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Securing Knowledge Sharing: within and between customer projects

A case study of the knowledge sharing abilities for customer projects developing lithium-ion batteries

Master's thesis in Management and Economics of Innovation

ADAM INGEMARSSON
JULIA WASSÉN

DEPARTMENT OF TECHNOLOGY MANAGEMENT AND ECONOMICS
DIVISION OF ENTREPRENURSHIP AND STRATEGY

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Report no. E2022:087
Department of Technology Management and Economics
Chalmers University of Technology
SE-412 96 Göteborg
Sweden
Telephone + 46 (0)31-772 1000

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ABSTRACT
Knowledge management and knowledge sharing is important for companies to increase their competitive advantage. There is a natural connection between knowledge management and project management as projects generate large amounts of knowledge and simultaneously depend on it. Therefore, knowledge sharing is crucial to capture, store and disseminate knowledge efficiently, limiting the risk of repeating mistakes or investigations.

The base of the thesis is a case study of Northvolt, a developer and producer of lithium-ion batteries located in Sweden, and their customer project teams. Through interviews, documentation and observations of the project teams within Northvolt, this thesis therefore aims to explore the knowledge sharing abilities of cross-functional customer project teams within a fast-growing and customer-centric organization. This includes, investigating the formal and informal processes used for knowledge sharing and also the influencing barriers and enablers, between and within the project teams. Together with previous literature on knowledge sharing, the findings of the thesis can be summarized accordingly:

- First, informal processes like networking are used to a large extent to share and to find knowledge, foremost within the project teams, but also between the project teams.
- Second, the high use informal processes relying on relationships, build trust and strong ties between individuals, which supports the sharing of tacit knowledge.
- Third, lack of time was the most prominent barrier both for formal and informal knowledge sharing.
- Fourth, all enablers found have strong connections to interactions and relationships which especially induce informal knowledge sharing.

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Table of Contents

1. Introduction

Companies operating in current globalized markets are constantly in search of competitive advantages to leverage against their competitors. A competitive advantage resides in a company's ability to leverage resources and capabilities into unique abilities, where knowledge has been the leading source of competitive advantage during the last decades (Nahapiet and Ghoshal, 1998; Spender and Grant, 1996). Knowledge has also been proven to have a critical role in the sustainability of reaching long-term success (Nonaka, Ikujiro and Takeuchi, 1995), thus stressing the importance as a resource. However, knowledge is especially difficult to capture, share and leverage as it often is problematic to conceptualize and companies are lacking the methodologies to manage it (Fernie et al., 2003). Due to it being complex, the capturing is thereby also complex and time-consuming (Neches et al., 1991). The need to organize and manage knowledge therefore becomes clear to leverage its capabilities as a competitive advantage (Abell and Oxbrow, 2006; Grant, 1991; Teece, 1998; Webb, 2017).

The potential upside of investing in knowledge management is huge, not only to gain a competitive advantage but also to reduce redundant costs. However, even if companies make large investments in knowledge management systems, there is no insurance of a successful capturing, acquiring and appropriation of knowledge (Kamara, 2002). According to Wang and Noe (2010), the Fortune 500 companies are losing billions of dollars each year due to poor knowledge management, especially because they underestimate the importance of understanding social networks, organizational characteristics and individual characteristics, and how it influences knowledge sharing processes. If this is of such importance for the Fortune 500 companies, it could also be applicable to other companies. Essentially, the source of knowledge resides within each individual, thus individuals are responsible for driving the evolution of knowledge within an organization (von Krogh et al., 2000).

Bartol and Srivastava (2002) explain that the research done on knowledge sharing by scholars has enlightened the criticality of knowledge creation and organizational learning. Knowledge sharing is therefore an essential part of the knowledge management practices as it is the primary way individuals can contribute to the diffusion, capturing and availability of knowledge, eventually leading to increased competitiveness of an organization if implemented correctly (Cabrera and Cabrera, 2002; Grant, 1996; Marouf and Khalil, 2015). Knowledge sharing was long seen as a natural part of a company, happening spontaneously over time (Ipe, 2003). However, this natural function of spontaneous knowledge sharing has lackluster effectiveness under the best of circumstances, due to the complexity of knowledge (Hendriks, 1999). In the end, when knowledge sharing is organized and acknowledges the setting, beliefs, and actions of individuals (Lilleoere and Hansen, 2011), it helps to prevent the repetition of past mistakes and drives new innovative thinking (Cabrera and Cabrera, 2002).

Evident in the project management literature (Fernie et al., 2003), there is a natural connection between knowledge management and project management as projects generate large amounts of knowledge and simultaneously depend on it (Marouf and Khalil, 2015; Turner, 1999). Shared knowledge can be used as lessons learned from one project to another, avoiding the time-consuming and costly process of reinventing the wheel, ultimately stressing the critical importance of knowledge in project management (Marouf and Khalil, 2015; Rezgui et al., 2002). The knowledge generated from past or parallel projects can serve as a guiding hand,

avoiding past failures and learning from successes, to increase a project-based organization's competitive advantage (Fernie et al., 2003; Marouf and Khalil, 2015). However, project managers do not always foresee the importance of capturing and sharing knowledge generated from past projects (Newell et al., 2006) because the value of the process might not be evident initially, thus knowledge is often easily lost.

1.1 Background

One company that highly relies on knowledge sharing is Northvolt - a leading manufacturer within the battery industry, with a heritage in Sweden. The journey of the company started in 2016 when it was founded in Stockholm. The mission of the company is to "build the greenest battery in the world with a minimal carbon footprint and the highest ambitions for recycling to enable the European transition to renewable energy" (Northvolt, 2022a). Since its introduction in January 2022, the company has grown rapidly and reached above 2000 employees from 104 different nationalities (Northvolt, 2022b). Currently, the company has its headquarter in Stockholm and an R&D campus in Västerås. In the northern parts of Sweden, Skellefteå, a Gigafactory named Northvolt Ett is located which is responsible for the manufacturing of the batteries. Besides the three locations in Sweden, the company has developed a new factory which is located in Gdansk in Poland (Northvolt, 2022a).

Northvolt operates in several businesses and industry areas such as automotive, truck and bus, energy storage and grid (Northvolt, 2022c). Most of the work within the company is project-based, which increases the importance of well-functioning project management. One important business unit within the company is "Automotive and Foundry" (A&F) which primarily works towards customers in the automotive sector. Within this unit, there is a Customer Project Management (CPM) team that works on different customer projects. Each manager within CPM is responsible for a cross-functional team consisting of engineers and product managers from different areas in the company. Together, each cross-functional team is responsible for developing batteries and systems together with its customer. One critical part is to share knowledge, or lessons learned, between the different phases of the project. Since the individuals within the teams could vary during project time, depending on the different competencies required, knowledge sharing becomes essential in order for the transitions to work smoothly. In addition, many of the learnings within one customer project could be valuable for other customer projects as well as to the rest of the organization.

1.2 Problematization

Northvolt´s rapid growth, caused by the increasing customer portfolio, creates new demands within the organization. In order for the organization to develop efficiently, valuable learnings must stay in the company and be both captured and spread by the employees. According to Wang and Noe (2010), there are several topics within the area of knowledge sharing that require future research. They show how environmental, individual and motivational factors need to be examined more comprehensively in order to understand the mechanism of knowledge sharing within organizations. Furthermore, after searching for literature on Google Scholar and the Chalmers library database on context-based search terms such as *customer-centric*, *fast-growing organizatio*n, *start-up* and *scale-up* in combination with *knowledge management*, *knowledge sharing* and *lessons learned*, there was very few results. Therefore, one can assume

that there is a knowledge gap regarding knowledge sharing in the context of customer-centric and fast-growing organizations.

1.3 Purpose and research questions

The purpose of this study is to understand how knowledge is shared within and between cross-functional project teams during rapid scale-up. By doing this, the study hopes to contribute to the theoretical field of knowledge sharing within project-based organizations. Moreover, the study aims to give insight to knowledge sharing within the context of customer-centric and fast-growing organizations, which former literature has not examined to the same extent. Therefore, the purpose of the study is to explore:

> *How is knowledge shared between and within cross-functional project teams in a customer-centric and fast-growing organization?*

Further, the purpose of the study is broken down into the following research questions regarding knowledge sharing in and between customer projects:

- Which informal and formal processes are used for knowledge sharing in and between the project teams?
- What are the influencing barriers and enablers for knowledge sharing in and between the project teams?

Based on the purpose and research questions, the study aims to develop additional theoretical contributions in the field of knowledge sharing between and within customer projects. These insights will hopefully give advice on how organizations can improve knowledge sharing within their current organizations as well as when they continue to scale up.

1.5 Delimitations

Delimitations on the study have been chosen to narrow the scope and are fourfold. First, this study has investigated the internal rather than external influences on knowledge sharing. This was done to utilize the opportunity to deep-dive into one specific case company and understand its processes for knowledge sharing. Therefore, the scope was narrowed to the case company, excluding factors such as the industry and competitors in that area. There was also no comparison between the case company and other similar companies, as the study primarily focused on mapping and not optimization in regard to best practices. Second, the study looks at the customer project teams but no other project teams within the case company as there is another level of complexity when considering the influence of customers in development. Finally, the last delimitation narrows the scope to the processes instead of the content of knowledge. There is less interest in what specific topics that knowledge contains at the case company, and thus the characteristics of the processes themselves for sharing knowledge are of significantly more interest. This hopefully gives a better understanding of the mechanisms of knowledge sharing.

2 Theoretical Chapter

This chapter aims to introduce previous literature and theories relevant for the discussion of the results. This first includes a sub-chapter presenting the concept of knowledge management and the nature of knowledge. The following sub-chapter digs into knowledge sharing including the value associated with knowledge sharing, the nature of knowledge sharing, tacit and explicit classifications of knowledge, formal and informal opportunities to share, networks of knowledge sharing and finally barriers and enablers for knowledge sharing. The third and last sub-chapter introduces the lessons learned process in more detail.

2.1 Knowledge Management

According to Ipe (2003) there are several definitions regarding the classification of knowledge. Davenport and Prusak (1998) describe knowledge as "*a fluid mix of framed experience, values, contextual information, and expert insights that provides a framework for evaluating and incorporating new experiences and information" (p.5)*. However, there is no general consensus within the literature regarding the difference between knowledge and information (Wang and Noe, 2010), and some authors use the terms interchangeably (Bartol and Srivastava, 2002) Tsoukas and Vladimirou (2001), on the other hand, describe that knowledge as something personal used to e.g., make judgments, by interpreting and setting the information in a context. Similarly, Nonaka (1994), describes that knowledge is based on information, but is also connected and influenced by an individual's own beliefs.

According to Davenport et al. (1998) knowledge management is a concept which includes the managerial practices that an organization uses to create, store, spread and exploit knowledge. Further, Yahyapour et al. (2015) describes that knowledge management is used to achieve organizational goals. An organization could take advantage of knowledge management by improving relationships towards for instance customers and suppliers (Goldoni and Oliveira, 2010). Moreover, there is a connection between the organization's knowledge management and their competitive advantage (Nonaka et al., 1995), as explained in the introduction.

The area of knowledge management has for a long time been connected to information technology (Gourlay, 2001). However, the individual's role within knowledge management is something that has increased in interest (Earl, 2001). This new perspective refers to the fact that individuals within an organization have knowledge (Grant and Spender, 1996) and that the management of knowledge is influenced by the connection between the individuals in the organization (McDermott, 1999). Similarly, von Krogh et al. (2000) describe that those individuals are the driving force within organizations due to their role as creators and source of knowledge. However, knowledge that is inherent within individuals could also cause issues for an organization. Armbrecht et al. (2001) describes that certain knowledge within R&D organizations, which have a high value for organizational outcomes, could result in a lower willingness to be shared.

Moreover, important success factors for knowledge management have been identified to be IT infrastructure, measurement, leadership, culture, roles and responsibilities (Koenig and Srikantaiah, 2004). Further, researchers describe the importance of creating an environment that supports improvement, creativity and sharing of ideas (Nevis et al. 2009; Gupta and

Govindarajan, 2000). Structures and systems must also be flexible in order to continuously support the sharing of knowledge (Gupta and Govindarajan, 2000).

2.2 Knowledge sharing

For a while, much attention has been paid to an organization's ability to use knowledge as a resource to further increase its competitive advantage (Davenport and Prusak, 1998; Grant, 1996; Grant and Spender, 1996). Commonly, organizations rely on recruitment of new employees that already have specific knowledge or training through helping employees acquire certain knowledge. However, according to Brown and Durguid (1991), this way of acquiring and developing knowledge within a company is both insufficient and inefficient. Developing and evolving knowledge internally through knowledge sharing, better tailors the knowledge to fit within a certain organization. Therefore, knowledge sharing is essential for organizational learning and knowledge creation (Bartol and Srivastava, 2002).

Knowledge sharing is a process within the field of knowledge management where "individuals mutually exchange their (implicit and explicit) knowledge and jointly create new knowledge" (Van Den Hooff and Ridder, 2004, p. 118). The process of knowledge sharing could also be interpreted as the link between the employees and the organization, extracting knowledge from individuals to create value for the organization (Hendriks, 1999). Both interpretations can occur simultaneously within the company, where knowledge is shared among individuals but is also stored within the organization. This is critical for creativity among employees and the dissemination of innovative ideas throughout organizations (Armbrecht et al., 2001), because individuals with a diverse set of knowledge exchanging knowledge within a group will enhance their ability to innovate far more than any lone individual can (Cohen and Levinthal, 1990). Other than an increased ability to innovate, research has shown that knowledge sharing has an effect of reducing production cost, shortening time for completion of product development, increased team performance and increased revenue from new products and services (Wang and Noe, 2010).

The efficiency of sharing knowledge is of particular importance when considering the field of project management in project-based organizations (Almeida and Soares, 2014; Bell, van Waveren, and Steyn, 2016). Marouf and Khalil (2015) indicate that this is because project management generates a vast amount of knowledge, which when shared correctly, can be reused throughout projects within the organization. This knowledge includes past failures and successes with development, suppliers, customers, products and other project specific aspects. When knowledge sharing processes are used to distribute this knowledge across the organization, it builds a long-term competitive advantage. Further, Liebowitz and Megbolugbe (2003) explained that knowledge sharing helps to prevent reinventing the wheel several times within the projects in an organization, thus mitigating the risk of making the same mistake over and over again. However, this is a common problem when sharing knowledge between projects because project members within the receiving project might not see the value of the knowledge or do not know it exists (Andersen and Hanstad, 2013; Newell et al., 2006).

2.2.1 The nature of knowledge sharing

There is a strong connection between an organization's ability to leverage knowledge and individuals' ability to share knowledge. It is people who create, share, and then use the

knowledge, who make it available throughout the organization (Ipe, 2003). The definition of knowledge sharing used throughout this study is similar to Ipe (2003) and Cummings (2004) definitions. They state that knowledge sharing occurs when one individual converts their knowledge into some format of which other individuals can understand, absorb, and use that knowledge. This conversion of knowledge can be aided by written correspondence, real time correspondence or structuring documentation, transmitting knowledge from one person to another. Further, it is important to note that sharing is distinguished from reporting, as sharing is a voluntary act not demanded by the organizational structure (Davenport and Prusak, 1998). Ipe (2003) describes sharing as a process occurring consciously between individuals, where the individual possessing the knowledge willingly and without compulsion presents it. Therefore, after sharing the possession of knowledge is joined among the participating individuals. In contrast, reporting follows a structured format where there are routines of exchanging information (Davenport and Prusak, 1998). However, although knowledge sharing for long was considered a natural function of an organization and certainly being more complex than reporting, it still can be reinforced by structured processes (Hendriks, 1999).

Furthermore, certain scholars like Chakravarthy et al. (1999) and Lam (1997) make a distinction between knowledge sharing and knowledge transfer. Where knowledge transfer refers to the transfer of knowledge between large entities, like departments, divisions and entire organizations. However, the chosen definition of knowledge sharing by Ipe (2003) and Cummings (2004) states that knowledge is passed between individuals, emphasizing the role of individuals. Therefore, this study is following Wang and Noe's (2010) example of considering knowledge sharing synonymous with knowledge transfer, as knowledge can be shared among individuals from different departments.

Knowledge is however not confined to any single organizational level, according to De Long and Fahey (2000), and could reside on an individual, group or organizational level. However, as they further explain, although knowledge resides at all levels in an organization and individuals only constitute one of these organizational levels, knowledge is created and transferred through the sharing among individuals and is independent of the organizational level. Therefore, there is a distinction between where knowledge exists and how it got there. Nonaka et al. (1995) further supports this by explaining that knowledge cannot be created without knowledge sharing between individuals.

2.2.2 Tacit and explicit knowledge

In the field of knowledge sharing there is one dominant classification of knowledge, derived from the work of Nonaka et al. (1995). Their work states that knowledge can come in two different classifications, either tacit or explicit knowledge, where three major variables differ them from each other. According to Lam (2000), these variables are codability, transferability and the method of acquisition, which define how tacit and explicit knowledge behaves in certain situations. With knowledge being recognized as a valuable asset in an organization, there has been an increase of interest in the understanding of the different classifications of knowledge as they behave differently.

Even though the concept of tacit knowledge has been around for more than 20 years (Nonaka et al.,1995), the importance of understanding it and the occurrence in literature has increased significantly in recent years (Wang and Noe, 2010). Tacit knowledge is defined by being

personal, context dependent and therefore also difficult to express by the knowledge holder, often connected to the phrase “we know more than we can tell” (Nonaka et al., 1995). Tacit knowledge can be seen as the know-how that is gained by an individual through experience in their roles in an organization (Nonaka, 1994). Therefore, tacit knowledge is defined to be sticky and both hard to understand and acquired by others than the knowledge holder. Thus, it is also the most difficult knowledge to share within an organization, often shared in discussions, meetings and training rather than documentation (Gomes, Olivera and Chaves, 2018). However, there is also a possibility to transform tacit knowledge into explicit knowledge, but there is often knowledge lost in the process making it ineffective for most organizations (Gomes, Olivera and Chaves, 2018).

Explicit knowledge behaves in quite the opposite way when compared to tacit knowledge. Explicit knowledge can easily be codified and stored without being dependent upon one single individual (Lan, 2000). However, there is often a misconception about explicit knowledge in that being easy to codify and store makes it easy to share across an organization. Explicit knowledge is still hard to share within an organization, but its nature makes it easier to share among individuals (Weiss, 1999). Weiss (1999) makes an argument that explicit knowledge specific to a certain context of one individual could still be hard to interpret by another, even though there is no problem expressing the knowledge in documentation and then sharing it. Therefore, regardless of being tacit or explicit knowledge, the value of the knowledge lies in its context and point of view of individuals, thus complicating the sharing process.

There has been general criticism in the field of knowledge management and knowledge sharing, in that much research aims to capture and disseminate explicit knowledge within organizations. However, Fernie et al. (2003) states that explicit knowledge is only the tip of the iceberg and most of the knowledge resides under the surface of individuals as tacit knowledge. Therefore, if only focusing on knowledge that could be codifiable and put in a large database, most of the potential knowledge within an organization is largely ignored (Preston et al. 1999). On the other hand, if capturing enough tacit knowledge from an individual, will it make them an obsolete asset within the organization? This question was asked by Fernie et al. (2003) and there is thus a conflict of ethics surrounding the ownership of that specific knowledge.

2.2.3 Formal and informal opportunities to share

Ipe (2003) describes that there exist both formal and informal opportunities to share knowledge. Further, he describes that the formal opportunities include for instance structured work teams or training programs that enable for knowledge sharing. Informal opportunities, on the other hand, include social networks and social relationships (Brown and Duguid, 1991). Similarly, Milton (2010) describes separate ways to share lessons: 1) Formal connect and collect systems refers to formal networks and meetings. 2) Informal connect and collect systems refers to loosen and mobile networks or self-organizing communities. The informal connect and collect systems are further described to enhance a discussion-oriented culture where knowledge could be created spontaneously. However, one consideration mentioned is regarding whether the right questions are asked or if lessons reach the individuals who need them.

Further, Ipe (2003) describes that previous research indicates that the majority of knowledge is shared informally and through relational learning channels. She describes that these relational channels, such as face-to-face communication, support knowledge sharing through the creation

of trust. Similarly, Gherardi and Nicolini (2000) emphasize the importance of the interactions between individuals and involvement within communities in order to adapt new knowledge. On the same note, Nelson (1991) describes that not all knowledge could be documented or articulated, and further the formal channels are more characterized by the sharing of explicit knowledge (Rulke and Zaheer, 2000).

2.2.4 Personal linkages and networks

In order to understand knowledge sharing within organizations it is essential to understand the personal connections between individuals. Newell et al. (2006) describes that employees within an organization need to have networks in order to get access to distributed knowledge and refers to Leana and Van Buren (1999) stating that individuals who have connections across different communities could play a key role. However, they also describe that besides a network, an individual must also nourish their internal connections within their project team in order to develop and refine the team member´s shared understanding.

In regard to networks, knowledge sharing literature brings up the concepts of "ties" or "links" between individuals. For instance, Granovetter (2018) describes that the nature of links between individuals in a network highly impacts knowledge sharing. Similarly, Reagans and McEvily (2003) as well as Cross and Cummings (2004) describe the importance of networks for knowledge sharing and state that the ties between individuals could impact the quality of the knowledge shared. Further, the strength or weakness of the ties are also shown to influence the knowledge shared between individuals (Granovetter, 2018) For instance, Granovetter (1973) shows that strong ties are more correlated to high emotional bonds in comparison to weak ties, which are described as non-redundant connections, and thus result in non-redundant information. Further, strong ties are also shown to impact the motivation to share knowledge from one individual to another (Reagans and McEvily, 2003).

Research also connects the phenomenon of strong and weak ties to explicit and tacit knowledge. Fernie et al. (2003) describe that strong ties are characterized by high trust, close relationships and longtime horizons, which is more suitable when sharing tacit and more complex knowledge. Similarly, Nonaka et al. (1995) describe that the sharing of tacit knowledge is a form of socialization, and thus more complex to share in comparison to explicit knowledge. Weak ties, in contrast, reduce the possibility to share knowledge as well as information. However, Granovetter (1973) shows that weak ties could result in a higher number of people being reached as well as work as bridges between networks.

In relation to the strength of the ties, the literature also explains more specific factors that could be influential in knowledge sharing. For instance, there is research on how justice and trust, which are two critical factors for interpersonal relationships, are connected to knowledge sharing (Robinson, 1996). Trust and justice are considered to be important factors since there is often mutual expectation between individuals regarding the exchange of knowledge (Wu et al., 2007). Furthermore, Kucharska and Kowalczyk (2016) examine the relationships between trust, collaborative culture and tacit knowledge sharing within project management. They show that trust is a critical factor for the exchange of tacit knowledge, but that it also supports a collaborative culture which overall enhances knowledge sharing. On an individual perspective, Cabrera et al. (2006) shows that openness to experience among individuals have a positive impact due to a higher level of curiosity and thus a higher willingness to seek for others´ point

of views and experiences. Confidence in the ability to share relevant knowledge has also been identified as a critical factor and is connected to the perceived level of engagement in knowledge sharing activities (Cabrera et al., 2006).

2.2.5 Barriers and enablers for knowledge sharing

Barriers and enablers have a profound effect on knowledge sharing within an organization, where enablers increase the likelihood that individuals share their knowledge while barriers decrease the likelihood (Yeşil and Hırlak, 2013). Following the example of Riege (2005), Keyes (2008), Barson et al. (2000) and Kaps (2011), this study divides barriers and enablers into three different categories: individual, organizational and technological. This categorization is believed to capture important barriers and enablers and create a holistic view. Furthermore, if ranked, the organizational barriers and enablers usually have the largest effect on knowledge sharing, followed by the other two categories. Examples of barriers and enablers for each category can be found in table 1 below. These examples further build upon the complexity of knowledge sharing, as the barriers and enablers are touching upon complex subjects like organizational culture, human behaviors and technology integration, which each have challenges by themselves.

	Barriers for knowledge sharing	**Enablers for knowledge sharing**
Organizational	Unclear or missing integration between KM initiatives and company goals	The existence of inspiring leadership
	Misunderstanding of KM and KS processes	Having a supportive culture
	Lack of leadership and managerial direction	Having informal settings that assimilate social exchanges
	Lack of transparent rewards and recognition systems	Physical proximity that is stimulated through job-rotations
	Low priority on knowledge retention	Training
	Inadequate resources for KS	Incentives or reward systems that encourage KS behaviors
	Large physical distances between individuals	Successful collaborations between team members and other teams
	Improper organizational structure	
	Competition among business units	
	Shortage of formal and informal spaces for KS to take place	
Technological	Constraints of IT systems to support sharing of tacit knowledge	Proper IT systems that can provide a strong platform support for KS
	The incompatibility of new and old IT systems	Communication systems that support KS purposes
	Lack of technical support for employees	Collaboration and training tools for individuals or teams
	Lack of maintenance of integrated IT systems	Easily accessible knowledge
	Unrealistic expectations of users	
	Insufficient training to use the IT system	
	Time consuming and expensive to build a knowledge database	
Individual	Fear of job security	Attitude towards KS
	Loss of power and/or status	Motivation to share
	Low awareness of the benefits of KS	Absorptive capacity
	Ignorance of those who possess the knowledge	Social ties
	Dominance in sharing explicit knowledge over tacit knowledge	Mutual trust
	Differences in experience	Self-efficacy
	Poorer verbal and interpersonal skills	Enjoyment in helping others
	Demografic differences	Awareness
	Status inequality	Access to help
	Lack of social network	Leniency in judgment
	Lack of time	Courage
	Differences in educational levels	Mutual reciprocity
	Lack of recognition of KS	Common identity of a group
	Bounded individual capacity	Human social networks

Table 1: *Examples of barriers and enablers for knowledge sharing (Riege, 2005; Keyes, 2008; Barson et al., 2000; Kaps, 2011).*

Most of the barriers and enablers are not independent, meaning that they are interlinked with each other. Mitigating one barrier could have a ripple effect throughout the organization,

mitigating other barriers and enhancing the effect of enablers. One such example considers the management support of knowledge sharing. Lee et al. (2006) found that management support induces both the quality and quantity of knowledge shared within an organization because it is positively associated with individuals' perceptions of knowledge sharing, increased trust among employees and increased individuals' willingness to share. Another example of interlinked barriers and enablers is digital communication channels and individuals' physical proximity (Bell et al., 2016). Intranets, databases, e-mails, chats, and calls can all help mitigate communication problems that arise with distances between employees and could even mitigate lack of time for individuals (Cabrera and Cabrera, 2002). However, some employees with extravert behaviors tend to share more of their knowledge when in physical meetings as they have closer connections between people, thus there are differences in willingness to share in physical or digital meetings (Wang and Noe, 2010). These two examples of relationships between barriers and enablers illustrate the delicate and complex balance between them and how they commonly interact with each other.

Furthermore, some barriers are hard to mitigate even if there is a solution because of lacking resources or the rigidness of organizations. One such concern is the barrier of not having IT structures for documentation and storage of knowledge (Neches et al., 1991). It is time-consuming and expensive to build new knowledge bases within organizations, however utilizing old bases and integrating them into the current system will be less costly for organizations when scaling (Wang and Noe, 2010). This may require that the old knowledge is converted into a digital format, in order to capture the past knowledge, which according to Neches et al. (1991) is difficult.

Another mistake when assessing knowledge sharing abilities is the lack of consideration for individual characteristics, incentives and interpersonal relationships (Carter and Scarbrough, 2001). To incentivize individuals properly mitigates major individual barriers for knowledge sharing (Yao, Kam, and Chan, 2007), as individuals are likely to refrain from sharing knowledge if they have low personal motivation (Stenmark, 2000). An individual's incentives depend on internal and external factors, where the internal incentives can be influenced by organizational culture and external incentives can be influenced by reward systems (Ipe, 2003). One use of incentives that act like a barrier for knowledge sharing is competition among individuals in an organization which affect both internal and external incentive factors (Wang, 2004). By having a culture of internal competition within organizations, knowledge becomes a powerful competitive advantage among individuals, internally incentivizing them to keep that knowledge to themselves to reap external incentives in the form of rewards (Ferrin and Dirks, 2003). Wang (2004) instead proposes to incentivize cooperation in and between teams to increase trust among individuals, which limits the effect of individual barriers and incentivizes an open culture. On the other hand, Kim and Lee (2006) found that individual performance-based rewards still increase knowledge sharing as long as it does not increase competition between employees, as it increases collaboration.

Finally, differences in organizational structures when comparing organizations can have a large impact on facilitating their knowledge sharing. Research done by Tagliaventi and Mattarelli (2006) indicates that organizations structured in factually divided segments inhibit knowledge sharing by reducing informal and formal interactions between the different segments. On the contrary, a decentralized and less hierarchical organizational structure and cross-functional incentivizes individual interactions, thus deviating from the formal line of authority (Wang and

Noe, 2010). The increase of interactions among individuals points to an increase in knowledge shared within the organization. Further, the organizational structures have a similar amount of influence over organizational knowledge sharing, as team characteristics have on knowledge shared within a team. Wang and Noe (2010) suggests that time spent in a team, the acknowledgement of individuals' expertise and the cohesiveness of the team positively correlates with the amount of knowledge shared within a team.

2.3 Lessons learned

Within the field of knowledge sharing, one common practice to share knowledge is "lessons learned" (Marouf and Khalil, 2015). There are several definitions in the literature regarding the meaning of lessons learned. According to Milton (2010), lessons are only learned when actual changes have occurred, and not only the identification of potential changes. Similarly, Weber et al. (2001) refers to previous research describing lessons learned to be connected to improved changes within an organization. Further, they describe that lesson learned also concerns both positive and negative experiences explained by the American, European and Japanese Space Agencies: *"A lesson learned is a knowledge or understanding gained by experiences. The experiences may be both positive, as in a successful test or mission, or negative, as in a mishap or failure" (p.18).*

However, many organizations find difficulties setting up proper lessons learned processes (O´Dell and Hubert, 2011), and are shown to not be prioritized (Carillo et al., 2013). Koenig and Srikantaiah (2004) describe that it is necessary for employees to have a well-functioning technology infrastructure in order to share lessons, but that too one-sided focus could cause issues. On a project level, Ayas and Zeniuk (2001) state that there are often enough lessons learned within projects, but that there is insufficient sharing between projects or to the rest of the organization.

Moreover, barriers for lessons learned are shown to be similar to the barriers explained in the knowledge sharing literature, e.g., company culture, structure, processes and project amnesia (Jugdev, 2012). However, Fuller (2011) indicates that the lack of time is a more prominent obstacle in the context of learning between projects. Similarly, Shokri-Ghasabeh and Chileshe (2014) investigated the barriers for lessons learned in the construction industry and found lack of employee time to be a major obstacle together with lack of resources and clear guidance. Moreover, success factors or enablers within the field of lessons learned could also be examined from the knowledge management literature.

3. Methodology

This chapter will include three parts explaining the methods used to investigate the research topic. Firstly, *Research design and approach* will explain the choice of a qualitative case study which is based on the relevance for the research questions. Secondly, *Data collection* will describe the three sources: interviews, observations and documents from which data was collected. Lastly, *Data analysis* will explain the method used in order to analyze the data.

3.1 Research design and approach

This study's research objective was to investigate how knowledge is shared within and between cross-functional projects teams within a customer-centric and fast-growing organization. This includes knowledge sharing activities within the CPM team and the customer project teams. The research has adopted a qualitative approach due to the need for a rich and in-depth understanding of the subject, as knowledge sharing is a complex process including e.g. human interaction (Wang and Noe, 2010). Further, a case study methodology was used in order to understand how knowledge sharing is used in practice within an organization, thus giving a context to the research topic (Yin, 2009). Moreover, the study uses an inductive approach where the findings create the theory in the form of generalizable interferences (Bell et al., 2018). Therefore, previous research has limited influence over the exploration leading to the findings.

3.2 The case company

The choice to use Northvolt as a case company helps the exploration due to the organizational structure agreeing with the purpose of the research. Northvolt is for this study the only source of primary data, where knowledge sharing could be examined qualitatively and closely. There were three different sources from which the data was collected during the study: data from interviews, observations and documents. Together with the literature presented in the theoretical chapter, this data can be analyzed and compared to the theories of knowledge sharing and project management. Therefore, with Northvolt as a case study, the gathered and analyzed primary data was valuable to connect the theoretical and practical settings.

3.2.1 The CPM team

The CPM team is a part of the Automotive and Foundry division at Northvolt. The team consists mainly of customer project managers who are respectively responsible for developing batteries which will be tailor-made towards the different customers. More specifically, the managers are responsible for leading a cross-functional project team which consists of representatives from the different line functions at the company. The role of the customer project manager acts like a bridge between the customer and the project itself, controlling e.g., the project schedule, budgeting, risk management and change management.

Most customer projects follow a developing process with phases, derived from the automotive industry but have been adapted to Northvolt's organizational and technical structure. The development of battery cells scales for each of these phases, going from R&D production, scaling their production further in Labs and finally reaching large scale production in the Gigafactory in Skellefteå before their full capacity start of production. As each phase has a long duration, reflecting and learning from previous experiences is crucial in order to use resources

effectively, lower costs and speed up development. Therefore, another responsibility of the customer project manager is to conduct a formal lesson learned process before the first phase and after each phase of the project, to capture improvements that could be implemented. The purpose of the lessons learned process is to improve the organizational work by targeting both success factors as well as mistakes. This concerns taking the time to reflect and adjust based on the new learnings. Further, the learnings within one team could also be valuable to be transferred over to other project teams since they could face similar challenges. It is in the interest of the whole organization that learnings will be identified, captured, and spread in order to enable continuous improvements.

In addition to the lessons learned process it is essential for the organization to create an environment that supports knowledge sharing. In order for the company to grow efficiently, knowledge needs to be both stored and spread by the employees. However, the rapid growth of the company, with new departments at different geographical locations, creates further challenges for these knowledge sharing processes to work efficiently. Therefore, it is in the interest to understand what could enable as well as hinder the company to increase the knowledge sharing among the employees.

3.3 Data collection

This study had a qualitative approach trying to answer how, which and what research questions that required an in-depth analysis of the knowledge sharing phenomena. Therefore, the data collection needed to be close to the sources to better understand the complex nature of knowledge sharing. Thus, the data collection involved three sources of primary data, gathered with various methods. The first source was employees working in the CPM team or the project teams and their experiences of knowledge sharing, which were collected through semi-structured and unstructured interviews. The second source was observations of meetings and processes conducted at Northvolt. Finally, documentation of formal guides and frameworks concerning knowledge-sharing activities were examined. These three sources of data will be further explained in the following subsections, elaborating on each source in more detail, however a summary of the data collection can be found below in figure 1.

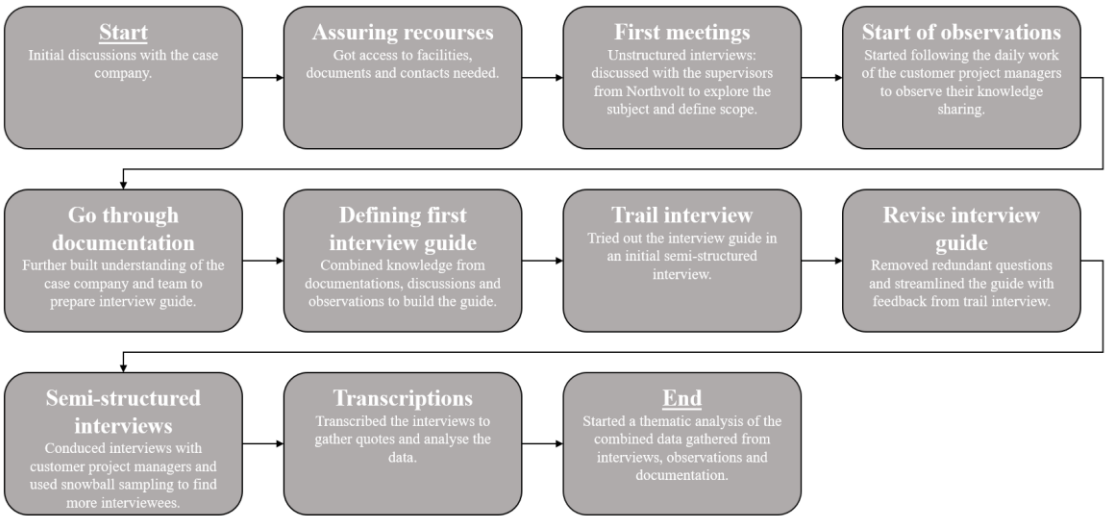

Figure 1: *An illustrative summary of the data gathering.*

3.3.1 Interview data

Knowledge sharing is conducted through the interaction between individuals and thus interviews with members in the project teams were the primary source of data. There are two different types of qualitative interviews, semi-structured and unstructured (Bell et al, 2018), where both were used for data gathering. Most of the unstructured interviews were conducted during the initial phase of the study to get a deeper understanding of the current situation that Northvolt was facing in regard to knowledge sharing activities. Further, the flexibility of having unstructured interviews helped the process of exploring the interesting subjects raised because the interviewees could speak freely about what they thought was important to bring to light (Bell et al., 2018). These interviews were primarily conducted with the supervisors from Northvolt, where they presented the insights needed to build an interview guide and introduce further connections in the CPM team.

From the insights gathered during four interviews together with frameworks grounded in knowledge management theory, a first draft of the interview guide was constructed for the semi-structured interviews. The questions included in the guide were aligned with the purpose of the study to answer the research questions and were open to let the interviewee elaborate upon answers (Bell et al., 2018). Follow-up questions were purposefully used to avoid neutral answers and thus gave a better understanding if participants generally were agreeing with each other. Further, to review the interview guide and its included questions, a trail interview was conducted. This made it possible to remove redundant questions and streamline the flow of the interviews to better capture valuable knowledge from the interviewees.

The sampling strategy to find suitable participants for the interviews relied on snowball sampling, as there was no definable sample frame for the CPM project teams. The snowball strategy starts off with a small group of participants, in this case the customer project managers of each of the ongoing projects, where each participant gives propositions of other relevant candidates to interview who is central to the problem at hand (Bell et al., 2018). Interviews were conducted until a saturation of opinions was reached and thus having another interview would have given no additional information. For this study, the sample size added up to 13 participants in total for the interviews. Primarily the interviewees were project managers in the CPM team, as seen in the participant summary in table 2 below. However, in the interviews, there was also representation from the line functions that was a part in the project teams, presented as “Engineer” in table 2.

Interviewee No.	Role	Time at Northvolt	Previous industries	Interview duration (min)
1	Project Manager	< 1 year	First position after university	60
2	Project Manager	4 years	Battery packs and battery systems	60
3	Project Manager	1 year	Construction equipment and automotive	45
4	Project Manager	< 1 year	Construction equipment	45

5	Project Manager	5 years	Electrical equipment	45
6	Project Manager	< 1 year	Automotive	45
7	Project Manager	2 years	Business development consulting and automotive	45
8	Project Manager	< 1 year	Battery	45
9	Manager	< 1 year	Construction equipment and electronics	45
10	Manager	< 1 year	Automotive	30
11	Engineer	1 year	Automotive	70
12	Engineer	< 1 year	Industrialization equipment	40
13	Engineer	4 years	Battery	55

Table 2: *Summary of information regarding the participants of the interviews.*

The interviews were conducted during a three-week period and had a duration of 30-70 minutes depending on the availability of the interviewee. There were always two interviewers present at each interview; one that focused solely on the interview guide and the interviewees train of thought, and one that took notes and interposed with follow up questions. However, even though this setup of taking notes captured most of the valuable information from the interviewee, there was a risk of valuable information slipping through and therefore each session was audio recorded. Each participant was told that their identity would be anonymous in the report and were asked if the session could be recorded, of which none of the participants declined. Some interviewees felt slightly uncomfortable while being recorded for the first couple of minutes of the interview, however they quickly forgot about the microphone. As the initial questions were about their occupation and role in the company, this had a limited effect on the results overall. The recording was used to transcribe the interview accurately in order to capture quotations and make the analysis easier.

3.3.2 Data from observations

To complement the interview data, observations of the knowledge sharing conducted in the CPM team were used. These observations of real processes were made to distinguish the differences between what employees say they do and what they actually do, which is in line with Argyris´ (1991) argumentation regarding espoused theories. This gathering of observational data thus further complemented the data gathered from the interviews. Therefore, during the duration of the study, there was a close collaboration with Northvolt to gain insights into their processes and participate in meetings with a focus on knowledge sharing.

The goal was to take an observational role during the meeting to not influence them too much while present in the room. While taking this observational role there was a risk of influencing conversational topics by having a presence in the meetings. However, the risk was estimated to be low as observations were conducted regularly over a long period of time where daily work

had to continue despite being observed. Afterward, a reflection of the meeting was conducted to discuss the observations and notes taken. During the period of February to May in 2022 there were weekly visits to the office and participating in meetings, where the day-to-day work was followed closely. Around 5-10 hours each week were spent on these observations giving a comprehensive view of how the CPM team governed the customer projects.

3.3.3 Data from documents

Theory and practice often differ the same way as organizational frameworks might differ from how employees actually work. Therefore, the final data collected concerns documentation on frameworks and processes involving knowledge sharing, which complemented both the interviews and the observations. This helped to understand if formal processes and frameworks are followed and perhaps lead to the discovery of potential barriers and enablers for knowledge sharing. These documents were primarily used by the CPM team and the customer projects, however general documentation for the entire organization was also used to a lesser extent. Furthermore, a formal description of Northvolts' view on the lessons learned process was derived from these documents. These documents included frameworks of processes, organizational structures, role descriptions and past documentation from lessons learned sessions. Due to confidentiality, there was limited information from the documents that could be shared in this study without being generalized. However, conclusions could still be drawn from the data gathered and could be presented in agreement with confidentiality regulations.

3.4 Data analysis

The same method of analysis was used for all three different sources of data, interviews, participant observations and documentation. The data analysis was mainly conducted through a thematic analysis which is one of the most common approaches in qualitative data analysis (Bell et al, 2018). Thematic analysis consists of finding common themes (Bell et al, 2018) and in this study, searching for patterns was the main tool in order to find major themes in the data. This included repetition of words and patterns of conversational subjects on a lower level of abstraction connected to the purpose and research questions of the study. The themes were extracted by going through the transcriptions of the interviews and notes from observations and documents, color coding the text with one color for each theme. Themes with lower level of abstraction were thereafter categorized into four major themes with a higher level of abstraction to build a comprehensible result.

The origin source of the data was transferred with each data point throughout the whole analysis to enable a comparison between the different sources. This helps to find insights in the different sources while simultaneously contrasting organizational views against individual views. Further, no data is presented in its entirety since it contains confidential information, thus only processed data is shown in the results except for carefully selected quotes. The quotes are completely anonymous; therefore, no names or roles are presented in combination with a quote to ensure that no backtracking could be done to the individual interviewee. As this study does not compare the knowledge sharing abilities of individual roles within the organization, this anonymization of the quotes will have limited influence over the results. Further, when interviewees were talking, it often included repetitions of words or phrases whenever the interviewer was thinking. These repetitions have been edited out of the quotes to clarify the sentences, while the content and opinions have remained unchanged.

4 Results

Walking into the Northvolt office in Stockholm for the first time, there is a sense that knowledge sharing is intentionally integrated into the design of the newly renovated office. Large open landscapes for desktops without designated settings enable new interactions. A stage, located in the middle of the Stockholm office, is used for weekly and monthly updates regarding the company where the employees can watch it from the office or watch the company wide broadcast. Finally, there is a large common area where people could meet for a coffee, eat lunch, or meet up for a brief discussion. These attributes are infused into all sites company-wide, ensuring an open environment for finding connections and sharing knowledge. However, even if there are indications of a work environment that facilitates knowledge sharing, several other factors need to be considered. To understand the knowledge shared within and between the project teams, interviews were conducted to capture different points of view on the topic. Therefore, this chapter presents findings from the gathered data, broken down into four separate sections. These present the organizational setting of Northvolt, the dynamics and execution of knowledge sharing activities among project teams, the influence of networking as a tool for knowledge sharing and finally barriers and enablers for knowledge sharing.

4.1 The prerequisites of knowledge sharing

When listening to the discussions among members in the CPM team on an operational development day together with concerns raised in the interviews, one challenge was expressed several times. It was the challenge of how to continue the organizational development, of moving from a start-up to a larger and more mature company, without losing the agility, energy, quick decision making and high intensity which permeates the company currently. The company is growing and developing at an incredible rate and spreading its roots all over Sweden and Europe as a whole. With this growth, structures, processes, and standardization must be introduced to govern the organization. However, *"Northvolt is fast to get results and make quick decisions, and with speed it is important to have less heavy processes."* (Interviewee 9, Manager). According to interviewees, structure and flexibility need to be balanced as the company grows, including the knowledge sharing activities within and between the customer projects and their teams. To understand the current prerequisites of knowledge sharing, the formal structures, processes, and tools will be presented in the following three sub-chapters.

4.1.1 The structure of the project teams

In this chapter, the primary source of data is derived from formal documentation of the CPM team and their frameworks. Presented in figure 2 below is an illustration of the CPM team and their associated cross-functional project teams. Starting with the CPM team, the senior director has the overall responsibility of the outcome of the customer projects in the customer portfolio, without having operational involvement in them. The Senior Director, who is leading the CPM team, therefore has close collaboration with the customer project managers whilst aligning with the managers further up in the hierarchy. Another branch in the CPM team structure is the project manager's office (PMO), which gives support to the customer project managers with e.g., time planning, risk management and operational development.

The customer project managers govern the cross-functional teams (aka. project teams) in addition to being part of the CPM team and have the main responsibility of customer relations within the customer projects, illustrated in figure 2. Because of their position in the company, the customer project managers interviewed explained that they receive and share a broad spectrum of knowledge. Further, interviewees described that knowledge is shared by default as a bottom-up model within the project teams, starting with the engineers working hands-on with production, going to the designated customer engineer for the line function before reaching the customer project managers. Finally, the customers are the last part of the organizational structure shown in figure 2. The relationship with the customer is often a collaboration between the companies rather than being a distant supplier. Several interviewees pointed out that the customers have a major influence on the projects which further affect the subject of knowledge shared within and between the project teams. Moreover, the project's structures and processes often mirror the customer´s for each project, having a close relationship where each part learn from each other.

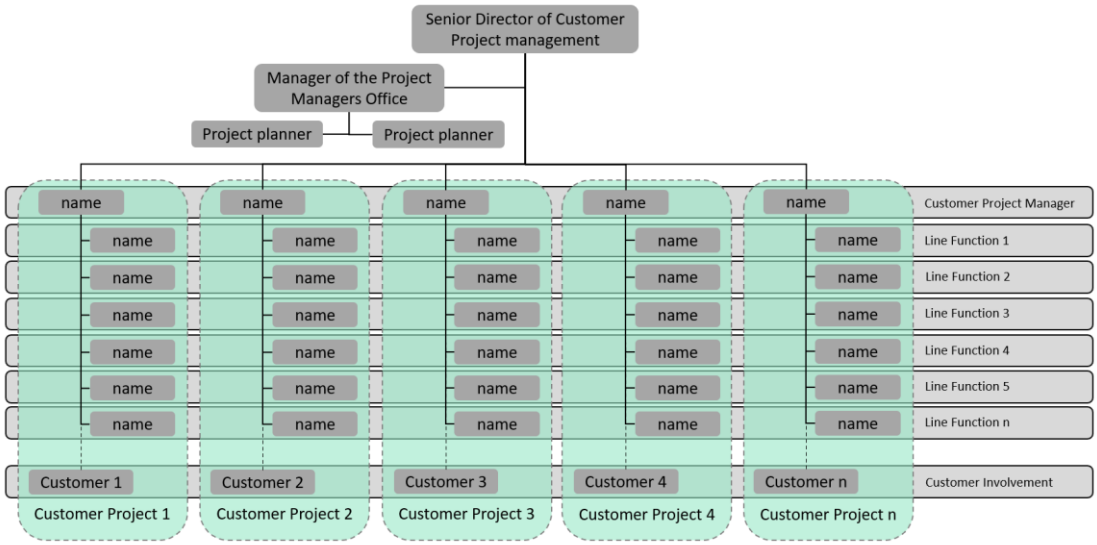

Figure 2: *Illustration of the CPM team and the cross-functional project teams derived from the "Project Process Framework"*

So far, the information stated has been derived from the formal documentation of the "Project Processes Framework", being the official guide for the processes involved in the customer projects. This document is updated regularly, with continuous improvements being added to streamline the framework. Besides the "Project Processes Framework", formal documentations of processes, structures and standardization were scarce which several interviewees raised concerns about. *"My personal opinion is now that we are at a point where our organization should be a little bit more structured."* (Interviewee 10, Manager). Meaning that the company has grown to a stage where structuring and long-term planning became more important than before. Many of the processes are also influenced by previous experiences from employees and there is little workflow standardization which occasionally leads to confusion. This has worked well whilst being a start-up, where an entrepreneurial approach is appreciated to encourage innovation and speed. *"It is a rather small company and I think start-up is a little bit too stretched. I mean we are more than 2000 people. As a company, we need to learn at some point that processes are very important and we need to implement them to a larger extent at some*

point, however sometimes we need to stay a start-up and leave processes out to be fast." (Interviewee 6, Project Manager).

4.1.2 New employee at Northvolt

The on-boarding is one of the few other formal knowledge sharing forums, which prepare project members with fundamental knowledge for their roles. The on-boarding process has changed and evolved significantly according to the interviewees with different employment durations, ranging from a basic variant in the early days of Northvolt, to a noticeably more structured process nowadays. Starting off, in the first year of the company's life *"there was a basic variant of on-boarding. I had some initial conversations with colleagues, and I received an email containing a handful of names for me to get in contact with to start the project I was assigned to."* (Interviewee 7, Project Manager). This was the period where the interviewees who were hired at that point in time referred to the on-boarding as "learning by doing" or "hands-on". However, the interviewees did not refer to it as negative, they mostly saw a challenge and felt excited. After this came the second iteration of on-boarding, *"I had one day of on-boarding at Northvolt to get to know the basics and everything."* (Interviewee 3, Project Manager). These interviewees tended to like this approach less than those who had a more basic on-boarding. Finally, for those starting within the past year, the on-boarding has become more elaborate. "*There are two different types of on-boarding. I would say the one thing is the general stuff and the other thing is the technical backgrounds."* (Interviewee 8, Project Manager). There was an improvement idea expressed by several interviewees of focusing more on the role specific starter-pack with documentation, frameworks and a list of connections, where one of the customer project managers invest time into creating their own *"organizational chart and on-boarding checklist."* (Interviewee 8, Project Manager). However, to summarize the opinion of all interviewees, they generally agreed that the on-boarding could benefit from even more knowledge sharing.

The interviewees often separated on-boarding with training within Northvolt. As there was a limited time that could be spent on handovers and on-boarding, there was a larger responsibility placed on the individual to build their own networks. Thus, the individual had a large part to play in their own training. *"I did it via networking. When (another colleague) started here, I gave her a plan with 25 people she should talk to. I got a similar plan from my boss and I liked it a lot and profited from it."* (Interviewee 10, Manager). Explaining that listening to others and eventually sharing knowledge back to new employees were large parts of training and personal growth.

4.1.3 Communication channels used for knowledge sharing

Based on the interviews and observations, there are several communication channels used by the CPM team and project teams to share knowledge. When the company grows, it is important to ensure continuous, efficient, and transparent communication where the right information reaches the right individuals, which will be a challenge in the future according to the interviewees. There are six communication channels found in the collected data used by the customer project managers and their teams: (1) meetings, (2) chats, (3) emails, (4) individual calls, (5) SharePoint and (6) external forums. The external forums are tied to each individual's ability to find them and can include online courses concerning general knowledge of programs and project management and advice from old colleagues if there is no confidential information.

(1) Meetings account for the largest part of the daily communication in the customer project manager's role, primarily with the project team and customers but also the CPM team. The meetings could be categorized into four categories where they are either formal or informal, and physical or digital. These different categories are used depending on the purpose of the meeting, where formal meetings are useful to structure and break down complex problems with a specific group and when there is a formal agenda for the meeting. On the other hand, informal meetings are more often spontaneous and urgent, relying on a smaller group of people joining. Concerning physical and digital meetings, it has more to do with the convenience of where people are situated and could often also be a hybrid of them both. However, even though all of the interviewees found digital and hybrid meetings functioning well due to vast improvements since the Covid-19 pandemic, most of them preferred physical meetings as it gives more nuance to the conversations, it is easier to meet new individuals and it gives the participants more energy.

(2) Chats in Microsoft Teams are also used extensively as a communication channel because of its speed and convenience. Everything from larger departments, teams, smaller groups and individual messaging are used as boundaries for these different chats. This was widely accepted as a well-functioning communication channel by the interviewees, whilst it is not overused. Everyone must be careful that irrelevant information or knowledge is not shared with people as it creates too much noise, which is hard to navigate as it is inefficient to read everything.

(3) Email is used, but only for specific situations where conversations have a longer time period and there is a specific subject being discussed or shared. This can vary in various parts of the company, but it can generally be used as a rule of thumb for the customer project managers.

(4) Calls vary in use depending on the individual preferences. Several interviewees preferred to call someone for short check-ins or if it was an urgent matter, and some instead preferred to use the chats for the same purpose.

(5) SharePoint is where all documentation and files are stored and shared among colleagues. As there is a vast number of documents on SharePoint there is a slight issue to navigate and find the right storage place sometimes. Northvolt's intranet can support this as much documentation is linked between the intranet and SharePoint, however, this documentation only covers general knowledge and updates regarding the entire company.

(6) External forums have a significantly lower usage at Northvolt compared to the interviewees' previous experiences but are still used to a small extent. *"If compared with established OEMs, there is a totally different resource base for internal and external educational courses. There you get them served on a silver platter, whereas at Northvolt you more actively have to do it yourself."* (Interviewee 4, Project Manager).

4.2 Knowledge sharing activities within and between project teams

This subchapter will examine the processes for knowledge sharing within and between the project teams. Further, it will bring up interviewees' own thoughts regarding how well these processes are working to enable knowledge sharing.

4.2.1 Knowledge sharing within the project teams

The "Project Process Framework" describes how the process for lessons learned should be executed, starting with *"A lessons learned workshop with the project team has to be done after each phase. The target is to collect and document what went good/ not good and to derive recommendations from this.*" (Interviewee 5, Project Manager). Further, it is written that the participants in the workshop should include the project members as well as other employees involved in order to obtain the full picture. However, the interviewees indicated that they only had performed lessons learned during some occasions and only when it was a clear need of the process. *"We have done it in some few cases after specific events such as here it actually went too wrong."* (Interviewee 3, Project Manager).

Furthermore, some of the interviewees described that it was more important for the project to continue into the next phase, rather than losing speed. "*Because you go on actually in the project, if you made a mistake in one phase, then you go on and then you solve this problem within the next phase […] so it is maybe not super valuable for the project itself."* (Interviewee 2, Project Manager). Further, there were also concerns among the interviewees regarding how much value a more formal lessons learned process would add to the project team. *"A lesson learned process is maybe not the thing that generates the most learning, but instead it may happen through more natural things when people open up."* (Interviewee 5, Project Manager). Moreover, some of the interviewees questioned the relevance of a lessons learned process due to the risk that it will be obsolete in the future. "*What is carried out through the lessons learned may not be relevant in the future if there are not more projects with the same customer or technology […]."* (Interviewee 5, Project Manager).

Instead of a high level of formal knowledge sharing, many of the interviewees described that knowledge was shared informally between individuals. Further, it was also explained as a continuous and on-going process. *"In the project itself is kind of given because you are in the middle of a development phase [...] so therefore it's a kind of continuous workflow and learning and information flow."* (Interviewee 1, Project Manager). However, many of the interviewees had a positive view regarding the non-formalized way of sharing knowledge. *"[...] to be honest, it is hard to formalize this. So, we are mainly doing this on a personal relationship level. We have a team that works very well together and we can rely on each other that if there is anything important you will be told."* (Interviewee 6, Project Manager). Moreover, there was no significant indication of a need to have a more formalized way to share knowledge within the project teams.

Many of the interviewees also described that the knowledge sharing processes often happened when meeting informally face-to-face. "*I think that knowledge is shared more in the coffee room as a percentage, compared to the information that is spread in the chat."* (Interviewee 1, Project Manager). They also stressed the importance of meeting face to face when exchanging deeper knowledge. *"But when it comes to really detailed knowledge transfer then it is I would say rather kind of face-to-face discussion or whatever kind of one-to-one contact with the specific person."* (Interviewee 2, Project Manager).

4.2.2 Knowledge sharing between the project teams

Within the "Project Process Framework" it is described that before a new project begins previous projects lessons learned need to be considered. Further, it is described that between each sample phase within a project, other projects' lessons learned from sample phases need to be reviewed and considered. Lastly, it is stated that all lessons learned need to be stored in a database in order for easy use by others. However, as described in the previous section, many of the interviewees explained that lessons learned were only conducted when it was a need of the process. In correlation to that, the sharing of lessons between the projects happened less frequently.

However, the lessons learned process between the teams was, in contrast to within the teams, often something that the interviewees viewed as a change topic. Many of the interviewees described that the organization needed a more efficient process for lessons learned in order to share knowledge between the project teams. *"When it comes to a knowledge transfer to another project [...] you cannot easily transfer without a proper lessons learned"* (Interviewee 2, Project Manager). Further, this was also expressed by another interviewee "*I think you need to do it separately. You need to put yourself in a different mood as well as take some time."* (Interviewee 8, Project Manager). Moreover, the interviewees stated that through a more efficient lessons learned process, improvement within one team could more easily be shared to the other project teams.

However, some of the interviewees stated the complexity of setting up an efficient lessons learned process. "*The problem is that we have a lot of information spread out in different documents, which makes it hard to navigate."* (Interviewee 9, Manager). Furthermore, there seemed to be concerns regarding the format of the lessons learned as well as the amount of information. *"I think the problem was always how to transfer this in a kind of lean way to another project or to the station itself. Because, I mean, if a project manager for example is handing over a 100-topic long list with all the lessons learned I say: hey guys I don't want to go through this."* (Interviewee 2, Project Manager).

4.3 Surviving through networking

Many interviewees explained that the necessity of a network was much more important compared to previous experiences at other companies, as one interviewee stated *"It is 1000 times more important. Northvolt is not like any other companies. Previously, I just asked the manager [...] here things change all the time and you need to be proactive."* (Interviewee 12, Engineer).

Furthermore, the importance of networking was also shown to be essential when joining the company. For instance, interviewees explained that it was through conversations with others that influenced how they initiated projects. "*Through my conversations with other colleagues I could see what the problems in other projects are and what is working well. So, the things which are working well I included."* (Interviewee 13, Engineer). Furthermore, one interviewee explained that he recommended new employees to contact several people when joining the company to build their network and to get familiar with the closest team. However, a few interviewees expressed that an organization chart would make it easier to find the right

knowledge. "*To make this easier, an organizational chart would help to find people."* (Interviewee 8, Project Manager).

The importance of networking was not only seen as a necessity when starting the company but also in many of the interviewees' daily work. More specifically, many of the interviewees expressed that a network was essential in order to work efficiently. *"There is no easy way to get this information without knowing people or there is not really a meeting."* (Interviewee 13, Engineer). Further, a lack of a network could result in a lack of understanding of the overall company, as described by one interviewee: *"But what you definitely going to miss is actually things which are happening around you which might be not directly connected to your work scope, but which are affecting you nevertheless."* (Interviewee 2, Project Manager). Therefore, it could be indicated that networks worked as a tool in order to get access to knowledge outside the project teams.

Furthermore, it was also clear that specific knowledge was sometimes connected to a few individuals. One interviewee explained it by comparing Northvolt to larger and older organizations. "*The difference between a start-up and a big company is that if you take some person out and just replace it with someone else, the big company still works [...] A start-up relies on very strong people who drive it [...] If you take some person away the whole thing falls"* (Interviewee 6, Project Manager). However, the knowledge connected to specific employees could sometimes be difficult for other colleagues to get access to without asking for it. "*If you do not ask them for something, why would they give you the knowledge?"* (Interviewee 7, Project Manager).

4.4 Barriers and enablers for knowledge sharing

To shed light on how knowledge is shared within and between the project teams, it helps to understand and map its barriers and enablers. However, all barriers and enablers will not be mapped, but only those which are the most prominent in the data. This will be presented in two subchapters, first the enablers of knowledge sharing and then the barriers of knowledge sharing. Each of the barriers and enablers are summarized in table 3 below.

Barriers from the results	Enablers from the results
Lack of time	Open and transparent culture for sharing
Relevance of knowledge sharing in certain groups	High trust
Geography and decentralized structure	Support of knowledge sharing from senior management
Uniqueness of projects	
Lack of digital storage capabilities	

Table 3: *The barriers and enablers presented in the result derived from the data collected.*

4.4.1 Enablers of knowledge sharing

One enabler was especially prominent in the data, having a large influence over the knowledge sharing activities and supporting the workflow of the CPM team and the project teams. Each interviewee agreed that there was an open and transparent culture to knowledge sharing within and between the project teams and within Northvolt in general. A typical answer explaining this culture was: *"I have never faced a situation when I ask someone for information that they*

don't give it. [...] Everyone here is very open and helpful." (Interviewee 10, Manager), in addition to that the knowledge sharing was *"quick and direct."* The customer projects are heavily dependent on knowledge and it is crucial for employee's daily work. This contributes to the openness and transparency of the knowledge sharing within the project teams, as they depend on the knowledge given and received. Further, *"everyone has a broad understanding of what is happening within the company"* (Interviewee 12, Engineer) enabling employees to understand the value of knowledge and who needs it.

Trust was also mentioned by some of the interviewees acting like an enabler for knowledge sharing. The importance of trust could be indicated to be linked to relationships among the employees and their openness to share. Interviewees said that trust not only helps sharing knowledge but also ensuring that the knowledge is correct. Finally, the last enabler to be mentioned was the support of knowledge sharing by the Senior Director of the CPM team. The support came in the form of emphasizing the importance of a functioning knowledge sharing process by allocating time and resources. Even though these processes were not called lessons learned specifically, they focused on reflections with the goal of exchanging knowledge.

4.4.2 Barriers of knowledge sharing

In total, five barriers were prominent while analyzing the data*:* (1) time pressure, (2) perceived relevance, (3) geography, (4) uniqueness of projects and (5) digital storage capabilities.

(1) The first barrier concerning time pressure was often the initial barrier coming to mind for the interviewees but also the most mentioned overall. Lack of time was indicated to primarily influence the formal processes of knowledge sharing compared to other informal knowledge sharing activities. *"Yeah, I think time is probably the main reason why lessons learned is prioritized a bit less than other activities. I mean, no one is saying: I don't like lessons learned and I will not pass my knowledge. I think it's more that this of course needs time."* (Interviewee 6, Project Manager). The lack of time also resulted in the prioritization of tasks shifting from formal processes for knowledge sharing to more urgent issues in the development of battery cells. *"It is generally easier to postpone a thing like lessons learned compared to certain other tasks."* (Interviewee 1, Project Manager). This ranking of priorities was thus one reason why the formal lessons learned process sometimes had been performed less regularly. *"So sometimes it was less prioritized than other urgent matters, therefore maybe we did do this less consistently."* (Interviewee 2, Project Manager). However, interviewees often expressed the importance of a lessons learned process if it was taken out of the context of time limits. *"If the lessons learned process would be more streamlined and quicker to perform, it would occur more often,"* (Interviewee 1, Project Manager).

(2) The second barrier had more nuanced opinions among the interviewees and related to the relevance of sharing specific knowledge within the project teams. The customer project managers are dependent on cross-functional knowledge from a variety of line functions, whereas the line functions generally are more interested in the knowledge originating from similar internal sources. This creates the relevance barrier, where the demand for specific knowledge varies between different functions. Within the project teams, or more precisely the cross-functional teams, specific knowledge from the line functions was sometimes viewed by themself as less necessary to be shared. Therefore, during the cross-functional meetings, there was sometimes limited engagement among the line function participants regarding the sharing

of knowledge. The barrier was also connected to a general fear of wasting time from others by presenting knowledge already possessed by the others. Therefore, if the knowledge were not relevant for everyone or already known by the meeting participants, individuals would rather not share it at all if they were too uncertain.

(3) The third barrier concerned geography due to how the decentralized structure of the facilities sometimes hinders knowledge from being shared both within and between the project teams. The interviewees indicated that over time and if ignored, there was a risk of *"disconnected entities"* (Interviewee 11, Engineer) moving in separate directions, thus limiting knowledge sharing between them. Further, even though the digital communication channels helped mitigate the barrier, it was not seen to be a complete substitute. *"I have to say I prefer to meet face-to-face to be honest. I mean due to Corona times it's a little bit difficult and also now with this distance between Skellefteå and Västerås."* (Interviewee 2, Project Manager). Some of the interviewees indicated that the distance issue has become better by the Covid-19 pandemic, where employees have trained and learnt how to use digital communication channels more efficiently. However, for certain tasks like reflections, operational development and the lessons learned process, most interviewees preferred to have physical meetings. According to them, physical meetings increase creativity, engagement, energy level and sharing, which is harder to reach from different locations. Furthermore, with larger geographical distances there are less spontaneous informal interactions where knowledge is shared by default. *"You should not underestimate the innovative power of taking a coffee with someone"* (Interviewee 5, Project Manager), indicating that informal knowledge sharing opportunities often occurred by being present at the office and taking a break with someone.

(4) The fourth barrier questions the need to share knowledge between projects due to the uniqueness of the projects themselves. *"I think first of all, every project is quite unique**,** I would say. Because in most of the projects you have different people, you have different ways of working together and I think the most important topic is that you have different customers which are requiring different things from you. You tend of course to adopt ways of working from your customers."* (Interviewee 2, Project Manager). The interviewees therefore stressed that knowledge was not easy to share between projects because there were different requirements used for the development phases in the different projects. On the other hand, one interviewee pointed out that the projects were *"homogenous on a higher level and everyone can relate to something during a lessons learned process."* (Interviewee 9, Manager). This further adds one dimension to the barrier, where details are different between the projects but act more similar on a higher level.

(5) The fifth barrier derived from the data was the less efficient use of digital storage capabilities. When formal or informal knowledge were shared it was seldom documented or stored at the same data location *"There's limited use of a knowledge database that we can search in if a problem happened before or not, but instead you often talk to someone from another project and hear that they had this problem and solved it."* (Interviewee 6, Project Manager). Further, interviewees expressed that the documented knowledge sometimes was decentralized and therefore more time consuming to navigate to find the relevant knowledge needed. Therefore, the efficiency of the knowledge database would benefit from ensuring a centralized structure with stricter governance. This was explained by the interviewees as a structural issue where there is a clear need to structure knowledge gathered so it can be easily accessible and stored.

5 Discussion

This chapter will examine the two research questions in order to give answers to the purpose of the study. Further, the most interesting aspects of the result will be extracted and discussed together with a comparison from previous research.

5.1 Processes for knowledge sharing

The first research question aims to answer the following question: *Which informal and formal processes are used for knowledge sharing in and between the project teams?* On a broad level, the result indicates that both formal and informal processes are used in order to share knowledge. This is in line with Ipe (2003) who states that there exist both formal and informal opportunities to share knowledge. For instance, the interviewees described that they used formal meetings as well as informal networks in order to get access to a sufficient amount of knowledge.

When investigating the knowledge sharing processes *within* the project teams in more detail, one highlighted process for knowledge sharing was the lessons learned process, which was documented as a requirement. However, many of the interviewees explained that they did not regularly conduct the lessons learned process within the project teams, which is in line with literature explaining that the process is not often prioritized (Carillo et al., 2013). The reason for not conducting the lessons learned process was also similar to results from other studies indicating lack of employee-time as a major obstacle (Fuller, 2011; Shokri-Ghasabeh and Chileshe, 2014). Instead, many of the interviewees emphasized the use of informal knowledge sharing processes, which is in line with Ipe (2003) describing its dominant role within organizations. Further, the interviewees stated the importance of meeting face-to-face in order to share more detailed knowledge. This could indicate a tacit nature of the knowledge, since it is described as difficult to be shared within organizations through documents only (Gomes, Olivera and Chaves, 2018). Moreover, many of the interviewees almost questioned whether formal processes should be used in order to share knowledge within the project teams. This gives support to the research by Nelson (1991), who describes it as difficult to document and articulate all knowledge.

However, the result indicates difficulties in sharing knowledge *between* the project teams. Unlike the many positive experiences among the interviewees regarding informal processes within the project teams, many of them explained that they were missing formal processes of sharing knowledge between the teams. The interviewees expressed difficulties setting up a proper lesson learned processes for this purpose, which is in line with the findings by O´Dell and Hubert (2011), that many organizations find it difficult. Furthermore, the presence of tacit knowledge may also be a reason for the difficulties with the lessons learned process since it may require conversion of tacit to explicit knowledge, which according to Gomes, Olivera and Chaves (2018) is shown to be inefficient since some of the knowledge is often lost.

Furthermore, networks of relationships could be seen as one of the most significant informal processes to get access to knowledge. According to Fernie et al. (2003), informal relationships, characterized by strong ties, enhance the amount of tacit knowledge shared. Therefore, the use of networks within the organizations could be seen as a natural and essential process that

supports the sharing of tacit knowledge which otherwise could be difficult through only formal processes. Moreover, the result supports the previous findings by Reagans and McEvily (2003) showing that strong ties could increase the motivation to share knowledge as well as the research by Kucharska and Kowalczyk (2016) which emphasizes the role of trust. However, one interesting finding, which differs from the previous literature by Armbrecht et al. (2001), is that knowledge was not indicated to be seen as a tool for power among individuals.

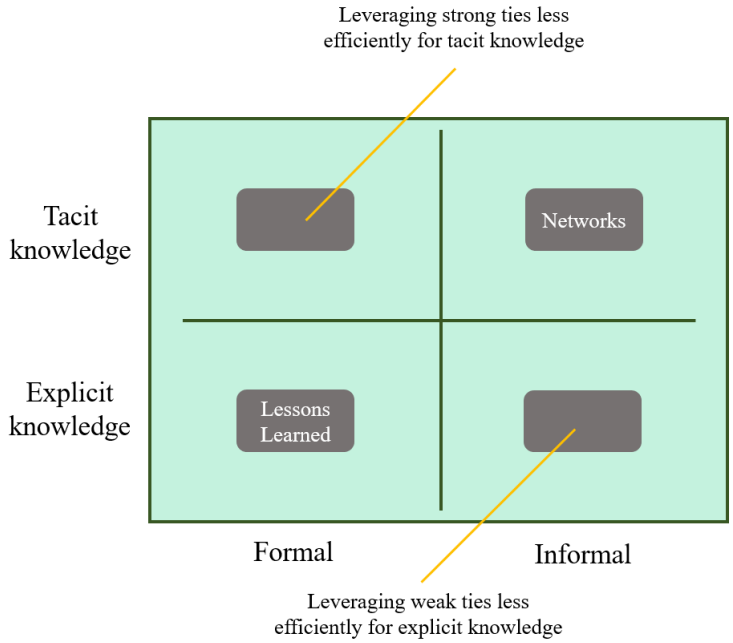

Figure 3: *Illustration of the relationship between the type of knowledge, the level of formality and the processes for knowledge sharing.*

To summarize, the relationships between formal and informal knowledge sharing, tacit and explicit knowledge as well as strong and weak ties could be illustrated in Figure 3. Based on the result, it can be reasoned that the organization has its strength within the upper right corner: Informal processes, where primarily tacit knowledge is shared between individuals, is characterized by networks and relationships. However, as the organization continues to grow there are indications that they must increase their focus on formal processes, such as lessons learned, in order to support the sharing of knowledge between the project teams.

5.2 Barriers and enablers

The second research question that this study aims to answer concerns the barriers and enablers for knowledge sharing: *What are the influencing barriers and enablers for knowledge sharing in and between the project teams?* This sub-chapter's purpose is therefore to clarify what the actual barriers and enablers are by comparing the overlap of the barriers and enablers found in the results (see Table 3) and the barriers and enablers found in the literature (see Table 1). Furthermore, as explained in chapter 2.2.5, the barriers and enablers are often interacting with each other, finding a balance between inhibitors and accelerators. At first glance, there seems to be a preponderance of barriers when overviewing the result from the data analysis in table 3, however this might be interpreted differently after the comparison with table 1 from the literature. What is interpreted as a barrier or enabler as an interviewee is likely to differ slightly from what researchers have agreed upon, emphasizing the importance differently.

Lack of time is the first barrier presented in table 3 and the only barrier expressed similarly in the results and the presented literature as an individual barrier. This barrier is most relevant when considering the formal process of lessons learned. Interviewees often expressed a lack of time while talking about the lessons learned process, which Fuller (2011) also explained as one of the largest barriers for lessons learned. However, it could also help to explain the reliance on informal knowledge sharing for the project teams, where informal encounters are often more flexible and therefore easier to fit into a tight schedule. Further, one can question if the lack of time also affects the prioritization and incentives surrounding knowledge sharing. Individuals are likely to refrain from knowledge sharing if they have low personal motivation (Stenmark, 2000), which could be caused by a lack of time.

Interestingly, lack of time could also be interpreted to affect the second barrier presented in table 3, concerning perceived relevance. There is a fear of wasting others' precious time by not knowing what knowledge they already possess, in part due to the organizational barrier of an improper organizational structure (see Table 1). Cross-functional teams and a matrix organization are in many situations considered to create more opportunities for knowledge sharing (Wang and Noe, 2010). This occurs because the different functions are mixed, creating communication channels between the different teams. However, the results indicate that this organizational structure of cross-functionality has limited positive influences over the knowledge sharing between teams. In this case, it also works as a barrier by not being efficient enough, sharing knowledge not relevant for all cross-functional team members and thus taking too much time. Therefore, the underlying cause for the perceived relevance barrier could be the lack of time itself. If there were enough time, employees might share knowledge even though others might already know it and the efficiency of sharing knowledge in cross-functional teams would perhaps be mitigated.

The lack of time barrier continues to have supposed influence over other barriers in table 3, such as lack of digital storage capabilities. The digital storage barrier could be divided into a lack of maintenance of integrated IT systems and that it is time consuming to build a database, where both are included in table 1. As time is of the essence for the customer project groups in particular and the organization in general, there might have been less focus on creating an upgraded and more organized database. Further, there is also an issue of maintenance of the current documentation of knowledge, thus making the navigation to find the knowledge needed time consuming. By being time consuming to build and maintain a good database for storing knowledge (Wang and Noe, 2010), a lack of time could once again be interpreted to be a cause of this barrier.

The third barrier in table 3 considering geography and decentralized structure could result in less extensive use of informal processes and face-to-face interactions. This barrier makes individuals in the teams rely more on digital communication tools to replace face-to-face interactions. However, there might be unrealistic expectations of users, where some individuals tend to share more knowledge when having a physical presence of other individuals (Wang and Noe, 2010). When individuals in the project teams prefer an informal approach, the digital communication channels therefore have less benefits for mitigating geographical barriers where it opens less opportunities for informal spaces for knowledge sharing. Nevertheless, digital communication channels still help to mitigate the lack of time because of its convenience (Cabrera and Cabrera, 2002).

The fourth barrier in table 3 concerning the perception of uniqueness of projects divides into two internal barriers of differences in experience and low awareness of the benefits of knowledge sharing. There should be some knowledge in one project that can be beneficial for another project. However, as the projects are slightly different, due to customers having different requirements, there might be a perception that the experience gained from the different projects are too different to share to another team. The difference in experience potentially makes the project teams unaware of the benefits of sharing knowledge between the teams.

Moving on to the enablers presented in table 3, the first enabler of having an open and transparent culture to sharing knowledge is quite comprehensive and can be interpreted as a theme of different enablers from table 1. The breakdown includes eight enablers from all three different categories: having a supportive culture, having informal settings that assimilate social exchanges, successful collaboration between team members, communication systems that support knowledge sharing purposes, motivation to share, access to help, enjoyment of helping others and a common identity of a group. In general, the enablers often rely on interactions and relationships between project members to induce knowledge sharing but also stress the importance of knowledge sharing. This could be the cause for the reliance on networking and informal interactions to share knowledge, where there are less enablers and more barriers for the formal processes like lessons learned.

When compared to the enablers found in the literature that is connected to an open culture, there are two enablers that are especially interesting and contradictory. The first of them regards having informal settings as a part of the open culture, as it was also a barrier for geography. This can be explained by the fact that physical locations create opportunities for informal meetings due to the open landscape and large common areas in the offices. However, there are no such informal interactions when individuals are spread across these physical locations and have to interact to share knowledge. The other enabler being interesting is the successful collaboration as a part of the open culture, which only includes collaboration within project team members and not between the project teams. There is a theme in the results where knowledge sharing in general is better within the teams compared to between teams, therefore the enabler only includes collaboration between team members.

The second enabler introduced in table 3 is high trust and thus includes internal relationship-based enablers. These are social ties, mutual trust and human social networks, which all correlate with the relationship driven knowledge sharing that occurs in the project teams and is a natural part of the Northvolt environment. Finally, the last enabler in table 3 concerning support of knowledge sharing by the senior management could be recognized as a part of the open and transparent culture, however it was often separated by interviewees and therefore interpreted as its own enabler in the results. The enabler can be broken down into the existence of inspiring leadership, attitude towards knowledge sharing and awareness, which differentiates itself by focusing on the importance of knowledge sharing.

6 Conclusion

This study aims to investigate how knowledge is shared between and within cross-functional project teams in a customer-centric and fast-growing organization. The study shows that Northvolt, as a case study, uses mainly informal processes in order to share knowledge in and between their project teams.

The knowledge sharing was also indicated to work more efficiently within the project teams, rather than between the teams. The lessons learned process, which could be seen as a tool for sharing knowledge between the project teams, was indicated to not fulfill all needs regarding knowledge sharing. Furthermore, barriers for sharing knowledge were identified as: lack of time, which was identified as one major barriers, geography and decentralized structure, lack of digital storage capabilities as well as perceptions regarding relevance and uniqueness.

However, in order for the project team members to get access to knowledge which could not be found within the project teams, social networks within the organization were shown to be of critical importance. The high degree of knowledge sharing through networks, based on strong ties, is in many ways suitable for sharing especially tacit knowledge. Relationships between individuals enhance the motivation to share knowledge and create trust which ensures the quality of the knowledge. Further, the use of networks was also enhanced by an open culture, encouraging individuals to contact each other. Knowledge was not seen as something belonging to certain individuals, it was encouraged to be shared.

6.1 Limitations and future research

The research is limited to a case study at Northvolt, which therefore only provides information on how knowledge is shared within the context of the company. Therefore, a recommendation for future research would be to investigate if similar characteristics could be found within other customer-centric and fast-growing organizations. More specifically, more research is needed to understand if the impact of interpersonal relationships and networks are more prominent characteristics within these organizations compared to more mature companies. Further research is also needed to understand if time, which was indicated to be a more critical barrier for knowledge sharing, could be found within other larger scale-ups or organizations in general.

Furthermore, most of the interviewees were the customer project managers from the project teams. Their point of view might differ from the other members within the project teams. Therefore, by including a higher variety of participants from the project teams, a more nuanced result might be obtained. In addition, the study is also restricted to the number of interviewees, which might limit the generalizability of the study.

The research is also restricted to the length of the time period when the study was conducted. Therefore, future research might also investigate the topic during a longer period of time to capture if there are any differences between the separate phases of the project. Moreover, some of the data from Northvolt might also become obsolete, due to the rapid change of the company.

To finalize, the study encourages future research within the area of knowledge management. As outlined throughout the thesis, knowledge is one of the most important resources for companies and organizations. And the ability to preserve, transfer and develop knowledge contributes significantly to if a company can reach long term success. If you want to move past the wheel, you cannot keep re-inventing it.

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Appendix A: Interview guide

The questions that formed the guide for the semi-structured interviews.

Introduction:

- Explain to the interviewee what the master-thesis is about and what the material from the interview is used for.
- Explain that the interviews are following GDPR regarding storing personal information.
- Tell the interviewee that the interview will be anonymous and that their identity will remain hidden in the final paper.
- Ask for permission to record the interview that will be used for transcription.
- Explain that the report will be sent to Northvolt before publishing it.

Starting Questions: get familiar with the interviewee's role

- How long have you worked for Northvolt?
- What is your role/position at the company?
- What project are you currently working on and how long have you worked with that particular customer?
- For how long has the project been running?
- What did you work with before Northvolt?

The phases of the project:

- In the beginning of a project (or a new phase of the project), how do you gather knowledge about how to conduct the project
    - Do you ask other individuals in other projects how they have done it?
- How do you finish a phase within a project - are there any reflections at the end?
    - How are these reflections processed and stored? Are they handed over to other projects? Are they implemented?
    - Are there any formal processes for these reflections?
- Are there any other continuous reflections done?
- Are any of these reflections useful according to you?
- How is the close collaboration with the customer affecting the reflections made?
    - Confidential knowledge?

Individual learning:

- How were you trained when starting your current position at Northvolt?
    - Were there different experiences at other companies that you worked for?
- When presented with a problem, what is the process you have to solve that problem?
- When presented with a problem, how do you find knowledge to solve that problem?
- Are there any specific individuals that you get in contact with to find useful knowledge?
    - Who are these individuals and what is their role and position?
    - Where and when are you talking to them?
- Are there any other alternative channels within the company to find knowledge?
- When you have learned something, do you further share these insights to others within and outside your team?
- (For the customer project managers) Do you as a CPM take responsibility that your team is learning?

Sorting for barriers and enablers:

- When is it hard to find the relevant knowledge you need?
- What do you see as possible barriers to share knowledge?
- In general, what are the major challenges for the company overall?
- Organizational context:
    - Is there enough time to share knowledge within or between customer project teams?
    - Are there appropriate processes and structures to share knowledge within and between teams?
    - Do you have the appropriate support from managers for knowledge sharing activities?
    - How is the digital working format affecting knowledge sharing and communication?
    - How do geographical distances affect knowledge sharing and communication?
- Team characteristics:
    - Are there particular individuals that you talk to get different sets of knowledge?
    - Are you often in contact with individuals outside your team?
    - Is your network at Northvolt important to find relevant knowledge?
    - Do you feel comfortable to share and ask for knowledge?
    - Are you close to the individuals in your team?
        - Do you feel that the closeness of relationships with others affect how prone you are to ask for and share knowledge?
- The culture within the organization:
    - Do you feel that the organization is encouraging knowledge sharing?
    - In general, is there an open culture for knowledge sharing?
        - Within the team?
        - Between teams?
- Individual characteristics:
    - Do you personally think that knowledge sharing is important for the organization?
    - Do you have previous experience of knowledge sharing within other organizations?
        - How do the experiences differ?
    - Do you feel motivated to share knowledge?
        - What is driving/not driving you to share?

Closing questions:

- What advice would you give the organization and managers to induce knowledge sharing and evolve the processes?
- Any questions that we might have missed that would have been good to ask?
- Do you have any colleagues in mind that would be good for us to interview?
- Is it ok to contact you again if we have additional questions?

DEPARTMENT OF TECHNOLOGY MANAGEMENT AND ECONOMICS
DIVISION OF ENTREPRENURESHIP AND STRATEGY
CHALMERS UNIVERSITY OF TECHNOLOGY
Gothenburg, Sweden
www.chalmers.se

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