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Intra-organizational knowledge sharing in the construction industry

A case study of knowledge sharing practices between supervisors in a major infrastructure project

Marcus Hernstig & Mona Zafar

MASTER'S THESIS ACEX30

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Department of Architecture and Civil Engineering
Division of Construction Management
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Gothenburg, Sweden 2021

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Abstract

For many years, several studies have been conducted about knowledge sharing (KS) in the construction sector, since it has been connected to a company's ability to stay successful in a competitive market. Construction companies has been seeking to improve their KS capabilities in order to increase operational efficiency and decrease construction costs. However, while there already exists great amounts of knowledge in the construction industry, the companies are unable take advantage of the shared knowledge.

This master's thesis has been made together with one of the largest construction company in Sweden, which was involved in a major infrastructure project. The aim of this master's thesis has been to investigate if there exists any KS practices between Supervisors in the various Area and Trade Blocks, what barriers and enablers there might have been for establishing KS practices, and finally propositions were made what the contracting company could do to more easily facilitate KS activities between Supervisors. An empirical study was conducted where Supervisors, Area Site managers, Trade Site managers, Trade Block managers and an Environmental coordinator were interviewed within the project. The interviews were performed in a semi-structured manner where questions were prepared beforehand. In addition, a literature review was carried out throughout the project which has provided relevant information about KS.

This report has provided insight into KS practices at a lower managerial level in a complex infrastructure project. Further, this master's thesis has suggested that KS practices is not prioritized in the construction sector, and neither in relation to this report. It was indicated that there is a lack of systematized way of sharing knowledge between Supervisors in the various blocks. The Supervisors mostly gain operational knowledge through verbal communication, over informal channels such as through meetings and personal interactions. Furthermore, the contracting company is lacking infrastructure within the organization which could capture shared knowledge between the Supervisors. Other barriers for KS between Supervisors are connected to a lack of time, a project-based environment, and an unclear responsibility area for enabling KS activities within the project.

However, the employees have a will to support as well as improve KS between Supervisor. Therefore, the case company have great potential to improve accessibility of KS between Supervisors through monthly meetings, workshops, digital weekly letters, electronic list of contact details, video conferences, job rotations and through physical site visits to a certain Area or Trade Block. The goal should be to create a learning environment within the organization in which the Supervisors can avoid repeat operational mistakes.

Keywords: Knowledge, Knowledge Sharing, Data, Information, Barriers and Enablers for Knowledge Sharing in the Construction industry, Communities of Practice, Communities of Practice in the Construction Industry, ICT, and Information and communication technology in the construction industry.

Acknowledgements

We would like to genuinely thank our supervisor, Associate Professor Martine Buser at Chalmers University of Technology, who has supported us during the writing process of this thesis and provided us with valuable insights. Furthermore, we would also like to thank our supervisor at the case company, who has given us support and guidance and contributed useful contacts within the company. Further, thank you to the case company who made this thesis possible to conduct.

We would also like to thank our families and other loved ones.

Marcus: Thank you to Marita, Mats, and Sofie for helping and supporting me during my years of study at Chalmers University of Technology. In addition, a special thank you to Valeria, who has always been there for me and contributed with motivation over the years.

Mona: A big heartfelt thank you to my parents Farigull and Arif who has been there through thick and thin. I am forever grateful for your support and love.

Marcus Hernstig & Mona Zafar, Gothenburg, June 2021



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1

Introduction

This chapter will describe the background to this study and clarify the purpose with the report. The underlying issues that form the basis of this case study will also be presented.

1.1 Background

For the longest time the Swedish construction industry has been criticised for its inefficiency and inability to stay successful in a competitive market. As a result of this, construction costs have continuously increased (SCB, 2021). The inefficiency within the construction industry has previously been highlighted by the Swedish building commission, which in 2002 issued a report under the name “Skärpning gubbar!” (“Man up!”) (Bygghögskolekommisionen, 2002). In this report it is stated that one of the reasons for the increasing construction cost is due to that available knowledge is not utilized in the construction sector.

In 2009, the report was followed up by another publication, “Sega gubbar?” (“Slow men?”) which pointed out that despite the suggested improvement measures made after the first publication, almost no change had transpired in the construction industry (Statskontoret, 2009). In fact, the disclosed number of construction defects had instead increased. The increase of construction costs was once more coupled with lack of knowledge sharing in connectivity to a stressful work environment, and untested construction operations.

Despite the above findings, companies in the construction industries are still shown to have become more knowledge-intensive (Levin et al., 2002). These companies have come to realize the connectivity between intellectual capital and a company’s long-term success (Kotnour, 1999), which has further motivated them to take on different strategies to be able to manage employees’ knowledge (Davenport and Prusak, 1998). As an example, Hansen et al. (1999) has distinguished between two different strategies for sharing knowledge in organisations: codification and personification. While codification is focused on the implementation of technical solutions such as IT-systems and databases, personification is, however, rather focused on personal networks. While there is no doubt that technical tools have continuously found a strong establishment in the construction sector, personal networks may be what people often think about in relation to construction projects.

The social aspect permeates the construction industry, since knowledge that is created in construction projects are strongly connected to the individual (SBUF, 2006). Individuals are often organized into projects in which they come together for a limited time to produce an output (Berggren, 2001; Svensson & von Otter, 2001). Project members can work on multiple projects at the same time and their work performance is highly connected to both a dynamic context and independence (Newell et al., 2009). Further, they are exposed to a lack of commitment, unclear working methods, and a high degree of workload (Sörqvist, 2004; Josephson, 2013). There is also the issue with tight time margins, which gives little room for project reflection (Sällström & Härngren, 2009). This means that often wrongly executed site operations or other types of conflicts are temporarily relieved, instead of when the root cause could have been managed. All this in combination with the construction projects' temporary nature makes the individual knowledge fragmented and volatile (Björkgren, 1999; Bygghögskolekommisionen, 2002). Construction members may feel that it is impossible to obtain an overview of who is producing the knowledge, where it is produced, and how it is later published and distributed (Bygghögskolekommisionen, 2002). This results in a difficulty to share knowledge with other project members, since after the project is dissolved, there are often no structures or routines for KS facilitation (Björkegren, 1999). Josephson and Saukkoriipi (2009), and Hansson and Pemsel (2011) also mentions this, and further states that there is no clear system for managing and utilizing knowledge and experience. It is suggested that instead of relieving temporary problems, they should instead be prevented in order to establish successful work procedures in the long term (Sällström & Härngren, 2009).

One major benefit in managing knowledge and experience in the construction industry is the ability to reduce the risk of repeated project execution and further project errors, which is often due to shortcomings in the communication between the different project members (Sällström & Härngren, 2009). If the reinvention of the wheel can be avoided, there are great chances in saving both time and money. However, for this to be accomplished, this entails systematic development in the project organisation that may otherwise inhibit knowledge management. According to Magnusson et al. (2011) a good basis for effective KS is to start from the project members and proceed from there. The notion is that committed project members will facilitate KS, since it is them who will carry out the work. Further, a culture must be developed in which commitment and motivation between project members is promoted, and the management must clarify the division of responsibilities regarding KS. When it comes to using knowledge in construction projects, having information stored in a database isn't enough; it needs to be search-able, organized, and have a relation to how it will be shared and used.

In regards to this report, a case study was performed during the spring of year 2021. The client is a government agency, and the contracting company is one of the largest construction companies in Sweden. The project is a SEK multi-billion infrastructure project located in Sweden. It consists of several Area and Trade Blocks with various geographical locations. The Trade Blocks can be described as functions that perform specialized construction activities, working across geographical project

boundaries. The activities can be anything from foundation works to installation works. However, the various Area Blocks are confined to a particular geographical area, and may not be perceived to perform as specific construction undertakings as the Trade Blocks.

The case study takes place in three of the Area Blocks, but also examines knowledge practices for Supervisors in two of the Trade Blocks. With Area B as a reference point the distance to Area A is around a few hundred meters, and to Area C the distance is a few kilometers. Various Subcontractors operate at the respective area sites and the amount of people involved can vary significantly depending on the phase of the project. There are a lot of nationalities involved in the project both on an operational level and a managerial level.

Hereafter, the context of the project and the Supervisors work setting, and tasks will be described in more detail.

The Area Blocks and the Trade Blocks task force mainly consist of construction workers, subcontractors, Supervisors, Site managers, Block Managers, and a Production Manager. Hierarchically, the division of responsibilities is such that the Production Manager has the overall responsibility for the project, while the Block Managers are in charge of either a specific Area or Trade Block. Further, the Area Site Manager works for the Block Manager and usually manages a team of Supervisors. In turn, the Supervisors are often in charge of managing a group of construction workers on-site and oversee the work.

An Area Block Manager's role may include multiple assignments such as resource planning, controlling deliverable towards the client, forecasting, managing invoices and project economy, arranging the project schedule, identification of stakeholders, and so on. Overall, the Area Block Managers make sure that they are on-top of what should be done in the project and try to plan for future uncertainties.

Similar to the Area Block Managers responsibility, the Area Site Manager also has a quite varied portfolio of tasks connected to their role. Some examples are coordination of materials, planning for logistics activities, find appropriate subcontractors and perform work preparation together with the subcontractors. Further, they also manage time-scheduling and sequencing, work performed by the Project Engineer, problem-solving, project cost-controlling, prepare work estimations, make sure that it exists up to date drawings, coordinate and communicate with other teams and stakeholders on-site, distribute and assign duties to the Supervisors, delegate administrative work, etc. In addition, the Area Site Manager also tries to ensure that the overall operations on-site flows as intended.

Therefore, one of the main differences between an Area Block Manager and an Area Site Manager is that the former has a more overall responsibility of the project, while the Area Site Manager seems to focus more on operational aspects that relates to the endeavours on-site.

The Supervisors were asked to describe a typical working day. Even though they operate in different settings there are many similarities in terms of their work activities. Often, the day starts with a morning briefing or a general meeting, where the Supervisors give instructions to the construction workers and hold discussions with the machinists, truck drivers etc, about upcoming tasks of the day, deliveries and possible risks. After this, the Supervisors usually go through emails, write down what was said during the daily briefing, go out to the site and overlook the site operations, or have continuous contact with the construction workers if they have any questions about deliveries or issues that may occur. Depending on the Area Block, there might be some variations. For example, in Area Block C, the Supervisor expressed that they sometimes have a Block Area meeting where all the officials participate, in order to coordinate between the different stakeholders on-site, as well as to have the opportunity to distribute information that may be important to everyone involved. However, in general it follows that the Supervisors takes care of the daily coordination on-site and that the work is carried out according to the project plan.

At the end of the day, the Supervisor writes an electronic diary and documents what has been done during the day and by whom, both in writing and with pictures. The pictures are usually attached with a more detailed description of a certain task included in the schedule. The main reason for this is to have documentation for the client regarding what has been performed, but it also acts as a base for the company if there would be a need to review some particular event in retrospect.

Now that material has been presented regarding what a Supervisor does and their area of responsibility, the aim of this report will be introduced.

This essay is based on that it was said to the authors by the case company that there were no KS practices between the Supervisors in the different Areas and Trade Blocks. The given statement therefore led to the following research questions.

Q1: Is there a need for KS between the Supervisors in the different Area and Trade Blocks?

Q2: Are there any KS practices between supervisors in the different Area and Trade Blocks? And if so, which topics?

Q3: Is there any KS between Supervisors today?

Q4: What could the barriers and enablers be for KS between the Supervisors?

Q5: What measures could be taken by the contractor to facilitate KS practices between the Supervisors?

2

Theory

In the following sections, theory will be presented regarding what knowledge is and the differences between data, information, knowledge, and experience. Further, it will be described what tacit and explicit knowledge entails. The nature of a project-based industry will be explained and how it differs from other types of organizations. It will be accounted for what KS is and the potential organizational benefits when knowledge is shared. Some barriers and enablers for KS will be presented. Further, an explanation will be given regarding how knowledge is shared in the construction industry through networking, communities of practice, and information and communication technology.

2.1 What is Knowledge?

This chapter will describe what data, information, knowledge, and experience is and the differences between the concepts. Further, it will be explained what tacit and explicit knowledge is.

2.1.1 Data, information and Knowledge

This section will describe what data, information, knowledge, and experience are and the differences between them.

It is important to distinguish between these notions from an organizational standpoint (Davenport & Prusak, 1998). Since companies often confuse these concepts, and many times invest unnecessary expenses on technology initiatives that often fail to deliver what is promised. Success and failure may lie in understanding what the organization needs in terms of these three constructs. Therefore, the difference between these concepts is described below.

Data

North and Kumta (2018) explains the relationship between symbols, syntax, and data. Numbers, or signs are symbols used for communication. To interpret these symbols and provide an understanding of them, there is a need for a specific set of rules which explains how these symbols can be combined, and these rules are called syntax. When symbols and syntax are put together, it forms data. If numbers such as 3,4,5 are joined, and a Celsius sign is added (34,5 °C), the symbols have been converted into data.

Data is often described as as a set of discrete, objective facts about events (Davenport & Prusak, 1998; Bhatt, 2001). Davenport and Prusak (1998) claims that for organizations, so is data mostly organized logs of transactions. For example, suppose a customer purchases gasoline at a gas station. In that case, the transaction provides data about the cost, quantity, and so on. Still, it does not offer insight into why the customer chose that particular service station or how likely it is that the customer is coming back. That is, it says very little, or nothing, about the financial performance of the service station. Moreover, data is needed for all organizations, and massive amounts of data are often stored in different technology systems. However, the storage of vast amounts of data can lead to a false impression of scientific precision. Data alone does not offer any more profound insight, and excessive data gathering will make it more difficult to identify what data is essential to the organization. Still, data is vital for firms because it is the raw material to produce information.

Information

It is not until the data is given a precise meaning in which it can be fully understood (North & Kumta, 2018; Davenport & Prusak, 1998). In the earlier mentioned example with the degrees, there is a need to specify the associated situation, for instance, if the degrees refer to air temperature, water temperature, or similar, to provide an understanding of a particular message (North & Kumta, 2018).

Further, Bhatt (2001) states that data, information, and knowledge are relative notions, namely, what is considered information for a sender of information may not necessarily be information for a receiver, and may be discarded as data by the latter. Davenport and Prusak (1998) argues that information is sent like a message and that it is meant to alter the perception of how the receiver views things, but that it is ultimately the recipient of the message that decides what information is. Something that is significant to the sender of the message may merely be noise at the receiving end.

Knowledge

Unlike data and information, knowledge is more closely related to action (North & Kumta, 2018; Davenport & Prusak, 1998). North and Kumta (2018) explains that knowledge can be split up into different levels, “*know what*” and “*know-how*”. “*Know what*” refers to incorporating information within oneself, while “*know-how*” relates to how that information can be applied in a particular context. In an organizational context, “*know what*” only produces value if it can be transformed into “*know-how*”. Bhatt (2001) says that knowledge is a combination of data, with specific procedures, rules, and operations which are based on experience and practice. Meaning is also an essential element in the knowledge concept because it is only through meaning which information transforms into knowledge. Therefore, knowledge is even more context-related than data and information.

Experience

Davenport and Prusak (1998) defines experience as something that an individual has done and has happened to that person in the past. Experience gives a historical standpoint that can be used to comprehend new circumstances and occurrences. New knowledge can be developed through experience because it allows an individual to make connections between past events and present ones. Bhatt (2001) mentions that prior knowledge increases the learning intensity and that new concepts can be learned faster and with smaller efforts.

2.1.2 Tacit and Explicit Knowledge

Primarily, two types of knowledge are spoken about in knowledge management (KM): tacit and explicit knowledge. Often, the knowledge resources of an organization are portrayed as an iceberg (Haldin-Herrgard, 2000). The top of the iceberg consists of the knowledge that is visible, explicit knowledge. However, underneath the surface, most of the knowledge exist, in other words, tacit knowledge. This form is not easily visible or straightforward to express in explicit form, making it difficult to diffuse and share in an organization. Tacit knowledge is essential because it is in its essence "*know-how*" and is needed to put "*know-what*" into action. Tacit and explicit knowledge will be further presented in the following paragraphs.

Polanyi stated "*We can know more than we can tell.*" (Polanyi, 2009, p.4). Polanyi was a philosopher, and he advocated the idea that knowledge is not always simple to formalize and verbalize; this type of knowledge is called tacit knowledge (Polanyi, 2009). Although tacit knowledge is difficult to express through words and sentences, it is no less essential for that reason. On the contrary, tacit knowledge is said to be a central part of the human understanding of the world. Polanyi displayed the difficulties with tacit knowledge through an example by pointing out that humans can recognize a face but cannot explain the traits that generated the recognition.

According to Nonaka and Takeuchi (2007), tacit knowledge is fundamentally connected to action. It is usually context-related—often described as an individual's informal skill, which is hard to grasp and capture through just observation by another person. Tacit knowledge can be problematic to express because it is often made up of mental models, beliefs, and perspectives, so deep-rooted in the individual that possesses the understanding that it is taken for granted. Dissimilar from tacit knowledge, there is explicit knowledge. What distinguishes explicit from tacit knowledge is that it is a form of knowledge that is organized and formal and can easily be shared and communicated. Some examples of explicit knowledge are product specifications, scientific formulas, and computer programs.

2.2 A Project-Based Industry

Going further, in this section the characteristics of a construction organization and its associated project environment will be described.

The construction industry is described as a project-based industry since different stakeholders come together to produce an end product such as a building or larger infrastructure project (Kamara et al., 2002). A client makes a request for deliverable that is designed and produced, and finally handed over to a client. According to the Bresnen et al. (2004), general project-based organizations have similar conditions and problems as project organizations in the construction industry, such as that the projects are temporary and they are either complex or standardized. However Engwall (2003) states that, construction projects are characterized by having varying scope, sizes, and levels of uncertainty, and every project is performed unlike another. Further, Bresnen et al. (2003), because each project is different, the flow of materials, personnel, and information have discontinuities. Consequently, it is difficult to create stable routines in the project. Moreover, the construction industry is characterized by fragmentation. All branches in a project have their language and knowledge base, creating added difficulties for sharing knowledge than in other sectors. Bearing in mind that a construction project can be a somewhat encapsulated environment, where almost all communication and interaction are embedded in many inter-organizational and inter-professional links, which of course builds a complex system of networks (Bresnen et al., 2004). Further, due to the complexity, values, and norms, as well as divergent professional and organizational interests are likely to be conflicting. This also adds to the intricacy of the diffusion of knowledge because the dispersion depends on close working relationships in project teams.

2.3 Knowledge Sharing

Under this section, knowledge sharing (KS) will be explained and defined. Further, it will also be described why organizations benefit from sharing knowledge.

KS is essential to gain a competitive edge and keep a dominant position over time (Javernick-Will, 2012). The actors in the construction industry know that they must share knowledge, disseminate practices, act quickly to fulfill their customers' needs, and diminish work load. Hickins (2000) states that KS contributes to faster learning processes and innovative ideas. If an organization learns faster than its competitors, it will put them in an advantageous position in the market. According to Javernick-Will (2012), many construction companies are therefore now implementing systems and initiatives to help them share and combine knowledge. Davenport and Prusak (1998) mention that leveraging knowledge provides a sustainable advantage because it generates ever-increasing earnings for a company. Moreover, material assets differ from knowledge assets in that knowledge assets expand with use, while material assets decrease when used. When knowledge is used and shared, it still stays with the source, increasing the knowledge repository of the recipient. Hendricks (1999) explains a need for at least two parties, a source, and a receiver, for KS to occur. The source can, among others, communicate their knowledge either verbally or written, and the receiver will then interpret the message and try to make sense of it.

From an organizational standpoint, KS is not only about the actual transferal of knowledge between individuals. Hickins (2000) mentions that KS is also about ac-

quiring the tacit knowledge that resides within individuals. He goes on to say that only two percent of organizational information is written down and captured. The rest of the information remains in the minds of the organization members. By capturing tacit knowledge and sharing it through an organization, there is a possibility of gaining faster problem-solving skills, time and cost savings, and customer loyalty.

2.3.1 Barriers and Enablers for Knowledge Sharing

According to MacNeil (2003) there are several barriers that impede learning in the workplace, which in turn are hindrances for communication and sharing of tacit knowledge within an organization. Therefore in this subsection, various barriers and enablers for KS are identified.

Organizational structure effects - According to Bresnen et al. (2003), there must exist a person within the company that has a responsibility of taking care of knowledge mechanisms within an organization, and there should be an established area of responsibility so that there are no ambiguities in what can be expected in terms of workload by the employee. Otherwise, there may occur hindrances for KS in the organization. An employee responsible for knowledge mechanisms must also have some form of line authority over the members who are supposed to provide information. If not, there may be few incentives to provide this employee with information. If authority is lacking, one must rely on the fact that the person holding the role is proactive and persuading organization members to share information.

Culture context and the climate for change – An obstacle for KS is if there is no drive to enable its activities and that there is no support from the management regarding such an initiative. There is a need for somebody to drive a change process and to introduce and develop change to an organization (Bresnen et al., 2003). Further, there must be continuous support from a company regarding a change. Moreover, the initiators should be aware that resistance from organizational members can occur in the early stages of a change initiative.

This view is partially aligned with Kotter's (1995) idea that a significant mistake in a change initiative is not to create a sufficiently strong guiding coalition. In successful cases, the group's membership composition consists of employees with influential positions in the company. It can be power in the form of title, information, and knowledge, influence, or relationship. The group also often consists of individuals who are not part of the senior management. Therefore the group often acts outside the typical corporate hierarchy since the executive order can be considered an obstacle to change. Companies that fail to create a guiding coalition will many times fall short regarding accomplishing change. It can be due to many factors, but such companies may lack a history of high-level collaboration and therefore underestimate the difficulty of implementing a change initiative. Strong leadership is a trait that is needed to implement a change initiative. Otherwise, a change program will be challenging to push through.

Carrillo et al. (2004) further discuss that organizational culture can be a key barrier for KM and KS. They are describing a corporate culture in terms of vertical silos. Various business units are working in isolation with small amounts of communication between them. There is often an issue with that the organization is unwilling to recognize that it exists a problem with its culture. Culture is said to be a top-down issue that cannot be changed quickly. There should be a focus on changing the organizational culture, so it promotes KS and communication. A company did this by realizing something they called a safety culture, where KS was an essential factor to fulfill the objective regarding the implementation of the new culture.

Skills and capabilities – Bresnen et al. (2003) further discuss that new KM initiative's success depends on the people in charge and their interest and ability to develop social contacts and informal networks. Informal power is discussed by Batilana and Casciaro (2013), who mentions two types of hierarchies within an organization: the formal and the informal hierarchy. Even if a highly ranked individual wants to implement a change, it can meet resistance if there is no high status within the informal network. A person with a high status in the informal network does not necessarily have to be at the top of the organizational hierarchy. On the contrary, it can be the one at the bottom of the order which has considerable informal power. Successful change agents, therefore, often have a central position within the informal network. These change agents often have many casual contacts who can provide access to information, knowledge, opportunities, and support and gather and mobilize people within the organization.

Communication, networks and information flows – Not establishing a network of knowledge officers (individuals that take care of an organizations knowledge mechanisms), with their own web of contacts in different parts of the organization is perceived to be a hindrance for KS (Bresnen et al., 2003). Enabling a network of knowledge officers may help provide sources of information, knowledge, and support, which can benefit the diffusion of knowledge throughout an organization. Regular and formal communication between change agents is critical. Further, establishing such a network may be even more critical when construction projects have several sites with various geographical locations. Since the knowledge diffusion then relies on social networks to disseminate knowledge. Other restrictions for knowledge distribution may be contractual constraints and inability to learn from post-project reviews.

Low degree of formalization - One issue that seem to stand in the way for KS is that construction companies do not prioritize the formalization and codification of operational knowledge (Styhre et al., 2004). Blueprints seem to be the most formalized documents that the construction industry has, and these have the objective to capture all necessary information as possible. This results in a low degree of formalization and learning processes become more self-organized and difficult to manage from an organizational point of view. Styhre and Gluch (2010) mentions that when knowledge is shared from a source to a recipient, it is unlikely that knowledge is made explicit in the form of documents or media. Therefore, most knowledge is

embedded in individuals or organizational communities. This is connected to what Styhre (2009a, 2009b) describes as the “oral culture” approach. This means that a substantial part of the knowledge is shared and transferred through verbal communication rather than through written documents. For example, the on-site construction workers are described to learn through either watching other workers that are more experienced than them, they try to do things themselves through experiential knowledge, or they are directly instructed to do a task (Styhre, 2009a).

Stability - Chinowsky and Carrillo (2007) mentions that the nature of construction projects creates an underlying issue with an unstable workforce. Employees are leaving organizations due to that they prefer other projects. For certain organizations the perception then becomes that it is difficult to justify KM initiatives, and in turn enable KS practices.

Time - Lack of time for KS seems to be a prevalent issue in the construction sector. Carrillo et al. (2004) mention that even if employees are willing to share knowledge, the tight project schedule does not allow for a KS culture. Often organizational members are under high pressure to deliver results during a minimal time frame. The tight schedule also affects the deficiency of post-project reviews and, in turn, lessons learned. Further, Styhre et al. (2004) found in a study of a Swedish construction company that tried to make use of meetings as an activity for sharing knowledge at the end of each project. Even if these meetings were utilized, the organizational members sometimes did not have time or energy to participate in these meetings. And even if the meetings did occur, issues related to real project issues were not dealt with properly, mainly since people do not have the energy to put in the effort needed to solve the problems at hand.

Resources and incentives – Another issue for KS is that there must be enough resources allocated to KM initiatives. Carrillo et al. (2004) states the importance of having a person or group that is responsible for implementing a KM strategy. Resources must be allocated for KM initiatives and there must be incentives for sharing knowledge. Most organizations do not have reward schemes for KS. A reward scheme may be important since it can promote employees to contribute to KM. However, there is difficulties with these since they are often based on performance which in the construction industry depends on teamwork, and therefore it will be difficult to distinguish between team efforts and individual contributions regarding KS.

Lack of Standard Work Processes - Carrillo et al. (2004) also mentions that deficiencies in standardized work processes impedes KM and sequentially KS. Mainly due to that there is often different operating procedures in an organization. There may be a necessity to streamline company processes, and procedures could be adopted by the manufacturing industry in order improve the mentioned issue.

Further, Fong and Chu (2006) gave some examples of enablers that contracting companies can utilize to promote KS in their organization.

2. Theory

It is suggested by Fong and Chu (2006) that for contracting companies to improve KS practices various activities should be deployed. The use of ICT, mentoring programs, coaching, or apprenticeship programs are beneficial methods and tools for KS. Other valuable methods can be to use staff rotation between project teams, or to create communities of practice (CoPs). The organization may create roles in the organization in form of a knowledge officer and allocate a certain budget to plan and organize KS activities, but also for change initiatives and to motivate the employees regarding KS.

To promote a KS culture in the organization it is important to continuously encourage KS practices among the employees (Fong & Chu, 2006). This can be done through staff rotation programs, employ people who actively reinforces KS in the organization. Employees must be aware about the positive effects of KS, and that understand that continuous participation in KS activities will generate good result to the company.

Barriers
Organizational structure effects ^[9]
Culture context and climate for change ^{[9][32][14]}
Skills and capabilities ^[9]
Communication, networks and information flow ^[9]
Low degree of formalization ^{[49][48][50][51]}
Stability ^[15]
Lack of time ^{[14][49]}
Resources and incentives ^[14]
Lack of standard work processes ^[14]

Figure 2.1: Identification of Barriers

Enablers
Hire staff that promotes and takes care of knowledge mechanisms, and create clear area of responsibility and line authority for these employees. ^{[19][9]}
Create a strong guiding coalition and leadership to drive a KM initiative forward ^{[32][9]}
Promote KS in the organization, display the benefits of KS and develop incentives for KS. ^{[14][19]}
Have one or several knowledge officers with central positions in the informal network. ^{[9][19]}
Establish a network of knowledge officers that can help to bridge geographical gaps. ^[9]
Streamline work processes ^[14]
Mentoring programs ^[19]
ICT ^[19]
Coaching ^[19]
Staff rotation ^[19]
CoPs ^[19]
Allocate a budget for KS activities ^{[19][14]}

Figure 2.2: Identification of Enablers

2.4 How Knowledge is Shared in The Construction Industry

Knowledge is said to be shared via social networks, often in the form of Communities of Practice (CoPs). Further, information and communication technology tools and best practice are useful methods to diffuse knowledge in an organization. All of these concepts will be presented in this section.

2.4.1 Networking

Networking is essential in construction to obtain information and knowledge and overcome barrier effects that may prevent organizational members and teams from understanding one's viewpoint (Anumba et al., 2005). Networks enable improved task performance since they can retrieve more information and knowledge than what one organizational member can do. When individuals in a network have worked with each other for a period, they often develop shared mental models regarding tasks, routines, a collective mental model of the team, and an understanding of the group participants. People in the network generate joint problem-solving know-how and create awareness regarding each other's capabilities. Since the network members have a history of interaction with each other, it reduces the need for small talk, which allows for more relevant communication and quicker problem-solving.

2.4.2 Communities of Practice

Anumba et al., (2005) discusses that networks can be built in form of Communities of Practice (CoPs).

In the construction industry, communities of practice have become an important topic. They are viewed as an excellent source for competitive advantage (Elmualim & Govender, 2008) and a suitable tool for KM (Bishop et al., 2008). The reason for this is because the communities of practice provide the opportunity to combine both tacit and explicit knowledge. It goes hand in hand with KS and competence creation. It also works in organizational learning regarding how construction companies can learn by sharing knowledge (Elmualim & Govender, 2008). Grisham & Walker (2006) have identified that organizations in the construction industry have seen benefits from maintaining a learning environment within a company where knowledge can be shared, created, and invented. Wenger (2011) mentions that through communities of practice, the organization can foster a learning environment in an effective way where knowledge becomes part of the company and integrated in the company's culture. More so, it adopts a place where knowledge fosters value for the company.

Wenger (2011) describes communities of practice as a social system where learning can be located in the relationship between the person and the world, and quotes:

"Communities of practice are groups of people who share a concern or a passion for something they do and learn how to do it better if they interact regularly." (Wenger,

2011, p.1)

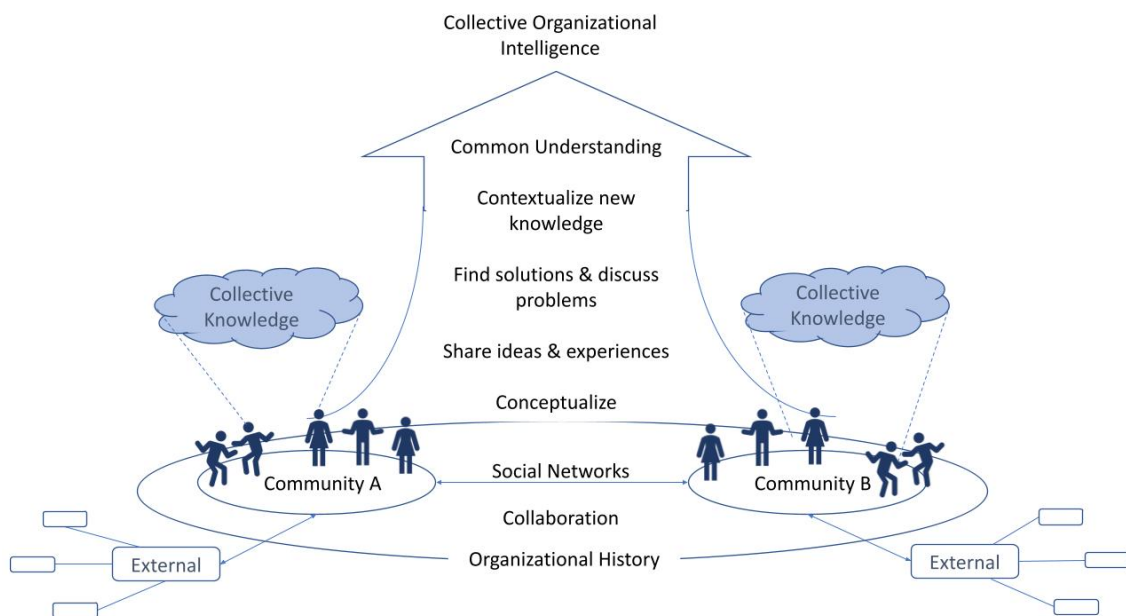
Further, the main drivers for why organizational members are said to want to take part in CoPs are according to (Koskela et al., 2009).

"The need to find answers to questions and get help and guidance from peers (i.e. active and collective learning)" (Koskela et al., 2009, p.443).

Further, Koskela et al. (2009) mentions that employees want to be part of an organizational culture that motivates participation i CoPs, supports active learning, and disapproves of repeated mistakes.

Koskela et al. (2009) illustrated how CoPs add to organizational intelligence, view Figure 2.1. They gave an example of a bridge engineering team that was supposed to design a bridge in a seismic area. But, they lacked competencies regarding how to design and construct in a seismic zone. The engineering team was referred to as community one, and they reached out to a group of geophysicists and seismologists to gain knowledge through discussion and collaboration. Community two (the group of geophysicists and seismologists) could help community one with their issue and link them to their external networks of experts. Jointly they shared knowledge, debated challenges and risks, and established strategies to combat potential dangers. Through accumulation and contextualization of knowledge, they managed to develop a shared understanding of the problem that would form the basis for new and similar projects in the future.

Figure 2.3: How CoPs contribute to organizational intelligence. The authors' own creation based on (Koskela et al., 2009, p.437).



Moreover, Koskela et al. (2009) suggested that even though communities of practice is a common concept in most organizations, it might be difficult to identify its existence or what they entail. It could even be common to ignore and take communities of practice for granted. The reason for this view could be because communities of practices are often called different names depending on the organizations. For the construction industry, communities of practice generally exists at a latent level but is often not made visible. There is also the issue of establishing time to participate in communities of practice (Grisham & Walker, 2006). Usually, participation takes place within the company hours or privately outside the working hours.

Moreover, there is a challenge regarding motivating individuals to participate in communities of practice (Koskela et al, 2009). Further, they mention that it is essential to create an environment that aligns an individual's purpose with the objective of a CoP. It is necessary to create an environment that aligns an individual's purpose with the objective of a CoP. Removing obstacles that hinder active participation is a factor in succeeding with the cultivation of CoPs. Grisham and Walker (2006) suggest a similar view, in which the organisation must provide space for motivation in the project where communities of practice can be driven through reward systems, that can either be intangible or tangible. Moreover, Koskela et al, (2009) suggest that the management in an organization must be clear in promoting and supporting an environment for KS and communities of practice, which they can do by promoting a culture in which the collective group is motivated, rather than focusing on individual-based rewards. It is also mentioned that the contextual factors are important to keep in mind since there are no universal solution that fits all organizations.

2.4.3 Information and Communication Technology

In this subsection information and communication technology is presented and how it can be used to facilitate for KS in an construction organization.

The construction team can be supported though IT-systems which helps to “capture, codify and reuse knowledge”, or it could be used to recover explicit knowledge that is related to a project from different construction documents (Kamara et al, 2002). Carrilo et al. (2000) states similar findings, in which the implementation of IT-systems gives the opportunity to both contribute and have access to “lessons learned”. An example of this lesson learned approach is through post-project review where the firm analyses the project performance and pinpoint issues (Kamara et al, 2002). Styhre (2009a) agrees with the aforementioned observation, in which construction firms have realized the benefits of project evaluation, both systematically and post-project. If previous experiences and knowledge can be disseminated and be used by other members of the organization, the members who need the knowledge do not have to waste time solving problems several times (Ahmad & An, 2008).

Moreover, Davenport and Prusak (1998) states that KM opportunities have been discovered thanks to reduced costs of computers and networks, which can create an

infrastructure for knowledge exchange. Further, they explain that it is not the computer power itself that enables this infrastructure; rather, it is the communication and storage resources and connectivity between the computers that help exchange knowledge. Chinowsky and Carrillo (2007) further states that information systems are essential to provide the organizational members with the right infrastructure so they can gain access to and share knowledge. Similar statements are made by Fong and Chu (2006) that mentions that building an infrastructure is important to capture explicit knowledge. A system which can connect employees and can create a possibility for them to document what is shared between them and retrieve relevant project files. An IT-system should be built so it fits the organizational context to promote KS and transform individual knowledge to organizational knowledge. It is essential that knowledge repositories in the system are easily available, comprehensible, and retrievable.

Moreover, Danvenport and Prusak (1998) mentions that common communication and storage means are; e-mail, intranets, networks, the internet, videoconferencing, and multimedia computing. These instruments can indicate where knowledge exist in the organization and help to connect individuals in the need to share knowledge, despite that it may exist a boundary of a physical distance between the source and the recipient.

In a study made of ICT-systems in a large Swedish construction organization it was found that the most common ICT-tools and systems used in the project organization as a support for information and communication related to the production were a database to share documents between the client, contractor and subcontractor, a digitized survey, an e-commerce system, mobile phones and email, and building and information modeling (BIM)(Jacobsson & Linderoth, 2010).

However, Bresnen et al., (2003) mentions that intranets and websites seem to be poorly used in the construction industry. Factors that can explain why this is such an absence regarding a standardization of systems, struggles with gaining access to the website or intranet from the offices on site, or lack of the latest information on the various platforms.

2.5 Summary

In this chapter, the literature background for this report has been reviewed. It has been described what data, information, knowledge, and experience is and the differences between the notions. Specifically, so is knowledge divided into know-what and know-how and closely related to action. Further, there are mainly two types of organizational knowledge, tacit and explicit. Tacit knowledge is said to be difficult to capture, share, and verbalize. While, the opposite is true for explicit knowledge characterized by being easier to capture, communicate and share.

In the theoretical section about a project-based industry, it has been presented that construction organizations are in their core project-based organizations but

with added difficulties connected to them since every project has unique elements. Fragmentation and conflicts of interests further characterize construction projects.

KS is said to be essential to provide a competitive edge over time. KS can help organizations improve their learning processes and problem-solving skills, which can generate cost and time savings.

However, several barriers have been identified in relation to KS in a construction organization. These have been presented in the theoretical section, and some methods to overcome these obstacles.

Further is has been described how knowledge in the construction industry is shared and created via networks and, more specifically, CoPs. A definition of what a CoP is has been provided, why people want to join a CoP, and how CoPs can contribute to organizational intelligence. Further, some difficulties with CoPs have also been presented, such as identifying CoPs, motivating employees, and enabling time for participation.

Finally, the importance of information and communication technology in relation to KS has been reviewed. Additionally, some of the most common communication means in organizations have also been presented.

3

Methods

3.1 Description of current situation

3.1.1 Case Study

According to Bryman and Bell (2011), a case study involves the intensive analysis of a specific organization, a location, an individual or an event. Stake (2000) further mentions that a case study is often concentrated on a bounded setting where the aim is to answer a small number of thematic research questions. The thematic issue of the case study is usually connected to a contemporary situation where an in-depth examination is made to demonstrate what is unique with this specific context. The purpose of a case study is often also based on the expectation to learn, in which the researcher can highlight what has been discovered in the case that was unlike other cases. In addition, Bryman and Bell (2011) states that a case study gives the opportunity to combine several qualitative methods, such as participant observations and unstructured interviews. A combination of approaches is especially fitting when the researcher does not want to be tied to one singular method.

This Masters's Thesis can benefit from these aforementioned structures of a case study, since the aim of the thesis is to present the contemporary KS practices between Supervisors in a large Swedish infrastructure project, what barriers and enablers are evident from the investigation and furthermore, how these barriers can be overcome. In the following sections, some common research strategies will be presented. Further, the chosen research approaches for this report will be highlighted which gives the opportunity to create an intensive study of a case.

3.1.2 Research Method

There are mainly two types of research methods, quantitative and qualitative. Which research method that is used should depend on the aim of the research. A quantitative method may be preferable for statistical analysis, for example, if the intention is to measure voting results through a social survey. However, if opinions and behaviors are supposed to be researched, then a qualitative research method may be favorable (Silverman, 2015).

Moreover, there are different philosophical standpoints in the social sciences about at what point in time the theory should be developed during the research (Mason, 2002). Principally there are three potential answers to this.

1. The theory is developed before the empirical material and the following analysis. This model relates to deductive reasoning. Then there has to be a clear hypothesis developed beforehand. The theory section is then refined by a study of previous research and is later tested against the empirical research, often through a falsification process. By using these models so is the research said to be moving from the general to the particular (ibid.).
2. The empirical research and the following analysis are developed first, before the theory. The method relates more to inductive reasoning, where explanations are matched with the data in order to amplify the research analysis and the empirical section (ibid.).
3. Through a dialectical process the theory, empirical data, and the analysis is developed at the same time. A possible benefit with this method is that it allows the researcher to move back and forth between broader concepts, experiences and own data. This method is more related to an abductive research strategy, which is linked to an interpretive tradition (ibid.).

Further, these research strategies are often used in combination with each other, and it is questioned if pure forms of these methods are ever used in practice (Mason, 2002). It is argued that researchers with many theoretical directions in their research, often in practice, immerse themselves in the abductive form of reasoning, even though they do not always perceive or admit this themselves.

For this thesis a qualitative research method has been used since the objective has been to capture the subjective opinions of the interviewees regarding knowledge sharing practices between the Supervisors involved in the various Area and Trade Blocks. Further, an abductive research strategy was chosen since this allowed for going back and forth between the development of the theory, empirical data and the analysis.

3.1.3 Theoretical Framework

The theoretical framework acts as a guideline for the orientation of the research (Given, 2008). It influences many aspects of the study, such as the purpose, research questions, data gathering, and analysis, naming a few.

After discussions with the supervisors at the case company and Chalmers University of Technology, it was decided to focus on the subjects areas Knowledge Sharing, Project Based Organizations, Networking, Communities of Practice, and Information and Communication Technology. The development of the theoretical framework was started by reading existing literature that could help improve the understanding of the selected subject areas. In the selection process, articles that could provide an understanding of the Swedish construction industry context were ranked higher for the theoretical sample. However, the central literature was often non-industry

specific with an international context, and therefore the theoretical framework is partly built up by these types of articles as well.

Specific keywords were used to find relevant articles connected to the earlier mentioned subject areas and in combination to the construction industry, such as Knowledge, Data and Information, Knowledge Sharing in the Construction Industry, Barriers and Enablers for Knowledge Sharing in the Construction industry, Communities of Practice, Communities of Practice in the Construction Industry, ICT, and Information and communication technology in the construction industry.

Search engines such as Chalmers Library, Google Scholar, Google Search, Emerald and Research Gate were used to access relevant academic sources. The references' reliability was mainly judged by the number of citations and the year published. However, some articles used were published a long time ago but could still be considered relevant. These articles have then influenced a subject area considerably.

3.1.4 Interviews

Interview guides can be developed through a structured or an unstructured format (Given, 2008). At one side of the spectra the interview guide may be very detailed, covering most of the intended research topic. On the other side, there is almost no guiding path for the interview and is often adopted if the intention is to explore a certain subject or an opinion. Many times, researchers place themselves in between these two extremes by using semi-structured interview formats. Because this allows for some freedom regarding in what order the questions are asked, and at what depth each question is addressed. Additional time can be distributed to certain questions depending on what is wanted to discuss. Open-ended questions are used to gather both narrative stories as well as concrete information. The format also allows for active listening and follow up questions.

For this thesis semi-structured interviews were performed. In the initial stages of the data gathering a framework of questions were developed in collaboration with the supervisors at the case company and Chalmers University of Technology. The framework was aimed to explore and create an understanding of the subject in the studied context. After the exploration process, more conclusive questions were developed, again in agreement and with the help from the respective supervisors. The questions were based on what was found in empirical material collected earlier, but also on the theoretical framework.

The selection process of interviewees was mainly performed together with the supervisor at the company, and partly with the supervisor from the Chalmers University of Technology. However, some of the interviewees were asked if they could suggest other suitable interview candidates for the study. Often they could, and the number of interviewees expanded in this way. First and foremost, the interviewees consisted of Supervisors who were involved in the projects' various Area and Trade Blocks. But, other managers were interviewed as well. The term "Senior Managers" is used

3. Methods

by the authors to distinguish between the roles higher up in the organizational hierarchy and the Supervisors. These individuals had roles as Area Block Manager, Trade Block Manager, Area Site Manager, and Trade Site Manager. The Managers were interviewed to give a different perspective to the supervisors' views regarding knowledge sharing. Also, an Environmental coordinator was recommended as an interviewee by a supervisor. Because, the Environmental coordinator was considered to have close contact with the production, the Supervisors and the other managers, and could thereby contribute with a different perspective on the matter. In total 12 interviews were conducted, and a full list of the interviewees, their role and which respective Area or Trade Block they belonged to is provided in figure 3.1. It should also be mentioned that Supervisor A worked in both Area Block A and Area Block B.

Area Block/ Trade Block/Production Support	Occupational Roles and Backgrounds
Area Block A	Supervisor A - Academical background: three years of university studies. Has worked in the construction industry and at the company as a Supervisor for two years. Area Site Manager A - Academical background: Masters degree. 10 years of experience in the construction industry. Has a background as a carpenter.
Area Block B	Supervisor B - Academical background: Masters degree. Has worked in the construction industry as a Supervisor for three years. Supervisor B1 - Academical background: three years of university studies. has worked in the construction industry and at the company as a Supervisor for two years. Supervisor A - Academical background - See Area Block A (Worked in both Unit Area A and Unit Area B). Area Site Manager B - Academical background: Unknown. Has worked at the company for 1.5 years, one year as a Supervisor but later got promoted to Area Site Manager.
Area Block C	Supervisor C - Academical background: One-year vocational studies after finishing high-school. Has worked as a Supervisor in the construction industry and at the company for one year. Supervisor C1 - Academical background: Initially applied for a five-year university program which has been paused due to work opportunity at the company. Started of as a trainee at the company which later turned into the role as a Supervisor. Has worked at the company for two years.
Trade Block D	Supervisor D - Academical background: two years of vocational studies. Previous background in other industry. Trade Site Manager D - Academical background: no previous education. Has worked in the construction industry for 45 years. Has a background in carpentry. Trade Block Manager D - Academical background: no previous education. Has worked at the company for 2.5 years, first as Deputy Block Manager and later as a Trade Block Manager. Has many years of experience in different roles in the construction industry.
Trade Block E	Trade Block Manager E - Academical background: three years of university studies. Has worked in the construction industry for more than six years. Has worked at the company as a Trade Block Manager for half a year.
Production Support	Environmental coordinator - Academical background: three years of university studies and an uncompleted masters degree. Has previous work experience as a environmental inspector. Has worked at the company for three years.

Figure 3.1: The interviewees unit affiliation, occupational roles, academical and industry experience.

Further, a simplified chart is used to give the reader an understanding of what the hierarchy looks like between the interviewees in the Area Blocks (see figure 3.2). Note, some of the people in the chart have not been interviewed, and the structure is similar for the Trade Blocks.

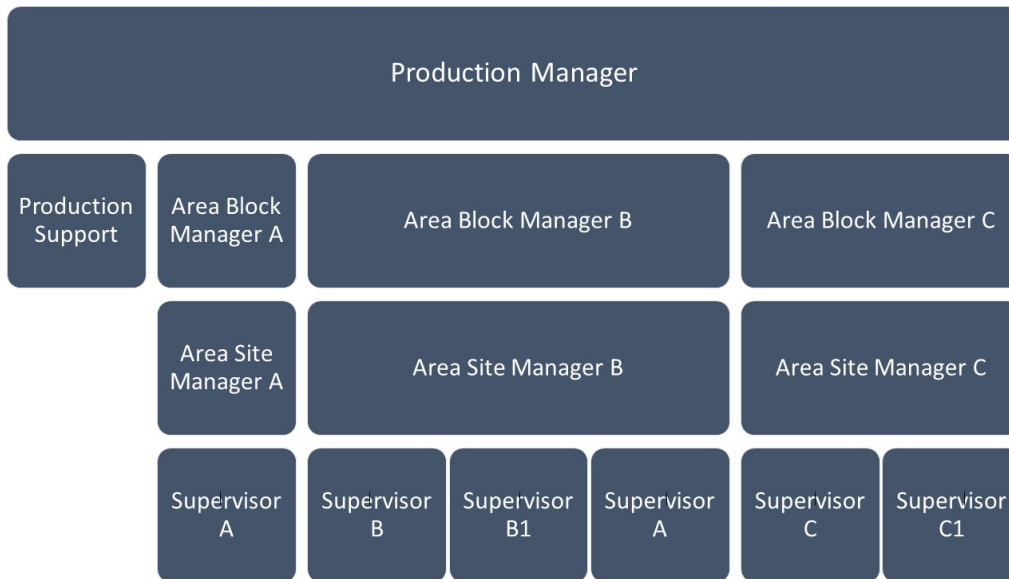


Figure 3.2: Simplified organizational hierarchy

3.1.5 Data Analysis

The data analysis used for the report has similarities to a thematic analysis. In such analysis, qualitative data is divided into categorized, summarized, and recreated segments, so the essential ideas are collected from the data (Given, 2008). Further, it includes a search for patterns, and the result of a thematic analysis becomes a description of the identified patterns. When semi-structured interviews are performed, which was the case for this report, specific themes can be predicted in the data early on since certain subjects were part of the data gathering.

Parts of the data collected from the interviews are then taken out from its original environment, given a new context, and categorized into a theme (Given, 2008). The collected data can then be analyzed together. The coding, development, fine-tuning, and pattern recognition is not a step-by-step process; instead, it happens during large parts of the time duration during a project. The authors think about the importance of every individual theme to keep a streamlined analysis. Further into the coding process, the authors start to evaluate and identify associations between various categories. Finally, conclusions are often based combination of themes and used for generalizations.

3.1.6 Ethical Aspects

The study followed the ethical guidelines set up by the Chalmers University of Technology. There was classified information from the company, and therefore the project and the case company were anonymized to protect sensitive data. In addition, to protect the interviewees, their identities were anonymized as well.

3.1.7 Limitations

This Master's Thesis focused on analyzing knowledge sharing between Supervisors involved in a major infrastructure project. Besides from the management and an the Environmental coordinator, additional stakeholders were excluded from the scope of this study. There is an awareness of the added value that other stakeholders could offer. However, due to the importance of narrowing down the project scope and the limited time frame for this study, additional views will not be included in this thesis.

All the interviewees remain anonymous to protect their identities. Moreover, for the same reason so was certain information, such as gender, not disclosed. The COVID-19 pandemic meant that interviews could not be conducted through physical meetings but had to be accomplished through video conferencing instead. This could mean that certain sounds or behavioral patterns could not be captured, and that could possibly have been useful for the study. Due to confidentiality, it was not possible to provide specific information on for example how the project was organized, located, contract sum, project size, number of project members in each of the Area and Trade Blocks, involved subcontractors, and the client. Even though, this information would probably have helped to contribute to a better understanding of the project's complexity and the interrelationships in the project.

Another limitation is that the concept of data, information, and knowledge are often complex concepts. For the interviewees to understand the notions better, a short oral explanation was given at the beginning of each interview. Despite this, the authors understand that there may be confusion among the interviewees about the different concepts when they have helped to contribute to the data collection. The authors have done their best to find out to what concept the interviewees referred to during the interviews by analyzing the transcribed material and checking it against the theoretical concepts regarding data, information, knowledge, and experience.

3.1.8 Validity of results

Validity of results means that what is to be measured, observed, and identified in the report actually agrees with what the authors claim to explore in the report (Bell et al., 2019). A distinction is also made between internal validity and external validity. Internal validity means a good congruence between the authors' observations and the theoretical ideas that are developed.

Regarding this report, interviews have been conducted. Through them, the authors have been able to see the connection between data from different sources. Moreover, since an abductive research strategy was used, theoretical concepts have been developed in parallel with the data collection, which led to a better match between the theoretical concepts and the empirical material.

External validity means whether the findings can be generalized on a larger scale (Bell et al., 2019). A case study has been performed that has a unique context attached to it, and a relatively small sample has been used. Therefore, the authors

acknowledge that it may be challenging to make a more significant generalization based on this study.

3.1.9 Triangulation

Triangulation means that authors use more than one method or multiple sources to study the same phenomenon (Bell et al., 2019). For example, in this report, triangulation was used by interviewing both Supervisors, the Senior Management, and an Environmental coordinator. In this way, several different perspectives could be given regarding knowledge-sharing practices between the Supervisors in the various Blocks.

4

Results

In the following chapter, the empirical results will be presented which was retrieved from the different interviewees involved in the case study. The current KS practices between Supervisors will be introduced with the intent to map the ongoing KS status in the project. Furthermore, present-day communication channels will be described in order to have an overview about current KS methods. In addition, the benefits and barriers will be mentioned as a basis for the discussion section.

4.0.1 KS practices for Supervisor

The educational background of the interviewed Supervisors varies. Some of them have a higher education in the form of a university degree, others have either a higher-vocational education or come directly from an upper-secondary school. A common trait for the latter two is that the industry often is involved in the education through some sort of a cooperation. This could for example mean that the companies involved provide for an internship placement, which was an entry point for a few of the Supervisors into the company. Otherwise, the company also offers a one year trainee program that prepares the applicants for a role in production, which was the case for one of the Supervisors. Alternatively, they applied to a Supervisor role at the company after finishing their education.

In the early stages as a Supervisor, it is common to start off as a Deputy Supervisor and then often get assigned a senior colleague, usually a more experienced Supervisor. The main purpose is then to observe and learn from this individual. Supervisor B describes this as a “see and learn” type of process. Additionally, Supervisor A adds that it is the Area Site Manager that has the ultimate responsibility which creates a mental safety barrier for doing mistakes. Further, Supervisor A was asked how knowledge is gained in the early stages of being a Supervisor and stated:

“By asking lots of questions all the time, and you have to be humble because I kind of know nothing”

Learning from mistakes also seems to be a common way of learning. An example was given by Supervisor A;

“... We have big problems with water. And then we know, that we have now learned, that we have to pump the water in a special way in order for it to go as slowly as possible to the treatment plant. Because we are not allowed to discharge the water

into the storm-water network, then it must be purified so that it is basically drinkable, and then we release it where all the rainwater goes out. So there you have learned a lot how not to do. But you did not know it first and it will be [that] you learn from your mistakes ... "

Further, the construction workers are a great resource in the learning processes, since they often have a lot of knowledge and experience regarding the work. Further, a feeling is that the learning experience is amplified when there is an opportunity to carry out the work by yourself, through trial and error.

It sometimes appears to be difficult to find relevant information about operational activities. Often this is connected to when a particular activity is performed for the first time by a Supervisor. In particular cases, Google or Youtube was used to gain the necessary information on how certain activities were to be performed. Some examples of such operational activities could be piling or excavation. Supervisor B states when projects have many unique elements to them it would be good to receive help from others which performed similar tasks before.

4.0.2 What do the Supervisors want to share?

There is mainly one reason why the Supervisors want to share knowledge with each other in the different area and trade blocks. The Supervisors want to gain knowledge on how a certain operational task could be executed. Supervisor D exemplifies by expressing it as “tips and tricks”, which can be beneficial in their daily tasks. This is also connected to the fact that the Supervisors want to avoid making mistakes as much as possible. Supervisor B express the following:

"Above all, I think that I, who am not so super experienced, it would have been good to be able to share other people's knowledge when it is necessary to perform specific tasks for the first time so that you can avoid the most fatal mistakes, or these beginner mistakes. There, I think you have a lot to gain. It may be that other Supervisors in other blocks have done a specific task before and where you could learn. While in the block where you sit by yourself, no one has done a specific task, and then you lose that opportunity a little."

4.1 Knowledge sharing between Supervisors in the different area and trade blocks

4.1.1 Is there any Knowledge sharing between Supervisors today?

All of the Supervisors are mostly in agreement that there do not exist any systemized way of sharing knowledge between the Supervisors across the area and trade blocks. Supervisor C says that there is not so much KS across the blocks. This is in alignment with a statement made by Supervisor C1, that mentions that knowledge

such as site operations is shared between Supervisors in the area block, but not over its boundaries. The interviewee also mentions that they have weekly meetings within the area block where knowledge and information can be shared. Additionally, Supervisor B describes that within the area block there are informal channels, such as breakfast meetings, but has not encountered that there exist similar forums across the blocks, where tasks can be discussed among colleagues. Conclusively, Supervisor B1 feels that KS across the different area and trade blocks is something that needs to be improved, in order to be able to better plan operational procedures. The interviewee further mention that operational Knowledge is more commonly shared with those that Supervisor B1 works closest to.

Supervisor A mentions that operational knowledge can be shared between Area Block A and B. Since the interviewee works in both of the sites. The reason why Supervisor A works in the two different blocks is that there is not enough to do in Area Block A at the moment, and the Supervisor is therefore "on loan" to Area Block B. An example was given by the Supervisor, in which at site A they had used a wheel loader or crane truck instead of an excavator, which was intended to be used for the specific work procedure, and in this way they could improve the lifting process that would later be performed. This information can then be transferred and be used in the Area Block B in a later stage of the project. Further, the Supervisor says that operational routines are not questioned, because there is a given way of doing things.

The Senior managements' view on whether operational knowledge is shared between the Supervisors beyond the individual blocks is partly in conflict with the Supervisors' opinion. While Trade Site Manager D is of the opinion that there exists KS practices between Supervisors. Area Site Manager A and Trade Block Manager D are unsure if KS practices exist between the Supervisors in the various area and trade blocks.

In general, all the Supervisors are in agreement that there is a need for sharing knowledge with other Supervisors in the various area and trade blocks. For example, Supervisor B1 expresses the importance of being able to discuss with colleagues in that performed similar work tasks, and this is a crucial aspect which is missing at the moment.

Supervisor B also adds that the need for sharing knowledge may also depend on other factors, such as experience. A Supervisor that has worked in the same role for 20, 30 or 40 years may not have the same necessity to share knowledge as Supervisors with less work experience even though it is believed that all Supervisors have some benefit of KS.

The Senior management are in agreement that sharing knowledge is a necessity, not only for the Supervisors but also for other involved workers in the different area and trade blocks. Furthermore, Trade Block Manager D mentions that it may not always be that the Supervisors themselves realize that they need to share knowledge, even though it can be helpful in the work they are performing. Trade Site

Manager D has a similar opinion and explains that even if the Supervisors between the different area and trade blocks are working with different tasks at the moment, eventually the knowledge that is shared may become valuable in future tasks.

In addition, the Environmental coordinator expresses that as a result of the lack of KS between the Supervisors in the various area and trade Blocks, this has an impact on the environmental team as well.

"They [the Supervisors] do not really talk to each other and then sometimes I have to convey a lot of information and then there are many solutions within, lets say... water purification, which we may have solved in one of the Blocks. And as the other Block may still be struggling ... Supervisors might be able to help each other. There is a lot of "learn by doing" sometimes, and I think we could have avoided that if you communicate better..."

Furthermore, the Environmental coordinator has the opinion that many of the Support Functions that are involved in the project are most likely impacted to some extent, due to lack of sharing knowledge between the different blocks. Since a lot of information must be documented and reported to the client, the Support Function may have to search for the information themselves if there is miscommunication in production.

4.1.2 IT-and communication system for sharing knowledge

It is stated by the Senior Managers and by the Supervisors that the most common communication means are video conferencing meetings, e-mail, face to face interactions, phone calls and in general there is a prevalent verbal communication between the members. Before the COVID-19 pandemic, there were more personal interactions in the form of physical meetings, however this is now avoided and video conferencing has have replaced these interactions to a high degree.

Further, a common view among the interviewed Supervisors is that they believe that there is no IT system where knowledge can be explicitly shared within the organization. However, a platform is utilized to share data and information and functions as an intranet. But, it is not specifically used or aimed to share and capture knowledge between project members. The platform is primarily used as a tool for storing information which concerns both production and design aspects. For example, drawings are usually stored in the system into different folders, but also other types of documents are uploaded there that are required by the subcontractors. Trade Site Manager D further explains that pictures of certain site-operations can be retrieved on the platform, but that pictures might lack complementing texts of how the operation was performed. Supervisor B mentions that the benefit with the platform is that it can be used by all the involved actors in the project at the same time. There is also the possibility to get notified when there occurs any revisions in the folders, usually the notifications are received through email.

A drawback with the platform is mentioned by Supervisor A, which explains that the subjective opinion is that it is difficult to search for information on the platform. Supervisors B is also of the opinion that the platform is lacking when it comes to finding knowledge that could be beneficial in daily work, such as best practices.

Supervisor B had experience from another construction company where the opportunity existed to register different types of experiences or steps that were performed and track the progression, which was later gathered as best practice at the company. But as far as Supervisor B knows, nothing like this exists in this project, but they do have work preparations where steps can be planned in advance and mention that it is rare to go through them afterward and evaluate them. Trade Block Manager D mentions that there exists video conferencing groups within the organization where information can be accessed. It might just be an issue that people are not fully using these existing tools.

4.2 Benefits of sharing knowledge between Supervisors

There is a common understanding that sharing knowledge would be a great benefit for the Supervisors in the different area and trade block. For example, both Supervisor C and E mentions that there is a learning opportunity in sharing operational knowledge. Supervisor C explains that since they work in different conditions and at different stages in the project, they can benefit from learning from each other across the blocks. Furthermore, Supervisor B states that while some of the operations in their block may not be exactly the same as in the other Blocks, they are still to some extent a repetitive task. Additionally, Supervisor A mentions that it is probably always a good idea to share knowledge with other Supervisors and that they do not necessarily have to agree with, or perform the task in the exact same way. Instead the Supervisors have the opportunity to improve and adapt it into their own on-site operations.

Trade Block Manager D agrees with the former statements, regarding that sharing operational knowledge between the Supervisors in the different blocks would probably benefit the production in terms of more effective operational activities. The interviewee recognizes that Supervisors in other area or trade blocks may have certain information about operational routines, which they themselves may not have, but which they could benefit from in their work.

Further, Area Site Manager A mentions that it is important to share operational knowledge between generations, and recognizes that it might be an issue if the older generation retires without having shared their knowledge to the younger Supervisors. In addition, the Environmental coordinator has similar thoughts and mentions that there is great benefit in being able to bring knowledge about site-activities from one block to the another, in order to refrain from reinventing the wheel again.

4.3 Difficulties with sharing knowledge

4.3.1 Responsibilities and support for sharing knowledge

The general perception among the Supervisors is that the responsibility for enabling KS between the different blocks lies with individuals higher up in the hierarchy. Some proposed individuals by the Supervisors who could be able to authorize these practices are the Area Block Manager, the Deputy Area Block Manager, the Area Site Manager or the Area Trade Manager. For example, Supervisor C mentions that actors higher up in the hierarchy often have continuous dialogue with each other about the ongoing project, and therefore they have the possibility to come together with a KS strategy. Supervisor A expresses a similar opinion and mentions the Senior management could set requirements for a “KS plan”, which is collectively followed by all the actors in the different area and trade blocks.

Supervisor B mentions that it is both the Supervisors and the individuals higher up in the hierarchy that must enable knowledge-sharing activities. The opinion is that it has to be sanctioned by the management and that the Supervisors take time for these potential activities. It is further discussed that all project members must prioritize this if they think that KS is essential. The Supervisor describes the organization as a tree, where the management is the trunk of the tree and refers to the Supervisors as the leaves. Such an initiative must spread from the trunk to the branches and then to the leaves. Otherwise, it will be tough to create a knowledge-sharing culture. Area Site Manager B backs up the different Supervisors ideas, and further mentions that since the Block Manager has full responsibility over everyone, then they should make sure that there is some exchange and cooperation between the Supervisor.

Trade Block Manager E is also of the opinion that the promotion of KS-activities between Supervisors in the different area and trade Blocks should be a top-down initiative, instituted by the Production Manager. The interviewee further assures that while the Trade block Managers and Site Managers will assist KS-activities, it is mentioned that since Production Manager has the ultimate control over the Blocks, then they should initiate such governance:

“The systematic way of working to promote the transfer of knowledge and experience between Area A, Area B, or Area C, Trade Block D, Trade Block C etc... it’s not in my scope. But, it’s my boss’s job in my boss’s management.”

In contrast to the earlier mentioned statements, Trade Block Manager D believes that it is the Supervisors themselves that should facilitate KS activities and pronounce that it is important that there is an openness to share and receive knowledge or information. However, if there would be a need for a KS activity, it is mentioned that it would be the Trade Block Manager D’s responsibility to create time in the Supervisors schedule to enable these activities.

In addition, Trade Site Manager D does not believe that systematized KS activities, for example organized meetings between the Supervisors in the different area and trade blocks, is not a good idea. There is an opinion that there are too many meetings as it is. Instead it is believed that help is taken when needed in order to perform the work at hand.

Moreover, most Supervisors believe that those from the management do not provide support for KS between Supervisors in the various blocks.

Trade Site Manager D provides an opposing view and thinks that the management supports these types of activities. Because Supervisors are encouraged to contact each other if there is a particular need for it to do their job, and Trade Site Manager D can provide suggestions of people to contact if a Supervisor needs to reach another Supervisor in another block. But there is nothing stated that they should do it.

Furthermore, Trade Block Manager D says that no direct support is given for these activities, but it is promoted. There is a will for them to exchange knowledge, but no directives are given for it to be carried out. However, this interviewee also says that contact suggestions are given if it is requested or recognized, that a Supervisor needs this information to perform their work. Conclusively, Area Site Manager B expresses that there did not exist any kind of support from the management and states that there is “no such talk” in regard to this.

A further statement was made by Trade Block Manager E, which mentions that there must be a leaderships culture in the organization, where leaders such as individuals within Senior management are not afraid to take in feedback from the Supervisors and helps support the Supervisors to be able to perform their best. Trade Blocks Manager B explains this in the following way:

Because when these "poor" Supervisors have not obtained or been given the opportunity to obtain enough information, such as that we [Senior management] have not delivered good enough documents for them..., they [Supervisors] should be able to say that "these are not good enough documents". Then we [Senior] management must be willing to accept it and not sit and discuss that "we are not doing a good enough job". Instead, we must talk with our staff so that they are able to perform their work in the most efficient way. In that way, we get feedback all the time and so instead of [Senior] management output how it [the site activities] should be done, we output conditions".

Trade Block Manager E also mention that a way to set conditions and help support the Supervisors can be by de-dramatizing goal fulfillment. This means that if a Supervisors is not able to meet a certain goal, regarding for example a site-operation, this does not necessarily mean that the Supervisor is doing a bad job. Instead, Trade Block Manager E explains that it may be that the management must work harder to make clearer data, so that Supervisor can deliver better results.

4.3.2 Organizational Structure

In general, the different interviewees mention the geographical distance as a common issue when sharing knowledge between the Supervisors, across the different Area and Trade Blocks. Supervisor A describes that the several Blocks are divided into "isolated-like islands" where each block becomes like a small project in itself. The Environmental coordinator also mentions that block-division may cause issues in sharing knowledge, and describes each block as being like small individual businesses. Area Site Manager A agrees with these perceptions and describes that the Supervisors from Area Block A may have less opportunity to share knowledge with Area Block C since they have a greater distance between each other geographically.

Another issue mentioned in connection to the geographical distance was the COVID19 restrictions, which further amplifies the difficulty in sharing knowledge between the Supervisors from the different area and trade blocks. Trade Site Manager A explains that in order to minimize the risk of spreading the virus, there are stricter requirements than usually in the different blocks. It was further stated that before the pandemic the Supervisors had the possibility to make unofficial site visits to the other blocks if they wanted to observe certain site operations or exchange knowledge. Supervisor C1 also mentions the stricter requirement as a problem, since this would mean that there is little to no permission in being able to visit other sites.

Two interviewees in the Senior management experience that sometimes it is difficult to share knowledge with each other since many involved in the project come from different nationalities. Block Trade Manager A states that everyone may not be comfortable speaking English, although most people eventually get used to it. Area Site Manager A further states that it can be due to the profession that covers many technical terms, which may not always be easy and can lead to misunderstandings.

Furthermore, the hierarchical structure is stated as both advantageous and problematic, in order for Supervisors to share knowledge between each other in the different area and trade blocks. Trade Block Manager D mentions that since their trade block performs specialized construction activities across the area blocks, therefore the opinion is that the Supervisors involved in the Trade Block D have greater opportunity to share knowledge with the other Supervisors in the different blocks. However, Trade Site Manager D has a contradictory view, and explains that since it is such a large project there are many individuals who do not know each other from before. This constitutes an issue since it would mean that the Supervisors have a hard time searching for other Supervisors to exchange knowledge.

4.3.3 Lack of time

A potential hindrance for KS practices between the Supervisors in the numerous area and trade blocks seems to be a lack of time. This issue is mentioned both by the Management and the Supervisors themselves. It is noted by Supervisor C that Supervisors in Block C are consumed by dealing with their work, and the daily schedule is adjusted to that. Therefore, it can be a challenge since it might be tough

to find time to help out and engage in others' issues. This view is further supported by Supervisor B that mentions that it might be tough to plan for these knowledge-sharing activities since problems related to the production arise daily and need to be taken care of.

Further, Supervisor C1 adds that other Supervisors may have to physically show up at Block C to show how a particular task should be carried out and reflects that there would be no time for that because of a busy schedule. It was further reflected upon by Supervisor C, who discussed that it may be personal qualities that are the basis for the lack of time problem. This is because it can affect how individual plans their day, what is considered essential, and how urgent a matter might be.

The managements' view seems to align with the statements made by the Supervisors, which can be summarized with the following quote made by Area Site Manager B:

“No, that time does not exist, you wish that time existed. To take advantage of that time and sit down and discuss. But that time does not exist, it is such a tight schedule that there is simply no such time.”

Trade Block Manager D recognizes and shares the opinion that everybody seems to be busy all the time and occupied with their own work, and do not know how much time the Supervisors have left over for sharing knowledge across the various area and trade blocks. The Area Site Manager A also adds to the later statement and says that everybody is overloaded by work as it is and that the time for this practice, in that case, must be restricted. Further, it was said by Trade Site Manager D that even if KS activities seem to take time from the daily work, these activities might help save time at a later stage.

4.3.4 Identifying where information, knowledge or experience exist

Overall there seems to be both certainty and uncertainty in regards to being able to identify where information, knowledge and experience exists among the Supervisors in the different area and trade blocks. Supervisor B states that it is difficult to know “who knows what”, or “who works where” and therefore it becomes hard to ask the right questions from the beginning. Trade Site Manager D and Area Site Manager B has similar perceptions and explains that the Supervisors may be unsure who to contact or who is suitable to ask when searching for knowledge. Furthermore, Trade Site Manager D is also of the opinion that the identification of knowledge would be easier when there already exists a relationship with individuals that carries the right knowledge.

However, some of the Supervisors from the different area and trade blocks express that they know where operational knowledge exists in the organization, and that identifying who to contact is usually not a problem for them. For example, Super-

visor C cites the following:

“In most cases, I would still say that I have it [the knowledge], and if it is the case that I do not have this contact that is needed, then I take help from my colleague, the other Supervisor, or a Site Manager who is here. If I do not have the answer, someone else usually has it. . . .”

Supervisor A is in agreement with Supervisor C, and mentions that there exists an established contract with the subcontractors which informs who is responsible for certain site operations. The information on this contract can therefore be useful when planning for site activities that will be conducted, in which the Supervisor can consult with the responsible subcontractor beforehand. Supervisor A further mentions that if there still exists uncertainty on whom to contact, then they will eventually contact the Site Manager for further information. Supervisor D also mentions that the Site Manager simplified the search for information, knowledge and experience, and further explains that otherwise they will have to continue the search process until they have identified the suitable knowledge.

A recurring theme among the Supervisors is that if they need relevant information to solve an issue or similar, then they do not know who to contact. This usually results in Supervisors having to go from one person to another, until they find the right person to contact. Supervisors seem to rely on the information from the Senior management about who to contact. Supervisor A describes that the right person can be found by that the Senior management has some idea of who to contact. Supervisor B1 confirms by stating that the Site Manager informs all the involved actors on the site if there is information they should take note of certain tasks or risks. Additionally, Supervisor D describes that if the Trade Site Manager does not have the right information or knowledge about a subject matter, then telephone calls must be made to different people and it can go in several stages before the right person is reached.

In addition, Trade Block Manager E suggest that there may be two reasons why Supervisors are unable to identify where information, knowledge and experience exists in the different blocks. The first reason mentioned was there is possibly a lack of systematic way where individual learning is facilitated and organized into project learning. The second reason mentioned was that the company may be lacking in their leadership culture, in which leadership must be developed where all the organizational members are encouraged to share knowledge.

4.4 Discussion

4.4.1 KS practices for Supervisors

As stated by Styhre et al. (2004), companies in the construction industry do not seem to give priority to formalizing and codifying operational knowledge. While blueprints are common formalized documents in the construction industry, they are mainly used to capture information such as design specifications. Styhre and Gluch (2010) further mentions that KS between two individuals is not likely made explicit in the form of documents or media, which gives outcome to the oral culture that the construction industry is often known for (Styhre, 2009a, 2009b). Similar to the literature, the results also imply that there exists a low degree of formalization in the individual learning practices for Supervisors. This leads to that some Supervisors have to use unconventional methods to try to acquire know-how. Google and Youtube were used by Supervisors to try to understand how certain work steps were to be performed. Probably the information found on these platforms relates to a different context, and even if it provides an understanding of operational activities, the information may be challenging to apply in full in the context of the project. This, in turn, can lead to that interpretation of the information has to be made, and the Supervisors might then have to go through such a trial and error process again, as mentioned by Supervisor B. Hence, the Supervisors do not have access to operational information through written documents when they need this, and they first and foremost gain operational information through verbal communication with other involved actors in production.

Furthermore, Styhre et al. (2004) mention that a lot of knowledge is gained through trial and error, and further indicates that the learning process is somewhat self-organized in construction projects. This theoretical finding demonstrates a correlation with the results, which suggest that the Supervisors increase their knowledge and experience when operational activities are done for the first time. Bhatt (2001) believes that knowledge is based on experience and practice, and that is achieved when information is given meaning. Furthermore, Hendricks (1999) says that in the end, it is the recipient of the information who decides what information is and what is not. There is thus a specific interpretive aspect in the process of determining what is relevant information. Supervisors try to acquire knowledge through observation. Something that Supervisor B calls a "see and learn process." One problem with this is that it can be difficult for a Supervisor to fully understand the underlying knowledge base that builds the behavior they are witnessing. The knowledge is tacit and is in many ways connected to the person performing the action. Supervisors must decide for themselves what seems relevant and not, but it can also mean that important information is lost in the process of acquiring knowledge. In order to determine what works and what does not, they must be allowed to test themselves through a trial and error process.

The subcontractors were also mentioned as a great source of knowledge for the Supervisor's, however, due to the lack of data about the subcontractors and their

role in the project, there exists some limitation on how their role may further enable or disable individual learning practices for the Supervisors. A speculated issue with the Supervisors individual learning practices can be that site-activity which has never been done before becomes a “hit and miss” kind of operation. If the Supervisors are lucky, the outcome is that the performed tasks are done without major hazards.

According to Fong and Chu (2006), a mentoring program, coaching, or apprenticeship program can be beneficial in supporting KS processes in contracting companies. The empirical findings suggest a similar idea since there already exist some kind of “watch and learn” in the early stages of a Supervisor’s role, which is dedicated to support the Supervisors that lack experience. Further, the case company is also formalizing trainee/internship programs for students. An observation is that Supervisors fresh out of school may need mentoring programs more than other Supervisors which have more than 10 years of experience working in the construction industry, since the former probably have a narrower knowledge base.

4.4.2 What do the Supervisors want to share?

The reason why people want to join a CoP is mentioned by Kosksela et al. (2008). They noted that the main reasons for joining CoPs are that individuals or groups wish to find solutions to various problems and get guidance from peers, to learn and to not repeat mistakes. In many ways, this is similar to the reasons why the Supervisors want to share knowledge. They want to learn tips and tricks that they can use in their daily work so they can avoid making recurring mistakes. Something that is stated by Supervisor B is that knowledge about how to perform operational tasks do not always exist within Area Block B. Supervisor B therefore thinks it would be good to share knowledge with colleagues in the other blocks to avoid beginner mistakes and such mistakes that have serious consequences associated with them.

Something that is mentioned by North and Kumta (2018) is the difference between "know what" and "know-how.". Applying this into the context of this report, the "know what" appears to be that the Supervisors want to embody information within themselves about operational tasks and procedures, and the "know-how" is related to that they want to apply this "know what" into the performance of specific operational tasks on-site.

4.4.3 Is there any Knowledge sharing between Supervisors today?

In the construction industry, information and knowledge can be obtained via networking. A form of network is said to be CoP (Anumba et al., 2005). According to Wenger (2011) CoPs are groups of individuals that have some form of common purpose and want to learn how to perform their activity better through continuous interaction within the CoP. Similar to CoPs, within the area or trade block there are groups of individuals who continually share knowledge with each other to reach

a common objective, which is enabled via informal channels in the form of various meetings and personal interactions.

However, the several communities of Supervisors do, for the most part, not appear to share knowledge between each other in the different area or trade blocks. According to Koskela et al. (2009), different communities that each have their collective knowledge can, through collaboration and discussion, share ideas and experiences, find solutions to various problems, and at the same time contextualize new knowledge and create a common understanding of how similar issues in the future can be tackled and solved. Through this process, they collectively contribute to organizational intelligence. One issue that seems to hinder the various communities of Supervisors to share knowledge is that there are few or no channels to meet and discuss ideas. Trade Site Manager D argues that knowledge is exchanged between the Supervisors when and if their work overlaps. However, one of the issues appears to be that there is no systematized way of sharing knowledge today.

The Supervisor gave some ideas on what they thought would be good channels for KS between the Supervisors in the area and trade blocks. Supervisor A mentioned that it would be good to have a meeting one day a month where all Supervisors could meet and discuss what they are up to in their various projects. Often the projects perform similar tasks, and it would be beneficial to hear how the other project teams have completed a specific operational task.

Another suggestion mentioned by Supervisor C and Supervisor C1 is to have video conferences where Supervisors can discuss ideas. Further, Supervisor C suggests that if a solution has been implemented on one of the sites, the Supervisors could perform a site visit to a particular area or trade Block to see how a specific operational task was performed by the project members in an area or trade block.

Supervisor C1 mentions job rotation as a possible solution to learn different work procedures. Staff rotation between project teams is also mentioned by Fong and Chu (2006) as a practice that can enable KS in a contracting company. One of the interviewees had seen the benefits of job rotation. Supervisor A who worked at both Area Block A and Area block B, and was exposed to a form of staff rotation. Supervisor A stated that working in two of the area blocks helped information to flow from one site to the other, and that operational procedures from Area Block A could be implemented in Area Block B and thanks to that operational performance could be improved. Moreover, Supervisor B suggested workshops as a tool to share knowledge, where the Supervisors could discuss what tasks they performed on-site and what they learned from it.

Further, one factor that is mentioned by Supervisor B and this seems to influence the willingness to share knowledge is lack of experience. Namely that people who have worked for a long time in the professional role may not have the same need to share knowledge as someone who does not have as much experience. Earlier, the same Supervisor mentioned that its need to share knowledge is due to the fact that

the interviewee was not so experienced in the professional role.

All the interviewed Supervisors are relatively young and new to the Supervisor role, where most have been in the position between one and three years. The Supervisor role also seems to be an entry-level position in the project. That means that some of the individuals who enter into the role of Supervisors in the project lack practical experience since before. It may therefore be probable that less experienced Supervisors see a larger need to share knowledge than their more experienced colleagues. One speculation is that probably the need to share knowledge is not necessarily linked to age or experience in the role. What is said by Bresnen et al. (2004) is that construction projects are often complex and Engwall (2003) mentions that each project is unique. The complexity and aspects regarding that each project is unique should contribute to the fact that there are work steps that even the most experienced Supervisor does not have the answer to how they should be solved. Therefore, probably also these individuals have a great need to share knowledge.

The Environmental coordinator mentioned that their team is affected by the lack of knowledge-sharing practices between the Supervisors. Other functions are also likely to be affected due to the lack of such activities. Hence, some support functions would probably benefit from establishing knowledge-sharing activities between Supervisors. Still, in this report, there is no further data on which functions are affected and which would benefit most from establishing KS between the Supervisors, but this may be a topic for future research.

Moreover, all of the Senior Managers and Supervisors seem to recognize the importance of sharing knowledge between Supervisors, and that it would be helpful when they perform operational tasks. The mentioned issues and suggestions strengthen the idea that it would be beneficial for the organization to facilitate joint meetings between the Supervisors to discuss and share ideas to help contribute to the organizational intelligence.

4.4.4 IT-and communication system for Sharing knowledge

According to Davenport and Prusak (1998), standard communication tools are e-mail, intranets, networks, the internet, videoconferencing, and multimedia computing. The tools are similar to the means of communication used in the project connected to the case study. Earlier in the text, it has been said that Supervisors communicates within the block through networking. In addition, the most common means of communication in the project are video conferencing, e-mail, phone calls, physical meetings, and the intranet. Sthyre and Gluch (2010) say that a verbal culture is a norm in the construction industry, and that it is unlikely that shared knowledge is made explicit, the knowledge stays with an individual or within communities. That is reflected in this project, where the verbal culture seems to be dominant. An implication could be that shared knowledge between project members remains within the communities of Supervisors or individuals. According to the Supervisors, there is no infrastructure to capture shared knowledge between the

project members. According to Fong and Chu (2006), it is essential to create such infrastructure so that individual knowledge can be transformed into organizational knowledge.

Moreover, Kamara et al. (2002) also say that IT systems can help capture, codify and reuse knowledge. One reflection is that if the company wants to implement KS tools and methods to enable an exchange of knowledge between Supervisors. For example, through the suggestions given earlier in the report, such as meetings, workshops, etc., it could also be beneficial if the knowledge shared between Supervisors could be documented and stored to a organizational database. The idea is that if the knowledge is not captured and documented, the knowledge remains within these individuals and is not transformed into organizational knowledge more than perhaps temporary. If the individuals leave the organization, then the knowledge would probably also disappear from the company. It would be good if the whole organization had access to the database so that knowledge can be transferred from one project to another. There should also be someone who ensures the quality of the information stored in the database.

4.5 Benefits of sharing knowledge between Supervisors

A common view among the interviewees is that KS would benefit the Supervisors in the different area and trade blocks. The Supervisors believe that sharing knowledge across the Area and trade blocks will generate learning opportunities and more efficient operational procedures. According to Javernick - Will (2000) can KS can help to distribute practices, reduce work and fulfill customer needs. Hickins (2000) mentions that some of the benefits of KS are faster learning processes and innovative ideas. Davenport and Prusak (1998) noted that leveraging knowledge will provide an organization with increased earnings and a sustainable advantage. Additionally, Hickins (2000) stated that KS would generate faster problem-solving skills and savings in both cost and time. And probably, much can be gained by establishing systematic knowledge activities between regulators in several areas and trade blocks.

One of the barriers for KS mentioned by Carrillo et al. (2004) is Lack of standard work processes. Namely, that there often exist different operational procedures in an organization. This barrier is also mentioned in the empirical findings by Supervisor A, Supervisor B, and Supervisor C. However, it does not seem that the various Supervisors think that it is a particularly large obstacle but instead they talk about it as an opportunity to learn from each other. For example, Supervisor A says that even though they have different ways of performing tasks, it is always good to share knowledge. Supervisor B adds to this and voices the opinion that even though the operational execution can vary in the different blocks, there are still many repetitive steps that are performed. Something that is also mentioned by Supervisor A is that there is an opportunity to improve but that the knowledge must be adjusted to suit their operational context.

Another benefit seem to be to the transfer knowledge between different generations, which is mentioned by Area Site Manager A. One barrier mentioned earlier by Chinowsky and Carrillo (2007) is an unstable workforce. Although that barrier was more linked to organization members leaving project organizations because they preferred other projects, there is a similarity to the mentioned problem. Assume that if there are many retirements within an organization and the employees' knowledge acquired over the years is not transferred or documented, that knowledge disappears from the organizational context. In this way, it would probably be advantageous to enable an exchange of knowledge not only between Supervisors in the various blocks but also across generational boundaries. Of course, there are different ways to facilitate such an exchange, but one proposal mentioned by Fong and Chu (2006) is mentoring programs, which would make it possible for personal contacts to be established and knowledge to be shared between parties who belong to different generations.

4.6 Difficulties in sharing knowledge

4.6.1 Responsibility and support for sharing knowledge

There is a contrast regarding whether the management provides support for knowledge-sharing activities between Supervisors in the various area and trade blocks. The Supervisors state that the Senior management does not, while the Senior management states that they do or at least promote it.

It seems that there is a difference of opinion regarding how KS should be performed. The perception is that the Supervisors want a systematized way to share knowledge, while the Senior management talks more about KS in the way that Supervisors should contact each other when a problem arises in the daily work, and then the Senior management may provide the Supervisors with contact information to other Supervisors in the different area or trade blocks. For example, Trade Block Manager D states that contact information is given to other Supervisors if one of their Supervisors encounters problems in their daily work, and a similar opinion is given by Trade Site Manager D. Thus, the Supervisors talk about a more proactive way of working with KS while the Senior management talks more about firefighting and fixing problems when they arise. Area Site Manager B mentions that there is no talk that management would need to provide support for systematized KS activities, and this may be one of the problems. The Senior management does not seem fully aware of the request for knowledge-sharing activities. One speculation for why this problem exist may be that the Senior management is busy with many meetings. During the interviews, some individuals from the Senior management stated that it might be challenging to reach them since they are involved in meetings most of their working days. If someone wants to discuss operational activities, they must keep it short. Hence, it may be difficult for the Supervisors to express their wishes for better knowledge-sharing practices.

In general, the Supervisors want someone higher up in the hierarchy to be responsible for establishing KS activities. However, Trade Block Manager D rather indicates that the Supervisors should facilitate these events themselves and further, Trade Site Manager D does not think that KS-activities is a good idea since there is a many meetings already and that in this case these knowledge activities should be aimed at those who feel they would benefit from it. There is a contrast between the Supervisors and the Senior management regarding who or which should facilitate knowledge activities within the organization. It may be that some in the Senior management underestimates that it requires strong leadership from higher up in the organization hierarchy to implement change initiatives. Trade Block Manager E was someone who had a similar opinion to the Supervisors, and mentioned that a top-down solution is important for establishing KS activities. It is probably the case that in order to enable knowledge activities between Supervisors within the project, there must be collaboration at a higher organizational level. Today, there are different views regarding what knowledge activities are and who will implement them. It is probably essential to establish a consensus regarding these aspects to enable knowledge-sharing practices between the different area and trade blocks Supervisors.

Kotter (1995) challenge the above findings on who can be responsible for initiating KS activities in the company. To drive a change process, it can be advantageous to have a combination of both influential individuals, and those that are not part of the Senior management. The general indication is that there can be one or multiple change agents that have strong leadership capabilities, in order to reinforce KS in the organisation. It is preferable that the change agent can be someone with power, whether it is in the form of status, information and knowledge, influence, or relationship. The reason for this is to create a sufficiently strong guiding coalition. Further, it can be someone in the hierarchy who has a large informal power; someone with a central position within the informal network (Battilana & Casciaro, 2013). This means that the change agent does not have to be at the top of the organizational hierarchy but rather it can be someone at the bottom of the hierarchy aswell, as long as the person has a wide network of contacts (Battilana & Casciaro, 2013, Bresnen et al., 2003).

In addition, it is important that there is continues support from the company in order to encourage a KS process (Bresnen et al., 2003, Fong & Chu, 2006). In a short-term perspective, the idea is that a company could allocate a small budget to a knowledge officer who can set aside a few hours outside their normal undertakings to promote KS activities, (Kotter, 1995, Carrillo et al., 2004) since there can be issues in creating time to participate in CoP (Grisham & Walker, 2006). In the beginning, in order for a knowledge officer to be able to take care of knowledge mechanisms, they probably need to be trained in the area. The company could then take the help of a consultant or seek help within the company, depending on what is considered most appropriate. In the long term perspective it may be good to hire one or several knowledge officers that is dedicated to knowledge activities full time. According to Bresnen et al. (2003), states that these individuals must have a clear area of responsibility and line of authority over those who are to provide

information. Otherwise, there may be no incentive to give the knowledge officer information.

4.6.2 Organizational Structure

As stated by Bresnen et al. (2004) the encapsulated environment of project-based organization can cause a complex system of networks where communication and interaction are embedded in many inter-organizational and inter-professional links. Further, Carrillo et al. (2004) describes a corporate culture where several business units work in isolation with little communication between them, which can be a key barrier for KS. In addition, it is also implicated that the organization may not be willing to recognize that it exists a problem with its culture.

In similarity with the literature mentioned above, the results strongly underline the organizational structure as a key barrier for KS between Supervisors in the different area and trade blocks. Both Supervisors and the Senior management suggest that the geographical distance between the different blocks create issues in KS practices since they are working in isolation with little to no communication. These results differ from the literature by Carrillo et al. (2004) mentioned previously, which implies the organizations unwillingness to recognize culture as an issue. However, it can be observed that the Supervisors, Senior management as well as the Environmental coordinator all seem to acknowledge the culture, in terms of geographical distance, as a barrier for KS.

Therefore, it can be preferable to employ and establish a network of knowledge officers in the each of the area and trade blocks that have continuous dialog with each other and help to diffuse knowledge and the geographical gaps (Bresnen et al., 2003, Fong & Chu, 2006).

Furthermore, the case study provides some insight about the involvement of people from different nationalities in a project-based environment. Trade Block Manager A as well as Area Site Manager A mentions that the language barrier can be a possible issue in KS between the Supervisors. Many of the project members do not have English as their native language. And, the explanation was that some of the project members might not be comfortable speaking English since there may be many technical terms that are perceived to be difficult to express. This idea was indicated by the Senior management but was not mentioned by the any of the Supervisors. Due to the lack of data and research by the authors on the language barrier, the authors cannot confirm whether this is a common issue in construction projects. Furthermore, the reliability of this implication is impacted by the fact that none of the Supervisors mentioned the language barrier as a problem in KS between the different blocks.

In addition, the COVID-19 also contributes to a new complexity in the organizational structure and KS between Supervisors in the different area and trade blocks. Some of the interviewees indicate that the pandemic has impacted the possibility

of sharing knowledge between the Supervisors, and that the stricter requirements has added difficulty in making site visits between the different blocks. This may be viewed as a limitation for the case study, since the selected data has not been able to confirm or deny the impact of the pandemic in relation to KS i project-based organisation. However, it is also observed that these mentioned results may be an amplification of the literature by Carrillo et al. (2004), which have stated that organizational culture in terms of vertical silos as a barrier for KS.

4.6.3 Lack of time

Carrillo et al. (2006) and Styhre et al. (2004) mention that there exist issues in initiating and developing time for KS activities in the construction sector. Carrillo et al. (2004) further mention that employees are usually willing to share knowledge, however the tight project schedule usually creates issues in making this possible. In addition, project members are also faced with high pressure to deliver fast results during a narrow time frame. In addition, Styhre et al. (2004) implies that it may be that organisational members do not have energy to participate in KS activities and the further, that the problem-solving activities during the meetings are done with little effort. Grisham and Walker (2006) therefore suggest that the organization must provide motivation for the project members to participate in communities of practices, which can be driven through intangible or tangible reward systems. Sexton et al. (2009) states similar findings and suggest that organizations can promote a culture in which the collective group is motivated.

In similarity to the above literature, several of the Supervisors as well as the Senior management states the lack of time as a potential barrier for KS activities between Supervisors in the different area and trade blocks. Supervisor C mention that it may be difficult to find time to help out and engage in other Supervisors issues and Supervisor B indicates that there exists high pressure to solve once own problem related to the production on a daily basis. This goes in line with the findings made by Styhre et al (2004) which implicates that organisational members may not have energy to participate in KS activities. Supervisor C1 further strengthens this correlation between the lack of energy and time by adding that it may be personal qualities that are the basis for the lack of time.

Even though the general view by the Supervisors and Senior management are that the tight project schedule may not allow for KS activities, there still seem to exist a willingness to establish, for example, knowledge-sharing meetings between Supervisors. The reason for this was mentioned by the Trade Site Manager D which states that KS activities may help save time at a later stage in the construction project. In line with these mentioned results, Carrillo et al. (2004) also mention that the time dedicated to KS may affect post-project reviews and further lessons learned. A speculation is therefore that the case company may see a long-term benefit in implementing a KS culture, if the activities are well fitted in terms of the company's context and the Supervisors tight schedule.

4.6.4 Identifying where information, knowledge or experience exist

The results suggest that there may be some difficulties for Supervisors to identify where information, knowledge or experience exists in the different area and trade blocks. According to some of the Supervisors, there is a degree of uncertainty on whom to contact when they search for knowledge, in which they must call several different people until they find the right person to contact. Trade Site Manager D mention that it may be that some of the Supervisors do not know other project members form before, which is correlates to the literature by Bresnen et al.(2003), that mentioned that project members that lack social contacts and informal networks may experience issues in identifying where knowledge exist. Further according to Battilana and Casciaro (2013), the ability to form social contacts with other colleagues in the organisation is essential in order to have access to information, knowledge, opportunities and support. It is therefore suggested by the authors that it may be beneficial for the Supervisors to to extend their social networks within the company. Another reason that has previously been mentioned under the “IT-and communication system”- section, is that there does not seem to exist an explicit IT-system, which may simplify the identification of knowledge between the Supervisors.

However, some of the Supervisors mention that they have no issues in identifying where information, knowledge and experience exists in the different area and trade blocks. The reason for this may be that they have good social capabilities and wide informal networks, which has previously been mentioned as key motivators for KS by Battilana and Casciaro (2013) as well as Bresnen et al. (2003). It may also be that these Supervisors has access to a person with high status in the informal network, such as the Site Area Manager, who may have a wide range of contacts that they can supply to their team.

Furthermore, Supervisor A, Supervisor B and Area Site Manager B have proposed ways to easier obtain and make visible information and knowledge to the Supervisors from the different area and trade blocks. For example, Supervisor A proposed a digital weekly letter where different organizational members can shortly describe their work role, what tasks they are involved in at the moment and what future projects they will be involved in. Supervisor A expressed that these weekly letters may give a quick insight about the different organisational members and further may provide an opportunity to simplify access to information, knowledge, and experience. This proposition goes in line with the literature by Fong and Chu (2006) that also mention IT-systems to enable the identification of information, knowledge and experience in the organisation. According to Fong and Chu (2006), an IT-system may help connect employees with each other. It would probably benefit the company to create an electronic list of contact details with the various project members. This list could also be linked to certain key words that indicate who knows what within the organization. For example, if "Foundation" is written as a key word, then a name, number, job title and email will appear to people who work in this area. In this way, it would be easier to connect people in the organization and highlight where knowledge exists.

Another proposition was made by Area Site Manager B which suggested to have Supervisors meetings where all the Supervisors can gather, meet each other and build contact. Supervisor B proposed a similar program such as a workshop where the different Supervisors can share what work they have done in the project, but also what they have learned from their work. These findings go in hand with the theory on communities of practices, which states that Supervisors may gain knowledge through discussion and collaboration in a CoP environment (Koskela et al., 2009). CoP may create a shared understanding between the Supervisors of the shared issue discussed in the meetings or workshop, which can further form a basis for future projects. In addition, the empirical study also correlates to the theory on networking, which states that a joint problem-solving, know-how is developed in the network between Supervisors (Anumba et al., 2005). Furthermore, it creates an understanding on other Supervisors capabilities. However, a challenge that was mentioned by previous theory but not in the results, was that the organization may find issues in motivating Supervisors to participate in communities of practice (Koskela et al., 2009). A way to tackle this could be by creating an environment that aligns the Supervisors purpose with the objective of the CoP.

5

Conclusion

For many years the Swedish construction industry has been suffering due to the lack of knowledge sharing between project members, which has resulted in an inefficiency and an inability to stay successful in a competitive market. The lack of knowledge sharing in the construction sector has previously been connected to an apparent verbal culture, obscure IT-systems, tight project schedule and complex project environment. The aim of this master's thesis was to investigate the current KS practices at a lower managerial level in a major infrastructure project in Sweden and more specifically, mapping out if there exists any KS-activities between Supervisors in the different Area and Trade Blocks today. Further it was investigated what possible barriers and benefits there could be for KS between Supervisors as well what the contracting company could possibly do to facilitate KS practices. In order to draw relevant conclusions about the current status of KS in the Swedish construction industry, this master's thesis used a qualitative-abductive research strategy and further compared theoretical findings with empirical findings.

Currently, there seem to be deficient KS practices between the Supervisors and further the few times the Supervisors gain operational knowledge, it is through verbal communication via informal channels such as through meetings and personal interactions. One of the problems seems to lie in that there are few channels to meet and discuss ideas that there is no systematized way of sharing knowledge. A further observation is that the lack of KS may be due to inexperienced Supervisors in combination with the project complexity and uniqueness. Since many of the Supervisors are relatively new to the Supervisor role in the project, they are probably more in need of sharing knowledge than other Supervisors who have worked for a longer time in the same profession.

While the verbal culture is dominant in the case company, other common means of communication are e-mail, phone calls and the intranet. It is observed that shared knowledge between project members is often not made explicit and that is usually stays with an individual. Furthermore, there is no infrastructure in place within the contracting company that can capture knowledge which is shared between the Supervisors. Establishing an IT-system could therefore be a possible method in order to capture, codify and reuse knowledge. An IT-system may easier document and transfer shared knowledge in a explicit form. The benefit of an IT-system may also be that individual knowledge can be transformed into organizational knowledge, which may be especially important when, and if, project members leave the organization. This will make sure that the knowledge is not lost and can be facilitated for

future use.

At the current moment, there seem to be uncertainty on who may initiate KS practices in the case company, since it is observed that the expectations are differing between the interviewees. While the majority of the interviewees wish for a top-down solution for initiating KS-activities, the literature review suggest that it may be preferable to have one or several change agents in the company which have both power in the form of status or influence, as well as power in the informal networks.

It should be noted that the desire to respectively participate and support KS practices is a majority opinion among the Supervisors and Senior management. However, even if there exist a willingness among Supervisors to participate in KS-practices, the lack of time might have created an inability for this to be possible. Since the Supervisors seems to be under constant pressure to deliver fast results during minimal time concerning site-operations, this may further cause a lack of energy to fully engage and participate in KS-activities. It can therefore be beneficial to create a culture of motivation among the Supervisors where they are inspired to participate in KS. To what extent or form the motivation for KS should be, is perhaps based on the context of the company. Potentially, it may be connected to the realization of how time can be saved at a later stage in the construction project, or how the Supervisors may benefit from the lessons learned during post-project reviews.

Furthermore, the project-based environment for the case company may have caused some potential issues for KS between Supervisors in the different Area and Trade Blocks. This goes in line with the cultural norm which permeates the construction sector and may therefore be recognized as a difficult barrier to overcome, since culture is observed to not be easily changeable. The reflection is that a suitable solution may depend on whether a short or long-term perspective is considered. If the time aspect is manageable, it may suffice that one or several change agents set aside some time outside their normal undertakings to promote KS-activities, Otherwise, a long-term solution may be to assign knowledge officers that can devote their full-time to promote KS-activities in the different parts of the organization.

In addition, it is observed that there may be some uncertainty in being able to source information, knowledge, or experience in the different Blocks, in which the Supervisors have to contact several people until they find a suitable person. This may not be the case for all the Supervisors, since some of them have suggested that they have not experienced issues in this regard. A reflection is that it may be due to the Supervisors ability to form social contacts with other project members, in which it may be that some of the Supervisors have a more extensive informal network than others. Expanding once own informal network and social capabilities could therefore be a convenient approach in order to decrease uncertainty with identifying the existence of knowledge.

This case study has presented the possible benefits of establishing KS-practices between Supervisors, both on an individual level, but also potentially on an orga-

nizational level. On an individual level, there may be great learning opportunities with sharing knowledge. An observation is that many of the Supervisors operational tasks on site are repetitive, though slightly different, which can be adapted and improved to suit their own operational context. Further, if the lessons learned can be transferred and facilitated across the Blocks, there is a decreased risk that the acquired knowledge will disappear due to unstable workforce. Therefore, on an organizational level, there exists great potential to create faster learning processes, sustainable advantage, innovation, but also the possibility to save both time and money.

5.0.1 Recommendations for the case company

Some suggestions on how the contracting company can more easily facilitate knowledge sharing practices between Supervisors will henceforward be presented. While the conclusion has formerly mentioned some possible ways to enable KS, the following ideas are those which the interviewees have proposed themselves. However, it should first be clarified that these proposals are only recommendations and there are no “one size fits all” solutions, as may be well-known about infrastructure projects. Therefore, an important note is that these recommendations can be adapted to fit into the case company’s organizational context.

The interviewees from the case company has suggested possible channels for KS between Supervisors, such as monthly meetings or workshops. The prelude to these meetings would be that all Supervisors can meet up and discuss the projects that they are, or have been involved in, with the intent to learn how others have completed similar operational task.

This master thesis has previously mentioned that an IT-system might make KS more easily accessible for the Supervisors. A potential suggestion could therefore be to make a digital weekly letter which could connect employees, but it could also give insight about different professional roles and provide contact information about useful project members.

Other channels suggested were video conferences, physical site-visits to a particular Area or Trade Block and finally, job rotations. The former proposal might support information to flow between the different Area and Trade blocks, as well as allow the Supervisors to increase their social networks.

Due to the COVID-19 restriction, it could be considered that the recommendations which requires physical presence may not be easily applicable at the current moment and can therefore be planned for at a later stage. A prioritization could therefore be on the recommendations that may not be hampered by the challenges of the pandemic.

5.0.2 Recommendations for further research

Due to the limitations provided by the scope of this master's thesis, the authors have not been able to analyse some subjects which may have granted important insight about projects and organisation in the construction sector. For example, it would be beneficial to investigate how other professional roles in the project, such as the subcontractors, views KS-practices in the different Area and Trade Blocks. Furthermore, this thesis has suggested that the Environmental coordinators role may have been affected by the lack of KS between Supervisors. It could therefore be valuable to make further research on how KS have impacted other functions in the project such as the economy function, environmental function etc.

In addition, this master's thesis has been limited to the Swedish market only and has further been based on a single region in Sweden. Therefore, a recommendation for future research is to include and compare with more regions within the Swedish construction industry, or further broaden the research and include organizations abroad.

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A

Appendix 1

Here the interview template is presented that was used during the semi-structured interviews for this report.

Interview questions

- Kan du börja med att beskriva lite om dig själv i din arbetsroll?
- Har du någon tidigare utbildning som relaterar till din arbetsroll?
- Kan du kort beskriva en vanlig arbetsdag på jobbet?
- Hur är ditt projektteam organiserat och hur kommunicerar ni med varandra?
- Finns det några ofta förekommande problem som du stöter på i din arbetsroll?
- Vad för typ av information behöver du för att utföra ditt arbete?
- Hur får du tag på information som är relevant för att utföra ditt arbete idag?
- Interagerar du och kommunicerar du med arbetsledare i din roll? (Fråga till ledningen)
 - Om ja, på vilket sätt
 - Med vilka arbetsledare interagerar du med i så fall?

- Anser du att det finns det någon kommunikation mellan arbetsledare inom de olika blocken idag?
 - Om ja, vad är syftet med denna kommunikationen?
- Anser du att det finns något utbyte av information, kunskap eller erfarenheter mellan arbetsledare i de olika blocken idag?
 - Om det finns det, hur går det till?
 - Om det inte finns det, hur tror du att ett utbyte av information, kunskap eller erfarenheter skulle kunna se ut mellan arbetsledare i de olika blocken?
- Hur tror du att ett utbyte av information, kunskap eller erfarenheter skulle kunna se ut mellan arbetsledare i de olika blocken?
- Tror du att arbetsledare är i behov av att utbyta information, kunskap eller erfarenheter mellan blocken?
- Anser du att arbetsledare i de olika blocken kan gynnas av att utbyta information, kunskap eller erfarenheter i sitt dagliga arbete?
 - Om du anser det, kan du beskriva varför du anser det?
 - Samt, vad tror du det är för kunskap de är i behov av?
 - Om inte, kan du beskriva varför du inte tror det?
- Anser du att det finns några svårigheter med att utbyta information, kunskap eller erfarenheter mellan arbetsledare i de olika blocken?
 - Om du anser det, vilka är då dessa svårigheter?
 - Om du inte anser det, varför anser du inte att det inte finns några svårigheter med att utbyta information, kunskap eller erfarenheter?

- Anser du att det finns tid att utbyta information, kunskap eller erfarenheter mellan arbetsledare i de olika blocken?
- Vem eller vilka inom organisationen anser du skulle kunna vara ansvariga för att möjliggöra utbyte av information, kunskap eller erfarenheter mellan arbetsledare i de olika blocken?
- Vad tror du effekten skulle bli om det finns något utbyte av information, erfarenheter eller kunskap mellan arbetsledare i de olika blocken?
- Vad ser du som de största möjligheterna med att dela information, erfarenheter eller kunskap mellan arbetsledare i de olika blocken?
- Finns det något IT- eller kommunikationssystem inom organisationen för att utbyta information, kunskap eller erfarenheter idag?
 - Om det finns det, kan du beskriva systemet och hur kunskap kan delas via det?
 - Om det inte finns det, anser du att de olika blocken skulle gynnas av att ha ett sådant system?
- Anser du att ledningen ger stöd för utbyte av information, kunskap eller erfarenheter mellan arbetsledare i de olika blocken? (Ledning = Projektledare, Platschef eller Blockchef)
 - Om du anser det, på vilket sätt ger ledningen stöd för detta?
 - Om du inte anser det, på vilket sätt skulle ledningen kunna ge stöd för utbyte av information, kunskap eller erfarenheter?
- Tror du att andra Platschefer/ Blockchefer/ Arbetsledare ser ett värde i ett informations-, erfarenhets-, eller kunskapsutbyte mellan de olika arbetsledare i de diverse blocken?
 - Varför tror du det?
 - Varför tror du inte det?

- Anser du att organisationsstrukturen hindrar, eller möjliggör ett utbyte av information, kunskap eller erfarenheter mellan arbetsledare i de olika blocken? (Till exempel, hierarkisk-uppdelning eller geografisk placering.)
 - Om du anser det, på vilket sätt hindrar eller möjliggör organisationsstrukturen ett utbyte av information, kunskap eller erfarenheter?
 - Om du inte anser det, varför tror du inte det?

- Tror du att ett utbyte av information, kunskap eller erfarenheter mellan arbetsledare i de olika blocken kan gynna organisationen som helhet?
 - Om ja, på vilket sätt?
 - Om inte, kan du beskriva varför det inte skulle gör det enligt dig?
- Ser ni något behov av att till exempel använda er av regelbundna möten mellan arbetsledare där de kan få dela med sig av information, kunskap eller erfarenheter mellan de olika blocken?