forward the inter-departmental knowledge sharing. If employees feel that they have enough time for inter-

action, this might indicate that they don't have any excessive work tasks, such as cross-departmental projects, that are not written in their formal job descriptions. However, there could be several possible explanations for this result and thus further research should investigate this situation more closely. In every examined knowledge-sharing situation the time availability explained only a small portion of knowledge sharing behaviour.

Interrelationships and mediation

Hypothesis 4 postulated that employee's knowledge self-efficacy is positively related to his or her intrinsic motivation towards knowledge sharing. In all investigated knowledge-sharing situations the estimated standardized coefficient path was strong and significant (coefficient: 0,50–0,51, $p < 0{,}01$) supporting hypothesis 4. Additionally, knowledge self-efficacy correlated more strongly with intrinsic motivation than extrinsic motivation supporting the hypothesis 5. These results are in accordance with both the self-determination theory and the self-efficacy theory (see Chapter 3.3). However, as mentioned, the knowledge self-efficacy factor was quite inconsistent even though its Cronbach's alpha indicated sufficient reliability. Therefore, these results need to be interpreted with caution.

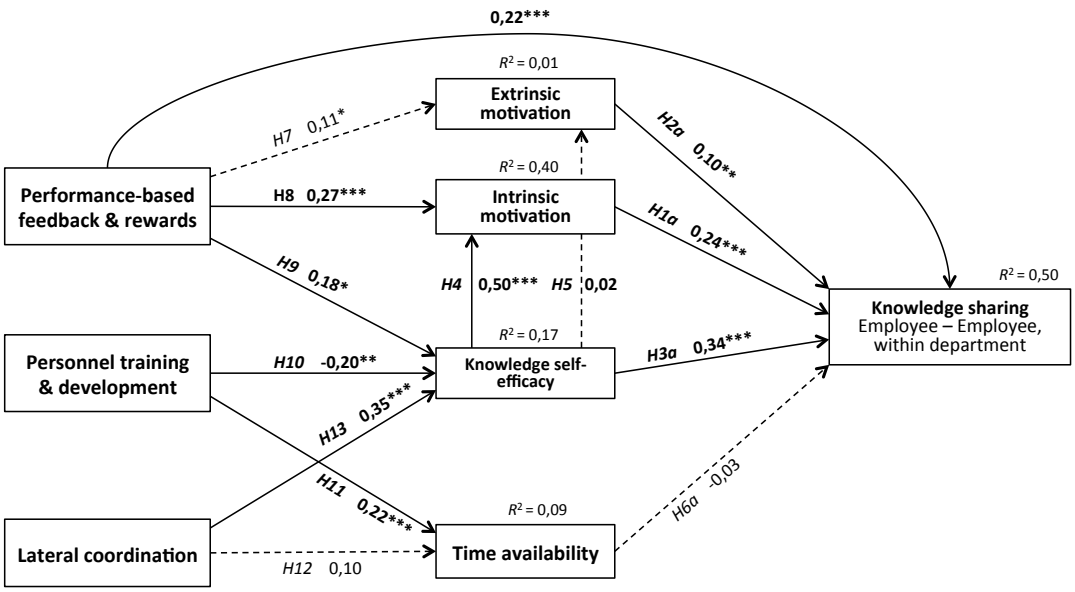
Intrinsic motivation and knowledge self-efficacy partially mediated the relationship between "performance-based feedback and rewards" and "employee–employee knowledge sharing within a department". In addition, the same factors were partial mediators between "lateral coordination" and "employee–employee knowledge sharing between departments".

Explanatory power of examined factors

The quite high R^2 values of knowledge sharing (Structural models 1R: R^2 = 0,50, 2R: R^2 = 0,46, and 3R: R^2 = 0,30) indicates that the MOA factors and knowledge governance mechanisms explain quite a large portion of how much employees and superiors share work-related knowledge with each other within a department and between departments. However, all MOA variables were not explained so strongly with the examined knowledge

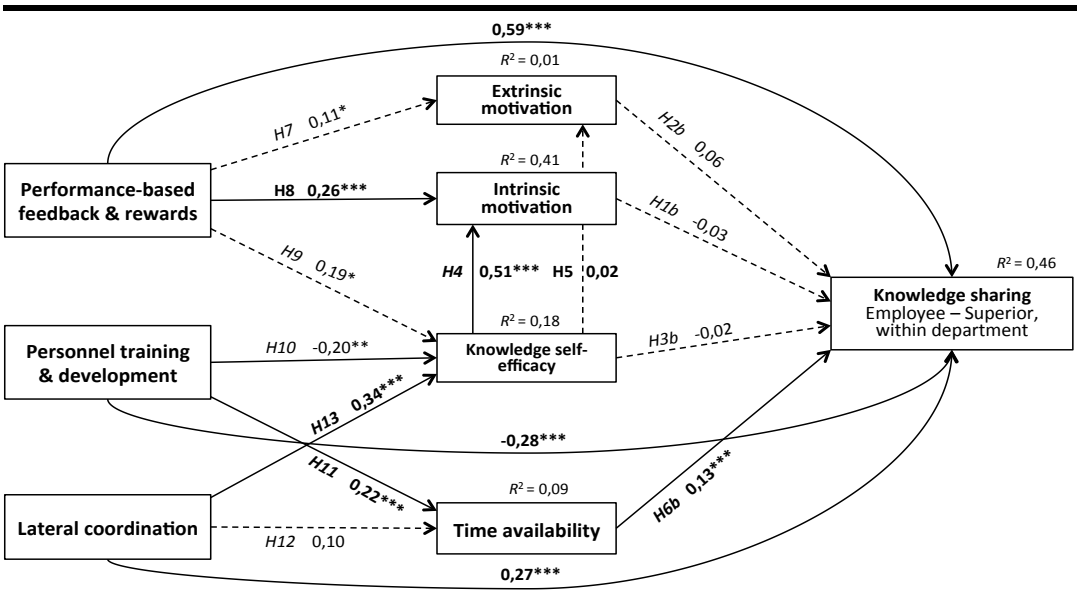
governance mechanisms. This is rational, because there are plenty of management practices that may have an effect on individual motivation, opportunity, and the ability to share work-related knowledge (see e.g. Foss, 2007). In this study, only three of these were examined. The R^2 values of extrinsic motivation, intrinsic motivation, knowledge self-efficacy, and time availability were 0,01, 0,40–0,41, 0,17–0,18, and 0,09, respectively.

The results are summarized in next three Figures (6,7, and 8). The figures include path coefficients, their significance, and the R^2 values of endogenous latent variables.



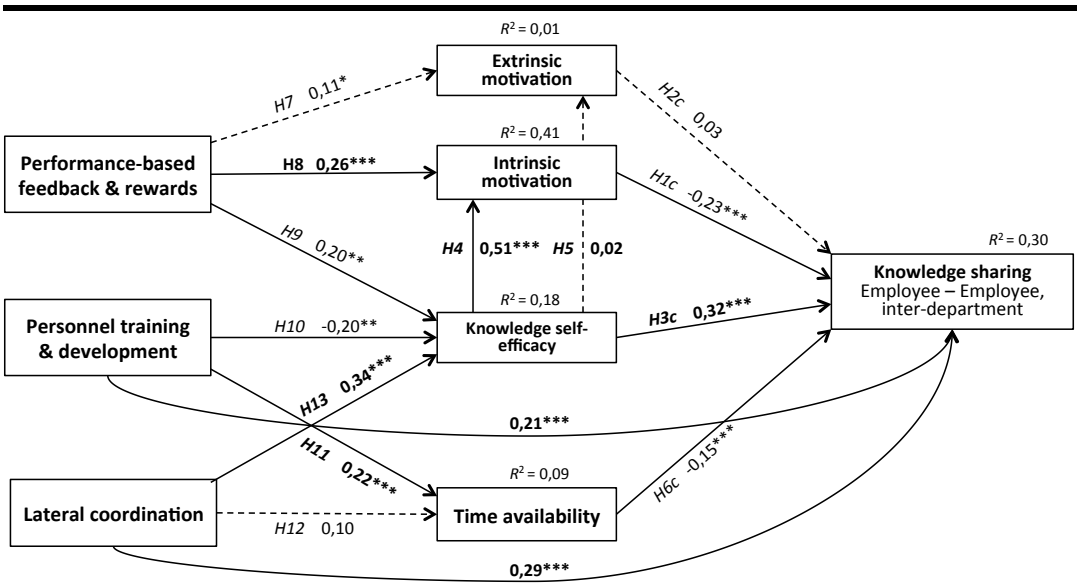
Note: *Coefficient values are significant at the levels of * p< 0,1; ** p< 0,05; *** p< 0,01.*

Figure 6: Employee–employee knowledge sharing within a department.



Note: *Coefficient values are significant at the levels of * p< 0,1; ** p< 0,05; *** p< 0,01.*

Figure 7: Employee–superior knowledge sharing.



Note: *Coefficient values are significant at the levels of * p< 0,1; ** p< 0,05; *** p< 0,01.*

Figure 8: Employee–employee knowledge sharing between departments.

8 CONCLUSIONS

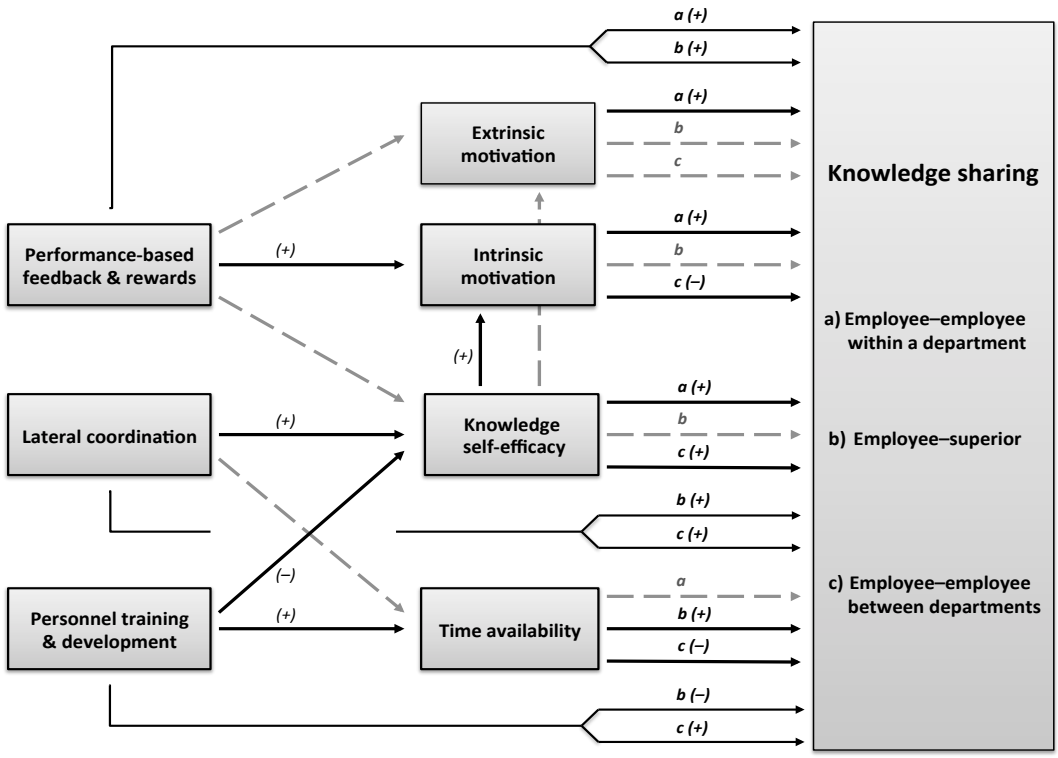
The objective of this study was to understand how organizational knowledge governance mechanisms affect individual motivation, opportunity, and the ability to share knowledge, and further, how these individual knowledge-sharing conditions affect actual knowledge sharing behaviour. This was stated to fill a research gap in individual-level knowledge sharing. To fill this gap, the study followed the knowledge governance approach and micro-foundations perspective to develop a theoretical model and hypotheses that could explain the casual relationships between knowledge governance mechanisms, individual knowledge sharing conditions, and individual knowledge sharing behaviour. The model and hypotheses were investigated empirically using a quantitative research strategy and multivariate data analysis techniques. Hypotheses were then tested and results were presented and discussed.

The research question positioned in Chapter 1 was:

> *How do the individual level conditions of knowledge sharing affect knowledge sharing behaviour and how can these conditions be managed using knowledge governance mechanisms?*

In sum, as an answer to the research question, this study showed that all examined knowledge governance mechanisms do affect individual level knowledge sharing conditions. Employees' motivation (especially intrinsic motivation) towards knowledge sharing can be enhanced by providing them performance-based feedback and rewards. Lateral coordination enhances employee's knowledge self-efficacy but does not affect time availability on knowledge sharing. Training and development is positively related to time availability for knowledge sharing. These mechanisms have a direct positive effect on knowledge sharing behaviour, but these are bounded with a knowledge-sharing situation. The individual-level conditions of knowledge sharing, that is individual motivation, opportunity, and the ability towards

knowledge sharing, do affect actual knowledge sharing behaviour when knowledge is shared 1) between employees in a department and 2) between employees from different departments. However, the MOA factors do not play in a crucial role when knowledge sharing takes place between subordinates and their superiors. In this situation time availability is the only factor that seems affect knowledge sharing. The effect was positive but quite small. When knowledge is shared with peers in a department, intrinsic motivation, extrinsic motivation, and knowledge self-efficacy affects knowledge sharing behaviour positively. In inter-departmental knowledge sharing situations, intrinsic motivation and time availability are negatively correlated with knowledge sharing and extrinsic motivation has no effect. Knowledge self-efficacy is also positively related to knowledge sharing between employees from other departments. The findings of this study are summarized in Figure 11.



Note: *Dashed line means that the coefficient path was not statistically significant.*

Figure 9: The summary of findings.

Taken together, knowledge governance mechanisms can be used to manage employees' knowledge sharing conditions and knowledge sharing behaviour. This will most likely affect organizational renewal capabilities via individual and organizational learning positively.

8.1 IMPLICATIONS FOR THE THEORY

This study has enhanced our understanding of individual knowledge sharing behaviour. This was probably the first empirical investigation that has focused particularly on the role of individual knowledge sharing conditions in different knowledge sharing situations. This study also provides new and interesting insights into the dynamics of individual factors and knowledge governance mechanisms in a hierarchical non-profit organization such as a military organization.

MOA framework

The empirical findings in this study provide a new understanding of how individual motivation, opportunity, and ability towards knowledge sharing affect knowledge sharing behaviour in different knowledge sharing situations. My findings support the previous argumentation (e.g. Argote et al., 2003; Lane et al., 2006; Siemsen et al., 2008; Foss & Minbaeva, 2009; Prieto Pastor et al., 2010; Gan et al., 2012; Chen et al., 2013) that considers MOA factors as the key drivers of individual-level knowledge sharing.

In this study, I examined work-related knowledge sharing. Results showed that within a department, the most of the MOA factors affected knowledge sharing among colleagues. The most important implication is that in accordance with Coleman's (1990) model (see Chapter 1, Figure 1), the MOA factors can be seen as individual level conditions of knowledge sharing and therefore the antecedents of individual knowledge sharing behaviour, like several scholars have proposed (e.g. Foss 2007; Foss et al., 2010; Gan et al., 2012). My findings corroborate the recent argumentation whereby individual motivation, opportunity, and ability are seen as crucial drivers of

knowledge sharing by indicating that MOA factors act in a crucial role if knowledge sharing is seen as a voluntary based action. However, my study provides new insights by suggesting that the role of these individual factors in actual knowledge sharing behaviour vary in different knowledge sharing situations.

My study suggests that in a hierarchical non-profit organization, MOA factors, as they were defined in this study, do not play a crucial role in subordinate–superior knowledge sharing. Furthermore, employees who were intrinsically motivated towards knowledge sharing were less likely to share knowledge with employees from other departments. This indicates that certain organizational features may diminish employee's intrinsic motivation towards knowledge sharing. In hierarchical line organizations, employees are usually bonded together through internal controls and are governed by standardized procedures (Friesl et al., 2011). Normally, the job descriptions do not demand collaboration between employees from different departments. Thus, when employees are ordered to participate in inter-departmental work-groups they might perceive these as an additional burden (see Friesl et al., 2011). Their inter-departmental knowledge sharing is then affected by organizational control and is not perceived as a voluntary based action, which may affect intrinsic motivation towards knowledge sharing negatively (Sub-chapter 3.2; see also Osterloh et al., 2001; Tsai, 2002). However, as explained in Sub-chapter 7.2, this doesn't necessarily diminish the actual knowledge sharing behaviour in these situations. These findings provide an entirely new aspect on individual-level knowledge sharing behaviour and new directions for future research as well.

Based on above, it can be concluded that in an organization, employee knowledge sharing motivation (both extrinsic and intrinsic) might not play a pivotal role when they share work-related knowledge in a formal working situations (e.g. inter-departmental teams), which are at some extent "controlled" by an organization. In these kinds of situations, employees might perceive work-related knowledge sharing as a part of their current task.

Thus, the actual driver of knowledge sharing behaviour might be an employee's commitment towards the organization (see Lin, 2006) or his or her work motivation (see Gagné & Deci, 2005) rather than a motivation towards the knowledge sharing. However, if employees perceive these situations to be added on top of their full-time job, this might lead to a negative sentiment towards these situations in general (Friesl et al., 2011). Certainly, there are several other factors that might drive employees knowledge sharing within these kinds of situations and therefore more information is needed to establish a greater degree of certainty on this matter.

Knowledge governance approach

The present study confirms previous findings and contributes additional evidence into the knowledge governance research (see Foss et al., 2010) by suggesting that the knowledge governance mechanisms examined in this study affect individual level knowledge sharing conditions as well as individual knowledge sharing behaviour. This effect might be either negative or positive. My findings enhance our understanding by showing that knowledge-sharing situation might be the main factor that determines how certain knowledge governance mechanisms affect individual knowledge sharing conditions or an individual's actual knowledge sharing behaviour. When work-related knowledge sharing takes place in a department, it seems that certain knowledge governance mechanisms are mediated by individual knowledge sharing conditions. When knowledge sharing takes place across the organizational units, these mechanisms affect knowledge sharing behaviour more directly by increasing or decreasing the extent of shared work-related knowledge.

The findings above imply that in a hierarchical line organization, with formal knowledge-sharing situations (e.g. inter-departmental knowledge sharing), employees perceive the knowledge sharing as a part of their job rather than a voluntary based action. It can be said that knowledge is shared because of the organizational rules and directives (see Grant, 1996). When an organizational climate is strong this might affect the actual behaviour and ac-

tion positively (Bowen & Ostroff, 2004). In these situations, the key drivers of employees' knowledge sharing behaviour might be their commitment towards the organization as a whole, trust towards their co-workers (Van den Hoof & Van Weenen, 2004; Lin, 2006), their work motivation in general, or the organizational rules and directives. However, there is a definite need for further research to clarify this matter.

As my results showed, "performance based feedback and rewards", "lateral coordination", and "training and development" could explain only a small portion of the MOA factors. This finding was expected because in almost any organizational factor it can be argued to be important for individual knowledge sharing. However, these findings are important because they uncover the contributions of different organizational management practices to knowledge sharing behaviour. (See Foss et al, 2010.)

Micro-foundations of renewal capability

This study provides a micro-level analysis on the organizational renewal capability complementary to the macro emphasis that has dominated the previous research (see Felin & Hesterly, 2007). Practically, this study investigated the underlying individual-level knowledge sharing process. Based on my findings, it can be concluded that by managing individual knowledge sharing conditions as well as, knowledge sharing behaviour, this can eventually affect an organization's renewal capability via individual and organizational learning. If the knowledge that is shared across the organization is valuable for the organization, this could foster organizational renewal and could lead to better organizational performance. This study, however, did not focus on the relationships between individual knowledge sharing behaviour and individual/organizational learning. It can still be stated that an organizational knowledge sharing process, is the most important process underlying renewal capability. It can be managed via individual level factors. Further research should be done to investigate this matter more precisely.

8.2 MANAGERIAL IMPLICATIONS

The findings of this study have a number of important implications for future practice. The results and discussion that are presented in previous chapters will help managers to understand how performance-based feedback and rewards, lateral coordination, and personnel training can be deployed in a way that will enhance inter- and intra-departmental knowledge sharing. Enabling the sharing of valuable knowledge will benefit organization through learning, which could further lead to even more efficacious organizational operations. This enables organizational renewal. In general, the results in Chapter 7 will help managers' work in a hierarchical line organization to realize the differences of how certain managerial practices affect employees knowledge sharing in different organizational settings.

Based on Chapter 7, I will present two of the most important themes, which I believe managers should pay an extra effort in order to enhance the flow of valuable knowledge in an organization. These themes are 1) enabling and supporting co-operation in an organization, and 2) deployment of governance mechanisms in an autonomy and competence supportive way.

Enabling and supporting co-operation in an organization

The line organization structure and strong hierarchical organizational culture might both be barriers in intra-organizational knowledge sharing. Therefore new collaborative job designs as well as, open and more flatter organizational structures that are deployed to challenge the traditional working methods, will most likely need full managerial support to be able to work sufficiently and to succeed (see Riege, 2005). If managers deploy formal work-groups and teams to enhance inter-departmental co-operation and knowledge sharing, they should bear in mind that it could have negative effects to employees' knowledge sharing motivation if these kinds of working conditions are not supported adequately. Participation in these kinds of teams/groups might feel as an extra burden, if they are not formally included in employees' tasks and job descriptions.

Furthermore, knowledge sharing in an informal situation could lead to better knowledge sharing outcomes (Willem & Buelens, 2007). In military organizations, the hierarchy and the line organization effect is hard to avoid even if the groups are formally meant to work horizontally (Friesl et al., 2011). One way to lower the organization-specific effects is by the shaping of tasks and job descriptions so that the co-operation is included in employees everyday tasks. As Probst et al. (2000) argue, instead of focusing on organizational hierarchies or management seniority in departments the focus should be directed on who needs to work together regularly and it should be identified who will benefit the most from the exchange of knowledge (Riege, 2005). If employees' tasks require co-operation between departments, the collaboration might arise spontaneously. In this case, employees' co-operation is allowed by organization; in other words, it does not happen because of the "manager orders it" and it is not perceived as an extra burden either. Within these situations, employees might perceive the situation more autonomy (e.g. job is interesting, challenging, and allow choice (Gagné & Deci, 2005)), which could lead to more intrinsic driven behaviour, and therefore employees might be more intrinsically motivated to share their knowledge to others.

As explained in Sub-chapter 7.2, in formal working situations, employees might share knowledge with others even though they are not intrinsically motivated towards the knowledge sharing. Intrinsic motivation is still the most desirable form of motivation (Gagné & Deci, 2005). For example, if employees are intrinsically motivated towards knowledge sharing, they will contribute to achieve organizational goals by sharing their valuable knowledge more voluntarily (see Osterloh & Frey, 2000). According to Gagné and Deci (2005) "horizontally enlarged jobs" could give employees a greater sense of the importance of their work, which can eventually enhance their autonomous (intrinsic) motivation. Managers should also show employees that they are honestly interested in improving co-operation between employees and departments (Kim & Lee, 2006).

Deploying governance mechanisms in autonomy and competence supportive way

Governance mechanisms that support employees' autonomous motivation will lead to better work performance (Stone et al., 2008). As previous research (see e.g. Kim & Lee, 2006; Foss et al., 2009) has shown, intrinsic motivation towards knowledge sharing is worth the support so managers can foster inter and intra-departmental knowledge sharing.[5] My findings suggest that managers should give employees feedback concerning their job performance and personal development and also reward them with fairness based on their performance. This will enhance employees' intrinsic motivation towards knowledge sharing. However, superiors should also encourage employees to give feedback to their managers. Regular development appraisals, for example, might be a good chance to share work-related knowledge between subordinates and superiors. It is obvious that peers working on the same types of tasks can have more value if they share with each other (Zhuge, 2002). However, if the above mentioned "two-way feedback" is encouraged by managers, then employees might share their developing ideas concerning the organizational functions also with their managers, which might be valuable information for the organization in order to improve its functions in general.

Managers can also enhance employees' knowledge sharing by deploying lateral coordination practices. These practices create opportunities for face-to-face interaction and enhance employees' self-confidence towards their skills and expertice. My results refers, employee knowledge self-efficacy might enhance his or her intrinsic motivation towards knowledge sharing.

One practical way to enhance employees' knowledge self-efficacy is by making them participate in joint decision-making. It should be noted that in a military organization the rank and age are deeply rooted in the culture

[5] Note that my results showed a negative correlation between intrinsic motivation towards knowledge sharing and inter-departmental knowledge sharing. That is, employees who were intrinsically motivated towards knowledge sharing shared less knowledge with their colleagues from other departments. As mentioned, this may indicate that certain organizational features diminish an employee's intrinsic motivation towards knowledge sharing.

and affects knowledge sharing (Friesl et al., 2011). To achieve full benefits, managers should make an extra effort to encourage employees to share their experiences and opinions in joint decision-making and similar situations despite their rank and tenure in the field. For example, when employees perceive that higher ranked superior respect and trust their expertice and knowledge, this will enhance their confidence towards their knowledge and therefore employees will more likely share their valuable knowledge to others. In other words, it will increase work-related knowledge sharing in general and enhance knowledge dissemination within an organization. Furthermore, this kind of "vertical job enlargement", in which employees have greater say over what they do, can enhance their autonomous work motivation (Gagné & Deci, 2005). These will further advance organizational knowledge creation and renewal.

8.3 LIMITATIONS AND FUTURE RESEARCH

The findings of this study must be viewed in light of its limitations. Since the data was gathered from the Finnish Defence Forces (FDF) the findings cannot be generalized to all public/non-profit organizations. All included respondents worked in hierarchical and military-leaded line and staff organizations. Thus, the result may be a reflection of organization specific attributes. Future empirical studies are needed to generalize the findings. These findings, can add the growing body of literature on knowledge sharing in non-profit organizations by enhancing our understanding of knowledge governance effectiveness and individual level knowledge sharing in a hierarchical non-profit organization. It should be noted, that the sample represented approximately 17 percent of the personnel working in the FDF's military schools and 49 percent of the target group (personnel who are involved in the FDF's personnel training, including administration, teaching support, etc.). The findings represent the military schools quite well.

It should be noted, that the study used self-reporting data, which may create a response bias. For example, respondents may overstate their re-

sponses to make the measured situation seem better or worse. Furthermore, in the questionnaire, respondents were asked to assess that at what extent their colleagues have used the knowledge received from them. It is clear that these assessments are not accurate and therefore the data does not necessarily capture the real extent of the knowledge shared.

Because my study was a Master's thesis, the timetable was quite strict. Therefore the data was collected all at once even though that is not recommended. By doing so, the self-report scales involve the possibility of a common method bias (see Podsakoff et al., 2003). However, according to Harman's single-factor test, the common method bias should not be an issue in this data.

My study has shown that there is a definite need to investigate how different knowledge governance mechanisms as well as, individual-level factors affect actual knowledge sharing behaviour in different knowledge sharing situations. The information from this study can be used to develop targeted interventions aimed at clarifying the further role of MOA factors on work-related knowledge sharing between subordinates and superiors as well as between employees from different departments. My findings indicate that motivation towards knowledge sharing may not be in a pivotal role when knowledge sharing is not voluntary. As mentioned in Chapter 7, it would be interesting to investigate how high work motivation correlates with intrinsic motivation towards knowledge sharing when knowledge is shared in a formal meetings or work-groups that are somehow controlled by an organization. These results should be further compared to observations from a situation where formal cross-departmental teams work together but in an autonomy supportive way (e.g. sufficient decision rights, no ample need to report through formal chain of command, co-operation is written in job descriptions, etc.).

Future research should be done to investigate how sharing of valuable organizational knowledge (best-practices, lessons learned, etc.) affect organ-

izational learning and renewal capabilities in the long run. These studies should focus on how valuable, experience-based knowledge that is shared at the individual level turns into organizational knowledge, how this knowledge is deployed in organizational rules, regulations, norms, operations, strategies etc., and how this further affects individuals through organizational governance mechanisms. By investigating the whole circle in the "Coleman's bath" (see Figure 1 in Chapter 1), we can clarify how knowledge sharing actually drives dynamic capabilities like organizational renewal.

As mentioned in Chapter 1, knowledge sharing research has not been able to explain how various knowledge governance practices affect individual-level knowledge sharing. The current study made several noteworthy contributions to the role of governance mechanisms in different types of organizational knowledge sharing settings. However, in future studies this still need to be explained in detail what types of mechanisms do affect each individual factor in each of these situations. All situations should be examined separately. I did not have the resources for this.

My findings also indicate that the type of shared knowledge could decide what kind of human factors actually drive knowledge sharing behaviour. Future studies will be needed to clarify this matter.

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APPENDICES

APPENDIX 1: The questionnaire: Means and standard deviations

Item ID	*Item*	*Mean*	*Std Dev*
PerfoFeedback_1	Employees in this organization obtain a feedback based on their job performance.	5,11	1,33
PerfoFeedback_2	Employees in this organization obtain a feedback based on their personal development.	4,64	1,46
PerfoRewards_1	I feel that employees are promoted to higher positions not for years of work but for competencies and performance.	4,13	1,58
PerfoRewards_2	Individual or team-based performance is measured with fairness.	4,95	1,62
PerfoRewards_3 (item dropped)	*This organization provides me with fair opportunities for advancement.*	*4,55*	*1,86*
PerfoRewards_4	The rewards based on job performance are provided with fairness.	4,41	1,71
TrainingDevelopment_1	Formal training programs are offered to employees in this organization in order to increase their specific abilities.	5,31	1,59
TrainingDevelopment_2 (item dropped)	*The organization uses job rotation to expand the skills of employees.*	*4,04*	*1,72*
TrainingDevelopment_3	The organization provides training focused on team building and teamwork skills training.	3,83	1,67
TrainingDevelopment_4 (item dropped)	*The organization has a mentoring system to help develop employees.*	*4,11*	*1,70*
TrainingDevelopment_5	Employees in this organization go normally through formal training programs every few years.	4,90	1,70
LateralCoordination_1	Interunit workgroups are set up to allow units to engage in joint decision-making.	4,68	1,69
LateralCoordination_2 (item dropped)	*There are people with a coordinating role whose specific job it is to coordinate the efforts of several departments for purposes of a specific project.*	*3,33*	*1,77*
LateralCoordination_3	Task forces (work groups) are set up to facilitate interunit collaboration on a specific project.	4,22	1,70
LateralCoordination_4	Decision making in our organization is characterized by participative, cross-functional discussions in which different departments, functions, or divisions get together.	4,32	1,52
LateralCoordination_5	Information and experiences are often shared in meetings or during teamwork.	4,61	1,61

Item ID	*Item*	*Mean*	*Std Dev*
	I share knowledge with other employees because…		
IntMot_1	… I think it is an important part of my job.	6,57	0,71
IntMot_2 (item dropped)	*… I find it personally satisfying.*	*4,74*	*1,81*
IntMot_3	… I like sharing knowledge.	5,63	1,31
IntMot_4	… sharing my knowledge with colleagues is pleasurable.	6,36	0,93
IntMot_5	… I enjoy helping colleagues by sharing my knowledge.	6,07	1,08
	Why do you share knowledge with other employees?		
ExtMot_1	I want my supervisor(s) to praise me.	2,53	1,77
ExtMot_2	I want my colleagues to praise me.	2,57	1,67
ExtMot_3	I might get a reward.	2,24	1,48
Ext_Intro_Mot_1	I feel proud of myself.	3,27	1,92
Ext_Intro_Mot_2	I want my superior to think I am a good employee.	3,95	2,05
Ext_Intro_Mot_3 (item dropped)	*I want my colleagues to think I am competent.*	*5,12*	*1,91*
SelfEfficacy_1	I am confident in my ability to provide knowledge that others in my company consider valuable.	5,18	1,18
SelfEfficacy_2	I have the expertise required to provide valuable knowledge for my company.	5,35	1,34
SelfEfficacy_3	It does not really make any difference whether I share my knowledge with colleagues (R).	6,24	1,22
SelfEfficacy_4 (item dropped)	*Most other employees can provide more valuable knowledge than I can (R).*	*4,61*	*1,39*
TimeAvailability_1	I have little free time to allocate during work (R).	4,26	1,72
TimeAvailability_2 (item dropped)	*I am usually under high time pressure at work (R).*	*4,94*	*1,61*
TimeAvailability_3	There is no time to share my knowledge with my colleagues due to pressure of work in this organization (R).	3,03	1,58
TimeAvailability_4	This organization does not create time for discussion with our colleagues (R).	2,90	1,69
TimeAvailability_5	I am too busy to attend training courses or workshops in my department (R).	3,19	1,75

Note: *(R) = reversed coded item*

Item ID	*Item*	*Mean*	*Std Dev*
	In last month, to what extent have…		
KS_Emp_Emp_1	…you gained work-related knowledge from colleagues in your own department?	4,96	1,51
KS_Emp_Emp_2	…you used work-related knowledge gained from colleagues in your own department to perform or develop your work task?	5,04	1,52
KS_Emp_Emp_3	…colleagues in your own department gained work-related knowledge from you?	4,96	1,28
KS_Emp_Emp_4	…colleagues in your own department used work-related knowledge gained from you to perform or develop their work task?	4,70	1,31
	In last month, to what extent have…		
KS_Emp_Sup_1	…you gained work-related knowledge from your superior?	4,59	1,69
KS_Emp_Sup_2	…you used work-related knowledge gained from your superior to perform or develop your work task?	4,29	1,77
KS_Emp_Sup_3	…your superior gained work-related knowledge from you?	4,51	1,56
KS_Emp_Sup_4	…your superior used work-related knowledge gained from you to perform or develop his or her work task?	4,06	1,65
	In last month, to what extent have…		
KS_Emp_EmpUnit_1	…you gained work-related knowledge from colleagues in other departments?	3,94	1,58
KS_Emp_EmpUnit_2	…you used work-related knowledge gained from colleagues in other departments to perform or develop your work task?	3,99	1,59
KS_Emp_EmpUnit_3	…colleagues in other departments gained work-related knowledge from you?	3,98	1,57
KS_Emp_EmpUnit_4	…colleagues in other departments used work-related knowledge gained from you to perform or develop their work task?	3,74	1,55

APPENDIX 2: Exploratory Factor Analysis: Pattern matrices.

Pattern Matrix[a] Model 1 (Employee–employee within a department)

	Factor							
	1	2	3	4	5	6	7	8
ExtMot_2	,901							
ExtMot_1	,868							
ExtMot_3	,835							
Ext_Intro_Mot_2	,700							
Ext_Intro_Mot_1	,663							
Ext_Intro_Mot_3	,571							
PerfoFeedback_2		,931						
PerfoFeedback_1		,904						
PerfoRewards_2		,600						
PerfoRewards_4		,552						
PerfoRewards_1		,506						
LateralCoordination_3			,894					
LateralCoordination_1			,872					
LateralCoordination_4			,837					
LateralCoordination_5			,626					
TimeAvailability_3				,797				
TimeAvailability_5				,752				
TimeAvailability_1				,746				
TimeAvailability_4				,731				
TimeAvailability_2				,707				
IntMot_4					,880			
IntMot_5					,799			
IntMot_3					,763			
IntMot_1					,645			
KS_Emp_Emp_4						,925		
KS_Emp_Emp_3						,815		
KS_Emp_Emp_2						,629		
KS_Emp_Emp_1						,570		
TrainingDevelopment_1							,921	
TrainingDevelopment_5							,885	
TrainingDevelopment_3							,520	
TrainingDevelopment_2							,414	
SelfEfficacy_1								,832
SelfEfficacy_2								,792
SelfEfficacy_3								,306

Extraction Method: Maximum Likelihood.

Rotation Method: Promax with Kaiser Normalization.[a]

Pattern Matrix[a] Model 2 (Employee–superior)

	Factor							
	1	2	3	4	5	6	7	8
ExtMot_2	,904							
ExtMot_1	,869							
ExtMot_3	,833							
Ext_Intro_Mot_2	,703							
Ext_Intro_Mot_1	,660							
Ext_Intro_Mot_3	,571							
PerfoFeedback_2		,954						
PerfoFeedback_1		,940						
PerfoRewards_2		,612						
PerfoRewards_4		,550						
PerfoRewards_1		,512						
TimeAvailability_3			,790					
TimeAvailability_1			,757					
TimeAvailability_5			,751					
TimeAvailability_4			,729					
TimeAvailability_2			,715					
LateralCoordination_3				,905				
LateralCoordination_1				,866				
LateralCoordination_4				,832				
LateralCoordination_5				,617				
IntMot_4					,896			
IntMot_5					,793			
IntMot_3					,734			
IntMot_1					,662			
KS_Emp_Sup_4						,883		
KS_Emp_Sup_3						,852		
KS_Emp_Sup_2						,673		
KS_Emp_Sup_1						,648		
TrainingDevelopment_1							,911	
TrainingDevelopment_5							,891	
TrainingDevelopment_3							,506	
TrainingDevelopment_2							,404	
SelfEfficacy_2								,770
SelfEfficacy_1								,745
SelfEfficacy_3								,324

Extraction Method: Maximum Likelihood.

Rotation Method: Promax with Kaiser Normalization.[a]

a. Rotation converged in 7 iterations.

Pattern Matrix[a] Model 3 (Employee–employee, between departments)

	Factor							
	1	2	3	4	5	6	7	8
ExtMot_2	,904							
ExtMot_1	,873							
ExtMot_3	,837							
Ext_Intro_Mot_2	,700							
Ext_Intro_Mot_1	,656							
Ext_Intro_Mot_3	,563							
KS_Emp_EmpUnit_2		,943						
KS_Emp_EmpUnit_1		,909						
KS_Emp_EmpUnit_3		,781						
KS_Emp_EmpUnit_4		,743						
PerfoFeedback_2			,914					
PerfoFeedback_1			,892					
PerfoRewards_2			,613					
PerfoRewards_4			,579					
PerfoRewards_1			,515					
TimeAvailability_3				,796				
TimeAvailability_5				,748				
TimeAvailability_1				,743				
TimeAvailability_4				,728				
TimeAvailability_2				,705				
LateralCoordination_3					,886			
LateralCoordination_1					,861			
LateralCoordination_4					,836			
LateralCoordination_5					,628			
IntMot_4						,893		
IntMot_5						,785		
IntMot_3						,739		
IntMot_1						,656		
TrainingDevelopment_1							,912	
TrainingDevelopment_5							,872	
TrainingDevelopment_3							,527	
TrainingDevelopment_2							,421	
SelfEfficacy_1								,825
SelfEfficacy_2								,821
SelfEfficacy_3								,324

Extraction Method: Maximum Likelihood.

Rotation Method: Promax with Kaiser Normalization.[a]

a. Rotation converged in 7 iterations.

APPENDIX 3: Confirmatory Factor Analysis: Item loadings

Measurement model 1 (employee–employee within a department)

Item	*Est.*	*S.E.*	*C.R.*	*Std Est.*	*P*
ExtMot_2	1			0,890	
ExtMot_1	1,066	0,054	19,617	0,897	***
ExtMot_3	0,825	0,046	18,069	0,834	***
Ext_Intro_Mot_2	0,926	0,074	12,525	0,675	***
Ext_Intro_Mot_1	0,868	0,072	11,99	0,673	***
PerfoFeedback_2	1			0,659	
PerfoFeedback_1	0,998	0,067	14,868	0,719	***
PerfoRewards_2	1,44	0,13	11,072	0,854	***
PerfoRewards_4	1,394	0,136	10,27	0,784	***
PerfoRewards_1	1,009	0,117	8,593	0,614	***
LateralCoordination_3	1			0,846	
LateralCoordination_1	1,001	0,061	16,492	0,848	***
LateralCoordination_4	0,914	0,054	17,007	0,861	***
LateralCoordination_5	0,841	0,062	13,625	0,749	***
TimeAvailability_3	1			0,879	
TimeAvailability_5	0,894	0,077	11,667	0,711	***
TimeAvailability_1	0,789	0,077	10,301	0,637	***
TimeAvailability_4	0,939	0,072	13,093	0,773	***
IntMot_4	1			0,845	
IntMot_5	1,019	0,079	12,851	0,759	***
IntMot_3	1,081	0,091	11,933	0,713	***
IntMot_1	0,694	0,058	11,96	0,721	***
KS_Emp_Emp_4	1			0,783	
KS_Emp_Emp_3	0,926	0,064	14,446	0,747	***
KS_Emp_Emp_2	0,961	0,173	5,542	0,649	***
KS_Emp_Emp_1	0,922	0,178	5,171	0,627	***
TrainingDevelopment_1	1			0,859	
TrainingDevelopment_5	1,044	0,072	14,459	0,839	***
TrainingDevelopment_3	0,766	0,075	10,209	0,626	***
SelfEfficacy_1	1			0,911	
SelfEfficacy_2	0,886	0,078	11,403	0,741	***
SelfEfficacy_3	0,548	0,076	7,201	0,503	***

Note:
Est. = Unstandardized Regression Weight Estimate
S.E. = Standard Error
C.R. = Critical Ratio, the estimate divided by its standard error
Std Est. = Standardized Regression Weight Estimate
*p = p-value; *** means that the p-value is less than .001.*

Measurement model 2 (employee–superior)

	Est.	*S.E.*	*C.R.*	*Std Est.*	*P*
ExtMot_2	1			0,889	
ExtMot_1	1,068	0,054	19,861	0,898	***
ExtMot_3	0,827	0,046	17,952	0,835	***
Ext_Intro_Mot_2	0,927	0,074	12,601	0,674	***
Ext_Intro_Mot_1	0,869	0,072	12,064	0,673	***
PerfoFeedback_2	1			0,663	
PerfoFeedback_1	0,988	0,066	14,981	0,716	***
PerfoRewards_2	1,428	0,127	11,207	0,852	***
PerfoRewards_4	1,391	0,131	10,614	0,787	***
PerfoRewards_1	1,001	0,116	8,619	0,613	***
TimeAvailability_3	1			0,884	
TimeAvailability_1	0,782	0,074	10,509	0,635	***
TimeAvailability_5	0,885	0,074	11,989	0,709	***
TimeAvailability_4	0,931	0,071	13,178	0,771	***
LateralCoordination_3	1			0,845	
LateralCoordination_1	1,003	0,061	16,468	0,848	***
LateralCoordination_4	0,916	0,054	16,862	0,862	***
LateralCoordination_5	0,844	0,061	13,729	0,75	***
IntMot_4	1			0,847	
IntMot_5	1,014	0,08	12,745	0,757	***
IntMot_3	1,077	0,091	11,862	0,712	***
IntMot_1	0,692	0,057	12,045	0,721	***
KS_Emp_Sup_4	1			0,657	
KS_Emp_Sup_3	0,77	0,063	12,128	0,535	***
KS_Emp_Sup_2	1,37	0,2	6,856	0,844	***
KS_Emp_Sup_1	1,263	0,187	6,74	0,814	***
TrainingDevelopment_1	1			0,859	
TrainingDevelopment_5	1,046	0,075	14,016	0,841	***
TrainingDevelopment_3	0,765	0,075	10,241	0,625	***
SelfEfficacy_2	1			0,745	
SelfEfficacy_1	1,113	0,107	10,382	0,904	***
SelfEfficacy_3	0,62	0,081	7,606	0,507	***

Note:
Est. = Unstandardized Regression Weight Estimate
S.E. = Standard Error
C.R. = Critical Ratio, the estimate divided by its standard error
Std Est. = Standardized Regression Weight Estimate
*p = p-value; *** means that the p-value is less than .001.*

Measurement model 3 (employee–employee, between departments)

	Est.	*S.E.*	*C.R.*	*Std Est.*	*P*
ExtMot_2	1			0,89	
ExtMot_1	1,068	0,054	19,859	0,898	***
ExtMot_3	0,826	0,046	17,946	0,834	***
Ext_Intro_Mot_2	0,927	0,074	12,605	0,675	***
Ext_Intro_Mot_1	0,869	0,072	12,077	0,674	***
KS_Emp_EmpUnit_2	1			0,81	
KS_Emp_EmpUnit_1	0,953	0,044	21,601	0,774	***
KS_Emp_EmpUnit_3	1,089	0,124	8,788	0,895	***
KS_Emp_EmpUnit_4	0,99	0,118	8,398	0,825	***
PerfoFeedback_2	1			0,662	
PerfoFeedback_1	0,997	0,067	14,961	0,721	***
PerfoRewards_2	1,433	0,129	11,13	0,854	***
PerfoRewards_4	1,385	0,132	10,503	0,782	***
PerfoRewards_1	1,005	0,117	8,6	0,614	***
TimeAvailability_3	1			0,878	
TimeAvailability_5	0,895	0,075	11,998	0,711	***
TimeAvailability_1	0,792	0,075	10,547	0,639	***
TimeAvailability_4	0,941	0,071	13,187	0,774	***
LateralCoordination_3	1			0,847	
LateralCoordination_1	0,999	0,061	16,494	0,847	***
LateralCoordination_4	0,915	0,054	16,938	0,863	***
LateralCoordination_5	0,839	0,061	13,697	0,748	***
IntMot_4	1			0,847	
IntMot_5	1,014	0,079	12,783	0,758	***
IntMot_3	1,075	0,091	11,868	0,711	***
IntMot_1	0,691	0,057	12,042	0,72	***
TrainingDevelopment_1	1			0,861	
TrainingDevelopment_5	1,041	0,074	14,044	0,839	***
TrainingDevelopment_3	0,763	0,074	10,255	0,625	***
SelfEfficacy_1	1			0,897	
SelfEfficacy_2	0,912	0,085	10,699	0,751	***
SelfEfficacy_3	0,563	0,074	7,645	0,509	***

Note:
Est. = Unstandardized Regression Weight Estimate
S.E. = Standard Error
C.R. = Critical Ratio, the estimate divided by its standard error
Std Est. = Standardized Regression Weight Estimate
*p = p-value; *** means that the p-value is less than .001.*

APPENDIX 4: Correlation matrix and descriptive statistics

Correlation matrix and descriptive statistics, measurement model 1.

	Mean	*Std Dev*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
1	4,52	1,36	1,00							
2	2,91	1,47	0,031	1,00						
3	4,65	1,24	0,656***	0,098	1,00					
4	4,46	1,42	0,598***	0,059	0,701***	1,00				
5	4,66	1,38	0,250***	-0,108	0,222***	0,219***	1,00			
6	6,16	0,82	0,277***	0,131*	0,374***	0,339***	0,207***	1,00		
7	4,91	1,16	0,301***	0,144*	0,390***	0,389***	0,123	0,476***	1,00	
8	5,80	1,00	0,147**	0,044	0,275***	0,328***	0,182**	0,518***	0,483***	1,00

Note: *1.TrainingAndDevelopment, 2.ExtrinsicMotivation 3.FeedbackAndRewards, 4.LateralCoordination, 5.TimeAvailability, 6.IntrinsicMotivation, 7.KSEmpEmp, 8.SelfEfficacy*
****p < 0,01; **p < 0,05, *p < 0,1*

Correlation matrix and descriptive statistics, measurement model 2.

	Mean	*Std Dev*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
1	4,52	1,36	1,00							
2	2,91	1,47	0,031	1,00						
3	4,65	1,24	0,656***	0,098	1,00					
4	4,66	1,38	0,252***	-0,109	0,223***	1,00				
5	4,46	1,42	0,598***	0,059	0,701***	0,221***	1,00			
6	6,16	0,82	0,277***	0,132*	0,373***	0,208***	0,339***	1,00		
7	4,37	1,39	0,310***	0,090	0,542***	0,208***	0,498***	0,224***	1,00	
8	5,80	1,00	0,148**	0,046	0,278***	0,186**	0,330***	0,521***	0,184***	1,00

Note: *1.TrainingAndDevelopment, 2.ExtrinsicMotivation 3.FeedbackAndRewards, 4.TimeAvailability, 5.LateralCoordination, 6.IntrinsicMotivation, 7.KSEmpSup, 8.SelfEfficacy*
****p < 0,01; **p < 0,05, *p < 0,1*

Correlation matrix and descriptive statistics, measurement model 3.

	Mean	*Std Dev*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
1	4,52	1,36	1,00							
2	2,91	1,47	0,031	1,00						
3	3,91	1,41	0,319***	0,049	1,00					
4	4,65	1,24	0,656***	0,098	0,360***	1,00				
5	4,66	1,38	0,250***	-0,109	-0,009	0,221***	1,00			
6	4,46	1,42	0,597***	0,059	0,401***	0,701***	0,219***	1,00		
7	6,16	0,82	0,276***	0,132*	0,101	0,373***	0,207***	0,339***	1,00	
8	5,80	1,00	0,149**	0,048	0,280***	0,281***	0,186**	0,330***	0,523***	1,00

Note: *1.TrainingAndDevelopment, 2.ExtrinsicMotivation 3.KSEmpUnit, 4.FeedbackAndRewards, 5.TimeAvailability, 6.LateralCoordination, 7.IntrinsicMotivation, 8.SelfEfficacy*
****p < 0,01; **p < 0,05, *p < 0,1*

APPENDIX 5: Structural Equation Modeling: Results

Structural model 1R (employee–employee within a department)

			Est.	*S.E.*	*C.R.*	*Std Est.*	*p*
FeedbackAndRewards	→	SelfEfficacy	2,078	1,15	1,807	0,183	0,071
TrainingAndDevelopment	→	SelfEfficacy	-1,591	0,692	-2,298	-0,198	0,022
Exp_Task	→	SelfEfficacy	-0,512	1,585	-0,323	-0,019	0,747
Exp_FDF	→	SelfEfficacy	0,996	0,4	2,493	0,143	0,013
LateralCoordination	→	SelfEfficacy	2,579	0,69	3,74	0,345	***
FeedbackAndRewards	→	ExtrinsicMotivation	0,171	0,099	1,723	0,107	0,085
FeedbackAndRewards	→	IntrinsicMotivation	2,418	0,462	5,237	0,266	***
TrainingAndDevelopment	→	TimeAvailability	0,221	0,082	2,702	0,217	0,007
LateralCoordination	→	TimeAvailability	0,096	0,076	1,271	0,102	0,204
SelfEfficacy	→	IntrinsicMotivation	0,399	0,041	9,824	0,5	***
Task	→	TimeAvailability	0,002	0,038	0,055	0,003	0,956
ExtrinsicMotivation	→	KSEmpEmp	0,061	0,028	2,218	0,099	0,027
IntrinsicMotivation	→	KSEmpEmp	0,026	0,006	4,191	0,24	***
SelfEfficacy	→	KSEmpEmp	0,03	0,005	6,21	0,343	***
TimeAvailability	→	KSEmpEmp	-0,018	0,031	-0,557	-0,025	0,577
Gender	→	KSEmpEmp	-0,014	0,133	-0,107	-0,006	0,915
Group	→	KSEmpEmp	-0,049	0,03	-1,614	-0,091	0,106
Task	→	KSEmpEmp	-0,076	0,029	-2,607	-0,173	0,009
Exp_Task	→	KSEmpEmp	0,167	0,148	1,123	0,069	0,261
Exp_FDF	→	KSEmpEmp	-0,009	0,029	-0,3	-0,014	0,764
FeedbackAndRewards	→	KSEmpEmp	0,217	0,051	4,26	0,218	***

Note:
Est. = Unstandardized Regression Weight Estimate
S.E. = Standard Error
C.R. = Critical Ratio, the estimate divided by its standard error
Std Est. = Standardized Regression Weight Estimate
*p = p-value; *** means that the p-value is less than .001.*

Structural model 2R (employee–superior)

		Est.	*S.E.*	*C.R.*	*Std Est.*	*p*
FeedbackAndRewards	→SelfEfficacy	1,863	1,01	1,845	0,186	0,065
LateralCoordination	→SelfEfficacy	2,289	0,613	3,737	0,344	***
TrainingAndDevelopment	→SelfEfficacy	-1,412	0,612	-2,307	-0,198	0,021
Exp_Task	→SelfEfficacy	-0,382	1,405	-0,272	-0,016	0,785
Exp_FDF	→SelfEfficacy	0,884	0,354	2,495	0,143	0,013
FeedbackAndRewards	→ExtrinsicMotivation	0,169	0,099	1,716	0,107	0,086
FeedbackAndRewards	→IntrinsicMotivation	2,364	0,459	5,153	0,262	***
SelfEfficacy	→IntrinsicMotivation	0,455	0,046	9,93	0,505	***
LateralCoordination	→TimeAvailability	0,1	0,076	1,305	0,104	0,192
TrainingAndDevelopment	→TimeAvailability	0,222	0,082	2,695	0,216	0,007
Task	→TimeAvailability	0,001	0,039	0,038	0,002	0,97
ExtrinsicMotivation	→KSEmpSup	0,038	0,032	1,185	0,055	0,236
IntrinsicMotivation	→KSEmpSup	-0,004	0,007	-0,522	-0,031	0,601
SelfEfficacy	→KSEmpSup	-0,002	0,006	-0,261	-0,015	0,794
TimeAvailability	→KSEmpSup	0,095	0,036	2,622	0,126	0,009
Gender	→KSEmpSup	0,355	0,152	2,33	0,127	0,02
Group	→KSEmpSup	-0,043	0,036	-1,219	-0,073	0,223
Task	→KSEmpSup	-0,031	0,033	-0,927	-0,064	0,354
Exp_Task	→KSEmpSup	0,178	0,171	1,039	0,067	0,299
Exp_FDF	→KSEmpSup	-0,023	0,034	-0,698	-0,035	0,485
FeedbackAndRewards	→KSEmpSup	0,637	0,092	6,959	0,587	***
LateralCoordination	→KSEmpSup	0,193	0,056	3,467	0,268	***
TrainingAndDevelopment	→KSEmpSup	-0,216	0,056	-3,871	-0,28	***

Note:
Est. = Unstandardized Regression Weight Estimate
S.E. = Standard Error
C.R. = Critical Ratio, the estimate divided by its standard error
Std Est. = Standardized Regression Weight Estimate
*p = p-value; *** means that the p-value is less than .001.*

Structural model 3R (employee–employee, between departments)

			Est.	*S.E.*	*C.R.*	*Std Est.*	*p*
FeedbackAndRewards	→	SelfEfficacy	2,189	1,116	1,961	0,198	0,05
TrainingAndDevelop-ment	→	SelfEfficacy	-1,58	0,672	-2,35	-0,201	0,019
LateralCoordination	→	SelfEfficacy	2,482	0,672	3,695	0,34	***
Exp_FDF	→	SelfEfficacy	0,977	0,39	2,507	0,143	0,012
Exp_Task	→	SelfEfficacy	-0,418	1,545	-0,27	-0,015	0,787
FeedbackAndRewards	→	ExtrinsicMotivation	0,171	0,099	1,729	0,108	0,084
FeedbackAndRewards	→	IntrinsicMotivation	2,343	0,461	5,081	0,259	***
SelfEfficacy	→	IntrinsicMotivation	0,414	0,042	9,954	0,507	***
TrainingAndDevelop-ment	→	TimeAvailability	0,219	0,081	2,69	0,216	0,007
LateralCoordination	→	TimeAvailability	0,096	0,076	1,269	0,102	0,204
Task	→	TimeAvailability	0,002	0,038	0,051	0,003	0,96
ExtrinsicMotivation	→	KSEmpUnit	0,028	0,044	0,638	0,033	0,523
IntrinsicMotivation	→	KSEmpUnit	-0,034	0,01	-3,421	-0,228	***
SelfEfficacy	→	KSEmpUnit	0,039	0,008	4,824	0,324	***
TimeAvailability	→	KSEmpUnit	-0,14	0,051	-2,748	-0,15	0,006
Gender	→	KSEmpUnit	0,057	0,212	0,27	0,017	0,787
Group	→	KSEmpUnit	-0,013	0,049	-0,269	-0,018	0,788
Task	→	KSEmpUnit	-0,031	0,046	-0,666	-0,052	0,505
Exp_Task	→	KSEmpUnit	0,041	0,239	0,171	0,013	0,864
Exp_FDF	→	KSEmpUnit	0,036	0,047	0,771	0,044	0,441
LateralCoordination	→	KSEmpUnit	0,259	0,067	3,871	0,293	***
TrainingAndDevelop-ment	→	KSEmpUnit	0,197	0,069	2,871	0,209	0,004

Note:
Est. = Unstandardized Regression Weight Estimate
S.E. = Standard Error
C.R. = Critical Ratio, the estimate divided by its standard error
Std Est. = Standardized Regression Weight Estimate
*p = p-value; *** means that the p-value is less than .001.*