CHALMERS
UNIVERSITY OF TECHNOLOGY

Knowledge Management in Project-Based Organizations

A Case Study within the Swedish Construction Industry

Master's Thesis in the Master's Programmes
Design and Construction Project Management & Quality and Operations Management

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Report No. E 2018:107

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Chalmers Reproservice
Gothenburg, Sweden 2018

Abstract

With its project-based organization, the Swedish construction industry struggles to manage the knowledge that is needed for their employees to fulfil their job tasks. Often locally separated, working on a construction site means being excluded from knowledge transfer and knowledge sharing with other employees. Especially for newly graduated employees it can be hard to find the information the need and a lack of social interaction with colleagues hinders an efficient start at the job. During this study a pre-study, an exploratory workshop as well as ten interviews were conducted to support knowledge management in a construction company. Although the researchers mainly investigated the case study of NCC Building Väst, a general suggestion to knowledge management within the Swedish construction industry can be drawn. As one solution doesn't fit everyone, different ways of knowledge management need to be provided by the organization. Firstly, knowledge can be stored and shared in a structured database, such as an intranet or organized folders. Responsibilities regarding certain roles within the organization and ways to contact those other colleagues must be clear. Finally, socialization plays a crucial role as human capital is a major factor of knowledge management. Communities of Practice and formal initiatives can be one solution to knowledge management within project-based organizations.

Keywords: Communities of Practice, Knowledge Management, Project-Based Organizations, Socialization, Swedish Construction Industry

Contents

English-Swedish Terminology

The following terms were used throughout the research process in Swedish and were translated into English analogously by the researchers. This shall provide the reader with a coherent text and understanding without requiring knowledge of the Swedish language.

Bid	Anbud
Blue-Collar Workers	Yrkesarbetare
Business Manager	Affärschef
Design Manager	Projekteringsledare
Digitalization	Digitalisation
Environment	Miljö
Finances	Ekonomi
Foreman	Arbetsledare
Head of Department	Avdelningschef
Installations	Installation
Knowledge Transfer	Kunskapsöverföring
Logistics	Logistik
Production Manager	Produktionschef
Project Director	Projektchef
Purchasing	Inköp
Site Manager	Platschef
Specialist Department	Specialistavdelning
Technical Installation Coordinator	Installationsledare

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1 Introduction

This thesis will focus on Knowledge Management (KM) in NCC Building Väst, a project-based organization (PBO) in the Swedish construction industry. It was carried out as a case study using a top-down approach meaning that the department´s current KM situation is reflected upon to analyse what the department could provide its employees with. NCC, the company of the investigated department, expresses this increasingly important requirement of KM in its intranet: “If NCC knew what NCC knows” the attempt to make use of the already established knowledge.

1.1 Background

Even though a vast amount of knowledge is already located within the department, it is not used to its full potential. Reinventing the wheel seems to be commonly applied instead of using available solutions. Knowledge in this context is assumed to be mainly tacit and therefore difficult to transfer (Hislop, 2009). To reach an overall efficiency within the department, working with KM is extremely important. Not only more experienced workforce, but especially sufficient supervising for newly graduated employees is needed according to (Sveriges Byggindustrier, 2017). A previous study at the case study’s company suggested learning from industrialization to provide standardized processes to employees (Holmquist, 2013). However, most construction projects are different from each. Other works at the company have investigated increasing efficiency and productivity through the concepts of lean construction (Falk & Wallberg, 2015) and learning from R&D (Pauldén & Stureson, 2015). One of the outcomes from these was the lack of human interaction among the employees. Hence, further research on human capital and practical learning was recommended. The importance of socialization and organizing the existing knowledge was noticed in previous literature reviews within the Swedish construction industry (Walker, 2016; Styhre, 2009). Therefore, the knowledge transfer at the investigated department was further scrutinized with a special emphasize on newly graduated employees.

Since many of them start their work experience as foreman, working on construction site, they are locally separated from the rest of the organization. Due to this disconnection, they suffer from isolation, only getting to know the people that they are working with. As described by Allen, “people who work nearby come to know each other better are much more likely to share [what] they are doing and consequently coordinate their work better” [sic] (2007, p. 24). This inhibits the knowledge capturing, sharing, diffusing and learning between projects (Bresnen, et al., 2016; Dubois & Gadde, 2002). The lack of proper KM in the department especially affects new employees since their network is not established yet.

1.2 Aim and research questions

KM processes at the investigated department could be characterized as ad hoc since consistent KM processes are not established and this might influence the productivity in a negative manner (Dubois & Gadde, 2002). Although the needed knowledge might be close within the department, it is not easily accessible. Other colleagues might share their experiences orally, however a standardized and systematic way to gather information does not sufficiently exist. To accomplish the aims described above the research questions are formulated as following:

- What KM tools need to be provided for newly graduated employees to gain the knowledge that they need to fulfil their tasks?
- How can the strengths and weaknesses of the existing KM system be utilized to support the department's overall efficiency?

The industrial purpose of this study is to map the existing KM tools within the department and put them into a context. Afterwards, their interrelations must be identified so that missing links can be connected so that a smooth knowledge transition to newly graduated employees can take place. On the other hand, the academic purpose of this study is to add value to the KM within project- based organizations. The desired outcome is a continuous improvement of KM to improve the overall efficiency of the department's operations while using available resources. In that way a minimum input of time and effort should help newly graduated employees to gain the knowledge they need to be able to execute the desired outcome of the tasks related to their job position and use their full potential.

1.3 Scope and Limitations

These purposes are going to be examined considering the following aspects:

- Investigation of the department limited to the participants available for the data collection
- Focus on the knowledge transfer to newly graduated employees starting as foreman on construction site
- The current used intranet is considered through the perspective of the data collection's participants without own judgment
- Related fields such as psychology and culture are disregarded as they would exceed the scope

1.4 Thesis outline

This thesis is divided into six chapters. In the first chapter, the study is presented to the reader addressing the background situation, aim and the research questions along with limitations. Chapter two starts with a brief literature review on previous researches in similar study fields and continues by studying literature regarding knowledge transfer and different aspects of knowledge. The methodology and how the research is carried out is explained in the third chapter. The fourth chapter introduces the reader to the case study of the investigated department and its working framework. In the fifth one, results and recommendations are the main concern. It starts with a current state analysis of the KM situation at the investigated department and later examines the strengths and weaknesses of the established components. The chapter is concluded with the participants' recommendations on how to overcome and improve the identified KM situation. Chapter six compares the theoretical and empirical findings to each other. The results are finally concluded in the last chapter. Reflecting on those, an answer to the research questions and the defined aims are given.

2 Literature Review

In the following chapter research work in the field of knowledge management will be reviewed. Firstly, a clarification of what knowledge is, seems crucial. Knowledge management will be characterized through the classifications of tacit and explicit knowledge, as well as the three different understandings of knowledge as a possession, process and practice. After that, former similar studies are introduced. Three Master's thesis that have been conducted in collaboration with the case study's company to improve efficiency and productivity in the company are presented. The three different approaches of industrializing, lean and absorptive capacity are analysed in the field of KM to improve the case study's company's processes. This is followed by two reviews of literature researches in the construction industry where a focus on practical learning and knowledge management through information technology is highlighted

2.1 Knowledge Classification and Transfer

Reviewing former studies, a variety of influencing factors on knowledge management have been found. Jonsson (2012) explains that many KM projects resulted in failure in terms of not having the expected outcome after implementing KM projects in many organizations due to the lack of identification of what knowledge is. In a complex situation as the case study of the investigated department, knowledge therefore firstly needs to be defined to be able to manage it. A popular common understanding originates from the knowledge classification of Nonaka (1994). Citing Polanyi's "We can know more than we can tell" (Polanyi, 1966) Nonaka differentiates tacit and explicit knowledge. This view was cited and validated by various authors during the last years including Alavi and Leidner (2001), DeFillippi et al. (2006) and Orlikowski (2002).

2.1.1 Explicit vs. Tacit Knowledge

Referring to Nonaka and Polanyi, Brown and Duguid (2001) point out the ability for knowledge transfer for explicit knowledge. In contrast, tacit knowledge needs to be converted into explicit knowledge first. Hislop (2009) opposes the ambivalent views by comparing explicit knowledge to objective knowledge. This again, results in a tangible perspective of knowledge. Hence, explicit knowledge can be codified and separated from individuals and society. Tacit knowledge contrarily is seen as personal and difficult or even impossible to codify. Containing cognitive traits, tacit knowledge is subconscious and represents context specific knowledge. The dichotomy between explicit and tacit knowledge is summarized in Figure 1 as per Hislop (2009).

Tacit Knowledge	Explicit Knowledge
Inexpressible in a codifiable form	Codifiable
Subjective	Objective
Personal	Impersonal
Context specific	Context independent
Difficult to share	Easy to share

Figure 1: The Characteristics of Tacit and Explicit Knowledge (Hislop, 2009, p. 21)

2.1.2 SECI-Model

Considering the two classifications of knowledge, the next step is to analyse the processes to transfer knowledge. Easterby-Smith and Lyles (2003) treat the subject of tacit and explicit characteristics influencing the knowledge transfer. For a better general understanding, Nonaka's SECI-Model will be introduced. The first time presented in 1994 and further developed in 2000, the SECI-Model combines four modes of knowledge conversion (Nonaka, 1994; Nonaka, et al., 2000): from tacit to explicit (externalization), from explicit to explicit (combination), from explicit to tacit (internalization) and from tacit to tacit (socialization) knowledge. Figure 2 illustrates the dependencies between the different knowledge transfers through a cycle.

- Socialization: Socialization transfers tacit to tacit knowledge by shared experiences such as apprenticeship, social meetings or spending time together. The transfer of tacit knowledge often requires to be in the same time-space-continuum rather than providing documents or books.
- Externalization: Turning tacit into explicit knowledge allows it to be transferred. The so-called externalization takes place through articulating. Using industrial designers in project teams or creating a concept are examples of this conversion mode.
- Combination: Databases or online computer-aided communication networks are typical examples for this conversion mode. Combination is the transfer from explicit to explicit knowledge. Several sources added together can be a way to create new knowledge in this context.
- Internalisation: The process from explicit to tacit knowledge is called internalisation. Knowledge is learned by action and practice and furthermore translated into tacit knowledge. A common concept is "learning by doing" which occurs through reading documents, experiments or simulations. Every individual perceives the explicit knowledge in their own way and internalizes it to their own tacit knowledge.

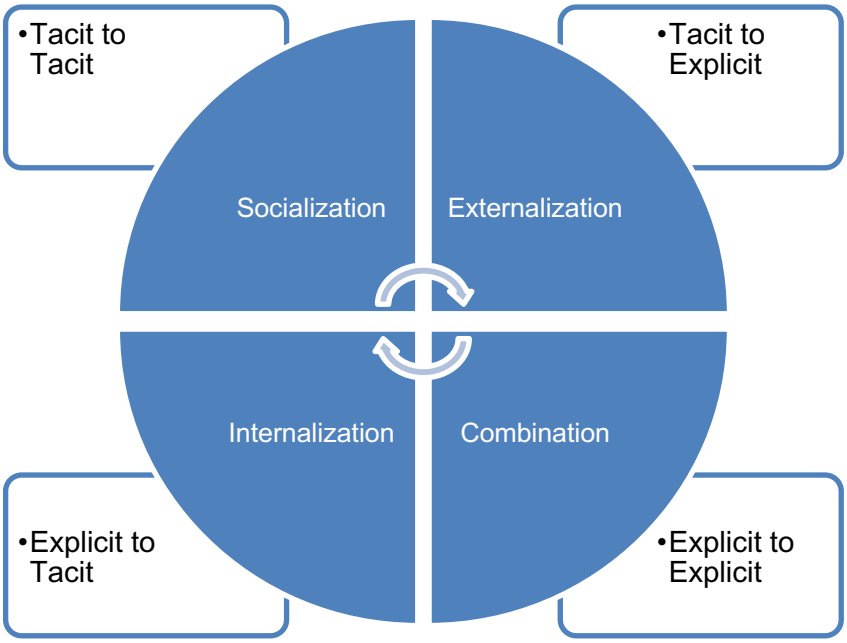

Figure 2: SECI-Model for Knowledge Transfer

2.2 Perspectives of Knowledge Management

To deal with the many influencing factors of knowledge management, this thesis uses various common characteristics to categorize them. Although different definitions of knowledge have been discussed, this study applies the three perspectives of knowledge with special regard to the Association for Project Management (2018) and Newell (2009). Former theories from known researchers such as Grant, Cook and Brown or Dale are used supportively to justify a durable definition. An organizational approach was targeted as the research topic deals with an immense number of influencing factors. The classification of knowledge into a structural, process and practice perspective allows a more accurate analysis of the investigated department's case study.

2.2.1 Possession Perspective

Knowledge in the possession perspective, also often referred as structural perspective, can be viewed as an ownership. As a tangible and explicit object, knowledge can be shared, captured, processed (Association for Project Management, 2018). Comparable with information, knowledge in the structural perspective can be applied reasonable, depending on the individual's cognition. Describing knowledge as "something people have" (Newell, et al., 2009, p. 3), knowledge is mainly acquired through scientific study using support such as books or media or other individuals. Already in 1996 Grant identified the importance of disregarding the creation of knowledge (Grant, 1996). He emphasizes the meaning of transferring and

coordinating the knowledge instead, so that an organization can apply knowledge and benefit from it.

2.2.2 Process Perspective

Knowledge as a process leads to a perspective of knowing (Ibert, 2007) and sensemaking in a social context (Newell, et al., 2009). In contrast to the Possession Perspective, the knowledge cannot easily be transferred as its framework and circumstances need to be considered. Human interaction is crucial to this view as described by the Association for Project Management (2018). In overall, an appropriate setting must be provided to empower trust between individuals and inspire them to build relationships. Hence, a common understanding can be developed and thus contributes to a corporate goal. The main obstacles of this perspective are the codification, collection and organizing of knowledge as Figure 3 shows:

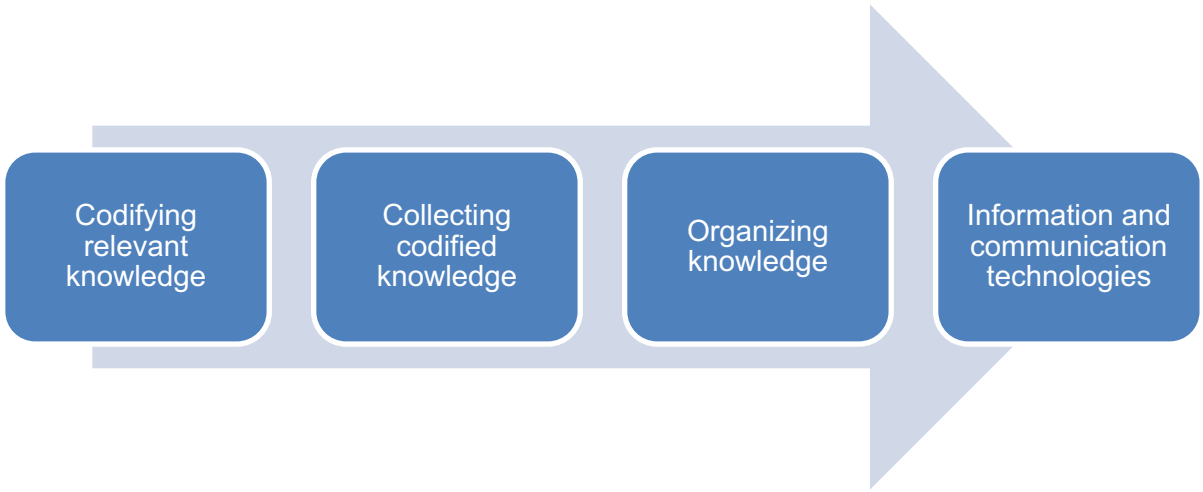

Figure 3: Knowledge as a process (Hislop, 2009)

2.2.3 Practice Perspective

The practice perspective treats the method of learning by doing. Knowledge is connected to actions which is the most effective way according to the studies of Dale (1969). Figure X shows his practice-oriented theory for learning. While only approximately 5% will be captured from a lecture, learning by doing reaches a number above 50%. Managing knowledge, this perspective does not only concentrate on the social context but requires an active form of knowledge transfer as per Newell et al., (2009), (Gherardi, 2000). As Cook and Brown (Cook & Brown, 1999) describe referring to Vickers (1976, p.2) that every individual “has not only its own set body of knowledge, but its own ways of [knowing]”, the Practice Perspective allows a more distinctive knowledge transfer. Every human being has their own experiences and has its own way to perceive and organize knowledge.

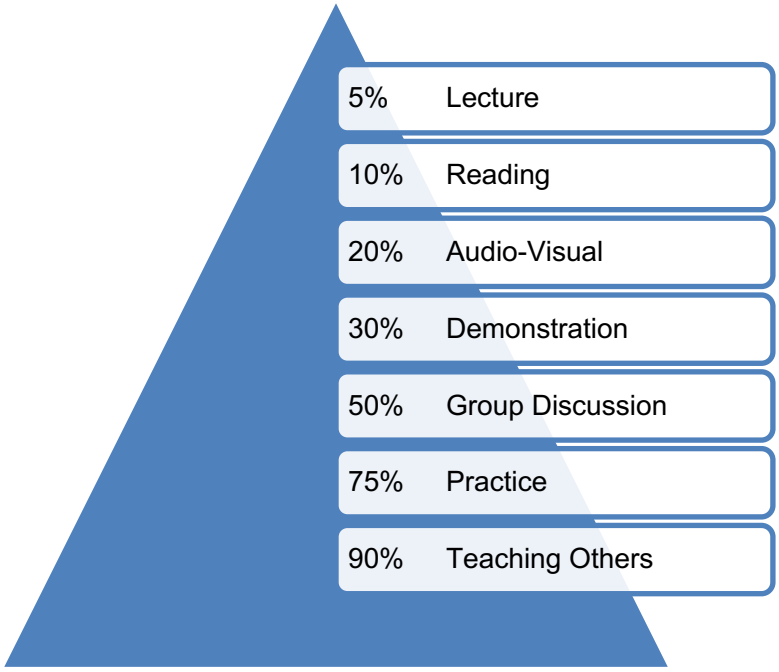

Figure 4: Adapted Cone of Experience (Dale, 1969)

Communities of Practice

Although the Process and Practice "have more in common than not" (Newell, et al., 2009, p. 15) the thesis emphasizes the feasible aspect of Communities of Practice (COP). The focus lies in the possible implementations of this concept. Lave and Wenger have been the first ones to introduce COP as an opportunity to "shape[s] newcomers' identities and in the process give[s] structures and meaning to knowledgeable skill" (1991, p. 74). The advantage of increased working, learning and innovating was confirmed by Brown and Duguid (Brown & Duguid, 1991). In 2004, Wenger further takes up the implementation of his proposed concept. The author characterizes COPs as "groups who share a passion for something that they know how to do, and who interact regularly in order to learn how to do it better" (Wenger, 2004, p. 1). Wenger, McDermott and Snyder (2002) suggest the consolidation of the dimensions domain, community and practice for enhanced knowledge management (Wenger, et al., 2002) and updated them on his homepage for consulting as listed below (Wenger-Trayner & Wenger-Trayner, 2015).

- Domain: The domain implies the commitment to a certain topic within a group. A common interest and competence separates the community from outsiders. Allied by a certain knowledge area, people can learn from each other's expertise and can explore and develop it together.
- Community: Socialization is crucial for this dimension of COP. Interacting and learning from each other make independent people a community. Although a daily base is not necessary, the involvement with the group is substantial to build a relationship within

the group. Insiders are being part of knowledge sharing and are available for other participants to address their issues.

- Practice: A COP doesn't only come with common interests but also joint resources such as methods, experiences or documents. Practical knowledge can be shared between a group of experts with the main attention on a common project but might as well occur during a lunch conversation. A shared practice will increase the individual as well as the collective knowledge.

2.3 Former studies

To get a first impression of knowledge management in the Swedish construction industry, especially also at the case study's company, former researches have been investigated. Their central issues and solution approaches will be discussed in the following.

2.3.1 NCC-based studies

During the pre-study of this thesis, it was brought up that some former Master's theses at the case study's company have been investigating the improvement at the company through industrializing (Holmquist, 2013), the lean perspective (Falk & Wallberg, 2015) and the concept of absorptive capacity (Pauldén & Stureson, 2015). Although not focussing on the investigated and knowledge management an indirect impact on the knowledge sharing and learning exists. Investigating previous works allows the researchers to figure out where the starting point is. Issues that have already been examined need less attention, on the other hand recommendations from former researchers on further research helps the analysed company to continuously improve.

Industrializing and the standardizing of technical concepts do not only result in a more efficient production but even a faster way and more productive way of knowledge gaining for new employees. Repeating techniques from project to project can counteract reinventing the wheel every time (Holmquist, 2013).

A similar method was examined by Falk and Wallberg (2015) who attempt to accomplish effectivity and productivity through the concept of Lean as outlined by Jørgensen and Emmitt (2009), Modig and Åhlström (2013); Sörqvist (2013); Winch and Carr (2011) and Womack et al. (1990). Also adopting standardization of processes and using a process map for the design phase, the results were similar to Holmquist's. A clear process helps the employees to identify crucial elements of complex projects and gives the employees more time for flow and value creation. However, flexibility and managerial freedom are yet valued as involvement and participant's engagement play a substantial role in a changing process. Moreover, trust and

collaboration between the employees are believed to be the key to success. In that way communication and the exchange of knowledge will build a common ground for the team to achieve their goals.

Pauldén and Stureson (2015) on the other hand, were focusing on how to implement R&D knowledge in the project-based organization. Applying Zahra and George's model of absorptive capacity (ACAP), their qualitative case study treated the challenges that come up when an organization absorbs external knowledge (Zahra & George, 2002). Problems with collaboration were identified as trust issues between the two parties of industry and academia due to a shortage time working together. Common expectations were not clearly determined and concluded in team members working individually instead of together. Moreover, a lack of structure was recognized which resulted in lessons learned from R&D being tied to certain individuals. Amongst other recommendations, further research on social capital was suggested.

2.3.2 Construction industry-based studies

Analysing former literature in the Swedish construction industry enables the researchers to recognize current trends that could be followed and implemented for the case study. A literature review on KM has been issued, analysing the developments between 2005 until 2015 within the construction industry. Based on the UK, Australia and Sweden, the 203 papers published in the journal Construction Innovation have been investigated. In Sweden, researchers such as Berggren, et al. (2011) and Bröchner (2013) have been reviewed. The main challenges that have occurred according to Walker (2016) were the lack of "blue sky" research and the insufficient consideration of tacit knowledge. Blue sky in this context refers to less researched fields in knowledge management such as visualizations and the use of game-modelling for big data. Artificial intelligence is suggested to support human-learning and increase effective innovation. However, a growth in that industry as well as a development towards Learning through Practice have been recognized. The tacit knowledge can hence be shared by socialization as recommended by Styhre (2009) referring to Carrillo's "people-centred techniques" (Carrillo, 2004, p. 640). Styhre also agrees to the use of information technology to overcome the challenge of sharing explicit knowledge in his literature review about the construction industry. Although he claims the literature both internationally and Swedish to be limited, he refers to a practical learning approach and clear procedures as key factors to innovative firms. The main references and issues of the subchapter 2.3 Former studies are summarized in the following figure.

Author	Subject	Result
Holmquist (2013)	Industrializing	Efficiency and productivity at the case study's company through industrializing
Falk and Wallberg (2015)	Lean	Efficiency and productivity at the case study's company through lean
Pauldén and Stureson (2015)	ACAP	Challenges at the case study's company due to lack of trust → recommendation on research about social capital
Walker (2016)	Review on KM between 2005-2015	Learning through practice and "Blue Sky" research gained significance in KM
Styhre (2009)	KM in the construction industry	Practical learning and clear structures are key factors to innovation for KM

Figure 5: References and Issues of similar studies

In short, knowledge can be distinguished into tacit and explicit knowledge. As explicit knowledge can be easily shared, it is comparable to the perspective of knowledge as a possession. It can be supported through IT when researching more about the so-called "Blue Sky" research. On the other hand, knowledge can also be tacit and therefore is often considered personal, subjective and difficult to share. An approach might be the knowledge transfer through the perspectives of knowledge as a process or practice. Researchers such as Lave and Wenger (1991) or Styhre (2009) emphasize the importance of socialization, for instance Communities of Practice.

3 Research methodology

According to Bryman and Bell (2015) a case study within business is defined by its "focus on a bounded situation or system, an entity with a purpose and functioning parts" (p. 68). The bounded situation of this thesis is the study of the investigated department and how the knowledge is managed within its organization. The aim of the research was therefore determined by analysing the existing knowledge management system to improve the department's overall efficiency. Semi-structured interviews and observations are a preferable research method as described for qualitative research as per Bryman and Bell (2015). Continuous feedback from both a supervisor at Chalmers and the case study's company each were used along the research process to focus on the research questions as efficiently as possible. For the same purpose a top-down approach was chosen so a more extensive view could be generated.

This led to a purposive sampling (Bryman & Bell, 2015) focusing on a broad variety of participants (see Figure 6 and Figure 7) to reach an overall perception of the current KM situation. It was established through a total of seven different job titles from foreman to trainee (see Figure 6) with one or two participants each from every job title. To figure out not only what is required by newly graduated employees but also what needs to be known according to more experienced employees, participants with various years of experience were contacted for the data collection (see Figure 7). The participants experience was located within a range from less than one year to almost 30 years at the case study's company. Some of them had previous work experience in similar fields so that their total work experiences were within a range from less than one year to 40 years in the construction industry. This enabled the thesis to examine how the current situation contributes to its goals rather than only focusing on what is required by the newly graduated employees starting their first job at the investigated department. As such, what worked well can be improved and what did not work well can be tackled using a minimum amount of resources to enhance the department's overall efficiency. To ensure relevant sampling, the participants were suggested by an operational manager that was familiar with the research subject as well as the department itself.

Job title	Number of participants with that job title
Design Manager	1
Foreman	2
Production Manager	1
Project Director	2
Site Manager	2
Technical Installation Coordinator	1
Trainee	1

Figure 6: Job titles and number of participants with that job title

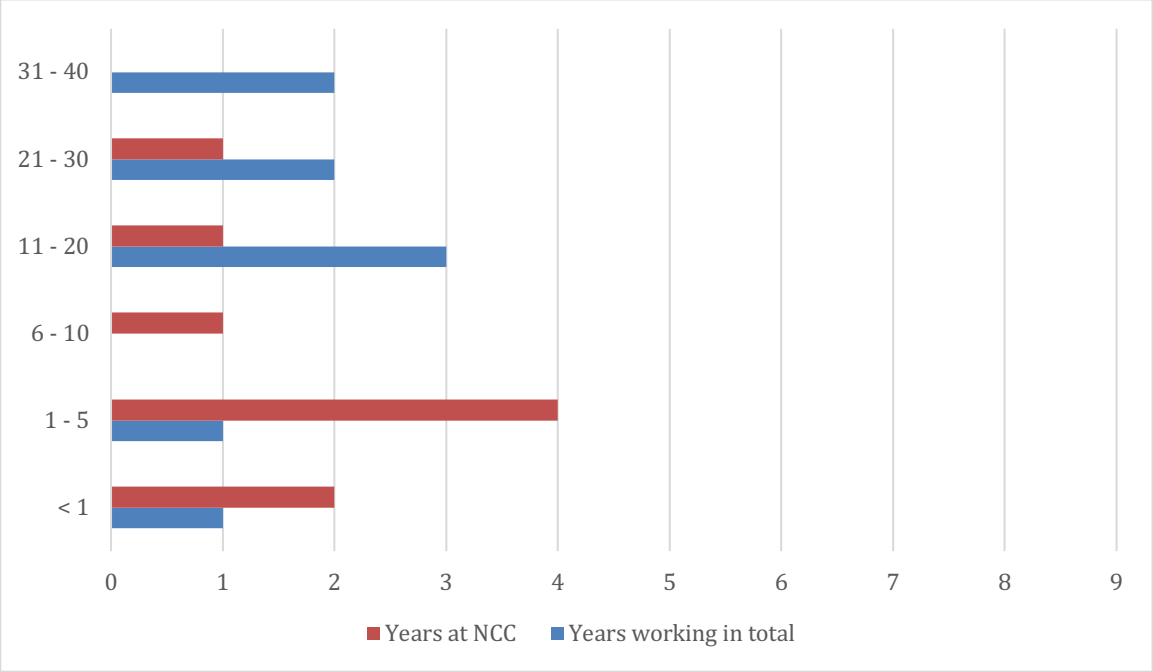

Figure 7: Work Experience of Participants at the case study's company and in total

The research process for this thesis can be seen in Figure 8 and will be further described in the sub-sections of this chapter. During the pre-study period, the investigated department's structure and communication processes were observed. After getting a first insight, literature review was done throughout in concomitance with the data collection and its analysis. Finally, a conclusion was made and presented during the last weeks of the research process.

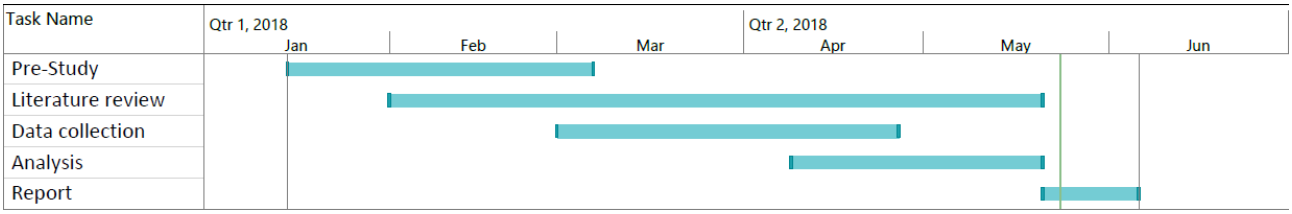

Figure 8: Gantt-Chart of the research process

3.1 Pre-study

A pre-study was made by having meetings with the operational manager at the investigated department and the lean construction manager. The investigated department's structure and its already existing KM system were examined. Further insight was given by two construction site visits and informal talks with different employees to understand the working environment and surrounding better. During this phase preliminary research questions were formulated by the researchers. After the pre-study, the research process took form as described in Figure 8.

3.2 Literature review

Literature was reviewed throughout the process of writing this thesis to research about similar cases, their applied concepts and theories in knowledge management. Due to its relevance in the field of business research and methodology, *Business research methods* (Bryman & Bell, 2015) was taken in special consideration. This procedure enabled a first limitation for the research questions which were then subsequently modified. The main understanding about the relevant research areas as well as previous research results derived from searches on the Chalmers library online database as well as Google Scholar. Suggestions and references of similar former researches were also considered, mainly conducted at Chalmers University of Technology. Scientific books and articles in English as well as Swedish were examined. They were selected by searching for generally relevant keywords such as *construction industry*, *information management*, *knowledge*, *knowledge management, knowledge transfer*. During the process and especially after the phases of the pre-study and data collection those keywords were narrowed down to more relevant terminology such as *best practice*, *communities of practice* or *explicit* and *tacit knowledge*.

3.3 Data collection and analysis

As a general perception of the participants was pursued, the chosen methods for the data collection were an exploratory workshop and individual semi-structured interviews with the same participants. The exploratory workshop aimed to answer the first research question (see 1.2 Aim and research questions) focusing on what KM tools are required for an efficient overall performance within the department, the qualitative interviews targeted the second research question (see 1.2 Aim and research questions) by inquiring how the current situation could contribute to the desired objective. The exploratory workshop was used to make the participants aware of the subject that was then re-presented during the interviews. Although the data was mainly collected in Swedish language and translated into English later, the language level of all participants can be regarded professional, not significantly influencing the outcome of this study. Shifting the focus from what needs to be done to how things should be done was hence the approach to build up a data collection about the executed practice, which

could be combined with the reviewed literature in the data analysis. The findings of both the exploratory workshop and the interviews were coded through the key concept of grounded theory (Bryman & Bell, 2015). The resulting categories and theories were compared to the existing literature, so backed up theories and suggestions could emerge.

3.3.1 Exploratory workshop

Based on the Affinity-Interrelationship-Model (Alänge, 2009) an exploratory workshop with nine employees of the investigated department was conducted to collect relevant data from different positions within the department. These employees were chosen according to their availability but also with a preferably broad background about their work experience to avoid bias and operational blindness. Opposing them with the question "*What were the main difficulties that new NCC employees have to deal with in order to capture the knowledge from experienced employees?*" was one of the approaches to emphasize which issues build the main problems in the existing KM system. The question was formulated according to recommendations by Alänge (2009) so that it was neither too general nor to narrow for capturing required information from the participants. Furthermore, the question was formulated in past tense according to recommendations so that no participant would feel responsible for former occurrences. The different steps taken under the workshop can be described as following:

1. Brainstorming of ideas
2. Grouping ideas (affinity)
3. Identify interrelationships of groups
4. Prioritizing importance of groups
5. Final discussion and conclusion

By making sure to involve everyone through writing visual post-its instead of having unilateral discussions, a broader mindset and less group thinking was promoted. Working on this common questioning, the workshop allowed the thesis to be narrowed down and made the participants aware of the issue in their environment. The exploratory nature of this method yielded quick results that were based on the participant's perception.

Although only two and a half hours were spent on the workshop – an appropriate duration would be 3-4 hours for an amount of 4-8 participants according to Alänge (2009) – observations and actively involved participants produced a thought-out result. Taking a shortcut during step three (Identify interrelationship of groups) by doing less grouping levels than would be desired and only finding a short description for the post-its instead of working out full sentences took the intended level of accuracy from the original purpose and therefore might have distorted the result. Other difficulties during the workshop were the different involvement levels of the

participants; whereas some are enthusiastically engaged and even came up with new thoughts that were out of the scope of this thesis, others were rather reserved and thoughtful. These observations that might have derived from participant's character traits or their former experience were noted after the workshop so that the individual's behaviours could be considered in the follow up interviews.

3.3.2 Qualitative interviews

To give the participants a "great deal of leeway" (Bryman & Bell, 2015, p. 481) semi-structured interviews were chosen as a follow up to the exploratory workshop. All the nine participants from the previous workshop agreed on having an individual interview. Having already been informed on the subject matter allowed to speed up the interviews which was ideal due to the participants' time restrictions. Furthermore, previous observations allowed considerations to be taken as to fit each participant's interview to what was considered their perceived enthusiasm as well as delve deeper into the topics presented during the workshop. The preparation of questions (see appendix) and their semi-structured implementation allowed the participants to explore different opinions and new ideas while remaining to the original purpose of the thesis. The questions were nevertheless more specific compared to the previous exploratory workshop. Their semi-structured nature enabled the researchers to receive new input as well as being able to clarify or change the questions and their order if necessary. As all participants were already part of the exploratory workshop, a common ground was established so that the questions were mainly the same to each participant. Small adjustments regarding their job position or job experience were made and specifications of questions occurred in case of ambiguity. Additional questions were raised when new issues came up during the interviews. All this was carried out in a time frame of 20 to 50 minutes while an average interview took 35 minutes. One main interviewer was asking the prepared questions and the other researcher took minutes, stepping in when necessary. Additionally, eight out of nine qualitative interviews were audio-recorded and reviewed after the interview. One participant rejected a recording of the conducted interview. The review was done as to counteract a lack of transcription due to time restrictions. The dual control principle hence made sure that there was no lack of information when analysing the data collection. For the interview without audio-recording, both researchers were taking notes throughout the whole procedure.

Despite already being aware of the topic through the exploratory workshop, participants might still be limited with their sharing opinions during the interviews as most of them were time restricted. They might have other opinions and information that they did not come up with during the interview session even though similar topics were brought up. The advantage of

non-biased and spontaneous answers might be opponent to the inability to prepare answers to the interview questions as the questions were not sent out to the participants beforehand. Moreover, after the originally planned interviews with the nine participants, a lack of knowledge about the existing trainee programme at the case study's company was highlighted from the interviews. Therefore, an additionally qualitative interview with different questions (see appendix) was carried out with one newly finished participant of the programme. Thus, the researchers could get familiar with the already established programme from another point of view.

4 Case Description

The following chapter introduces the reader to the case study of NCC Building Väst. The department belongs to the business area of NCC Building which stands in contrast to NCCs other business area NCC Infrastructure (NCC Sverige AB, 2018). Both are in the area of Constructions and Civil Engineering and are conducted in Sweden, Denmark, Finland and Norway. Located in the Western part of Sweden, the investigated department mainly constructs offices and residential buildings but also other premises in both the private and public sector (NCC Sverige AB, 2018). With a focus on the city of Gothenburg, the current projects include constructions such as the visited new building of Kvarnbytornet, a housing complex, an expansion of the airport of Landvetter as well as the refurbishment of the dormitory of Olofshöjd. The organization structure of the investigated department can be seen in Figure 9 below.

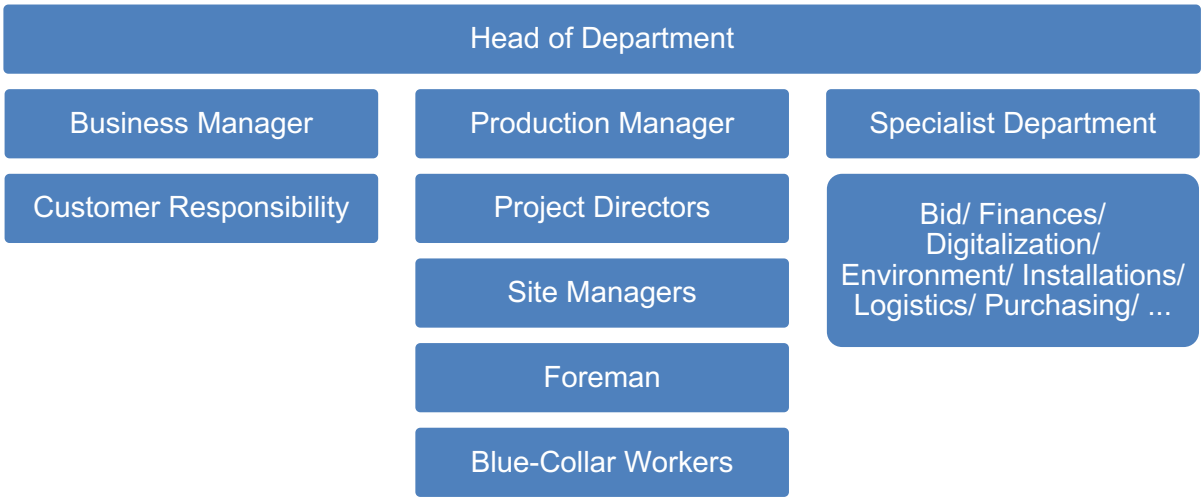

Figure 9: Organization structure of NCC Building Väst

5 Results and Interviewees' Recommendations

The findings of the data collection are aiming to answer the research questions (see 1.2 Aim and research questions) and are mainly based on the qualitative data that has been collected during the exploratory workshop and the interviews at the case study's company. Additionally, data from other gatherings such as feedback sessions and observations are considered. The chapters are divided according to Hislop's perspectives of Knowledge as a Possession, Process and Practice (2009). Every subchapter firstly consists of the participants' perception of the current situation regarding KM at the investigated department and secondly, by the identification of the strengths and difficulties in the current situation. The subchapters are then concluded with recommendations of the interviewees to improve the current situation according to the data collection.

Current Situation

To understand the KM situation at the investigated department, an analysis of the current situation has been done. This was to understand which KM attempts already exist and derived from the interview question "How do you work with the transfer of knowledge and experiences?". The given answers are shown below.

- A lot of existing material
- Assign responsibility step by step
- General courses, e.g. safety
- Meetings after projects
- Mentorship
- Phone meetings
- Responsible person
- Role Descriptions
- Social Platforms
- Socializing and exchange of knowledge
- Specialist Department has processes
- Summer internships

Furthermore, whether these KM activities are aligned with each other was investigated. Other interview questions about existing material and socialization opportunities were considered to develop a better understanding of today's complex situation. In this way, briefly mentioned issues could be linked to more explicit descriptions. The results are grouped in three sections; the first section considers the existing materials such as checklists and manuals that are provided to gain knowledge, followed by the current structure and responsibilities that come with KM. Finally, the socialization of the participants is examined to highlight the existing processes of human interaction.

Advantages and disadvantages of the current KM situation

At the investigated department, there exist some positive and some negative things regarding the current KM situation. The negative aspects deriving from the conducted interview are shown below:

- Construction Site is locally separated
- Inconsistent Systems
- Initiative/ Engagement
- Lack of Structure
- Learning by doing required
- Not enough Time
- Too much information at once
- Unclear Expectations

Both the positive and negative findings are presented according to the three perspectives of knowledge namely knowledge as possession, knowledge as process and knowledge as practice so that the reader could easily understand the current situation.

Interviewees' Recommendations

In this part, the recommendations and ideas for improvements for current situation is presented. The responses from the interviews are shown below:

- Don't work alone
- Get feedback from new grads
- Get to know different roles
- Get to know working life beforehand
- Give feedback to new grads
- Involve experienced staff
- More specific courses for different needs
- Right setting for curiosity
- Same space-time-continuum
- Start as foreman
- Visual leadership

The answers are given to the question: "Do you have other recommendations for making the knowledge and experience transfer to the newly graduated employees more effectively so that they could get acquainted with their roles as quick as possible?" As it was with the advantages and disadvantages in previous chapter, the results will be presented in three different perspectives of knowledge, namely as possession, process and practice.

5.1 Possession: Existing Information

Knowledge as a possession at the investigated department means information and experiences that can be found within the organization. These can for instance be presented in the company's intranet (online platform) or other documentation.

5.1.1 Current Situation

One issue that was mentioned in the interviews was the numerous amount of existing material that is provided at the case study's company. Due to the large structure of the department, a vast number of documents have been collected. A missing structure however hinders the employees to find what they are looking for. Additionally, the found material might not have been reviewed. Thus, the current situation is unreliable. As the intranet of the investigated department has been under construction during this research process, it has not been further analysed by the researchers themselves. A clearer structure might be a result of the new-launched intranet. However, a first investigation during the pre-study of this thesis showed that it includes general information regarding the company´s structure, how it is organized, and responsibilities of miscellaneous departments. A process map and the company's values have been part of the intranet. Although these documents are not too specific, they still provide useful information and contribute to a total understanding of the company. Despite the launch of a new intranet, the structure of the intranet came up during the data collection and was therefore considered through the participant's perspective.

Manuals and checklists – Providing a new employee with a good reception on the first day is the responsibility of the boss so that the employee gets a good reception at the first day. The required practical issues are gone through with the boss. Furthermore, the new employee gets a short and general introduction about subjects such as company values, safety or working conditions. Upon these, the newcomer also gets acquainted with his or her first tasks. During the data collection it was mentioned, that one of the departments, the Specialist Department, has several manuals and checklists regarding different processes to provide a systematic system to their new colleagues. This arises from regulated processes that have to be taught to all involved employees to enable an organized and appropriate way of working.
On top of these formal documents like manuals and checklists, there are also some informal documents that exist in different project organizations. The necessity for these emerged from some project organizations themselves. Some construction sited felt the need of assigning clear tasks and responsibilities to their colleagues. Their experience showed that a common way of working adds value to an efficient way of working. Clear responsibilities give the advantage to distribute the workload equally among the participants.

Role Descriptions – When a newly graduated employee starts at the investigated department, it occurs that they do not receive clear information about what is expected from them. Although there are some general role descriptions for a variety of roles, the newly graduated employees often do not get those and therefore experience stress at work trying to figure out their tasks. Besides, the role descriptions are too general which the newly graduated employees might not be fully aware of. It is an issue that some roles demand a more specific description for the newcomers to fulfil their tasks.

5.1.2 Advantages and disadvantages of the current KM situation

The positive findings with the current situation when approaching knowledge as possession at the investigated department would be that many experienced employees are available and willing to share their knowledge with the young and inexperienced ones. Furthermore, the Specialist Department has processes which are well documented in manuals. Besides the Specialist Department, the complete case study's company has a lot of existing material that newly graduated employees could find knowledge.

On the other side of the coin, the same lastly mentioned sentence on the paragraph above, the amount of knowledge/data/information that is on the intranet is huge, not up to date and not even structured well. Another negative finding is that, different departments are not allowed to make changes on intranet since it is operated centrally and aimed to serve all of the case study's company's departments in Sweden. Furthermore, the unclear expectations from newly graduated employees is another negative finding. The newly graduated employees seem to find that the amount of information given in the introduction day is too much and very difficult to grasp them all. Finally, it is mentioned during the interviews that some improvement ideas that the employees have are handled in a bureaucratic way so that with every improvement ideas that the employees come with need to be put in the intranet with calculations to predict how much savings the idea would generate.

5.1.3 Interviewees' Recommendations

Every role should have a clear definition of what is expected from the persons in those roles. This should be structured well and be present at the project portal so that people are also able to see what their colleagues' responsibilities are. The role description should be from general (from company level) to specific (project level). Using experienced as a resource and actively asking questions to them should be promoted. One solution fits all kind of mentality does not work in knowledge management and transfer from experienced to inexperienced. Therefore, there should be alternatives and employees should be able to choose whichever suits them best. How the sharing and transfer should be with alternatives. Some prefer getting the

information and giving the information through databases and some through human-to-human interaction. The intranet that the case study's company had during the research process changed so that the researchers were not able to compare the old and the new versions of the intranet. It is although recommended from the interviewees that the information on the intranet should be up to date, only relevant information should be there and that it has to be structured very well so that employees do not struggle finding what they need. A drawback of having too complex intranet and employees not finding things quickly makes them choose not to use intranet for searching for knowledge and experience eventually and hence decreases the commitment to use it.

It is also recommended by the interviewees that there should be enough time for the learning process. If there is a time press, then the task might just get done but actual learning would not take place since time for reflection is not existing. Another recommendation is to create circumstances that encourage active learning. Learning from documents would not be complete unless the newly graduated employee gets the possibility to do it himself/herself. To support this, mentorship is recommended. As discussed above, with mentors it is not only the traditional understanding of mentorship but also an informal one where experienced colleagues can guide the newly graduated employees. These informal mentors could even be colleagues who started only a couple of years ago but have been in similar situation. It is recommended that this culture of asking to colleagues is encouraged and eventually becomes a company culture.

Knowledge worth sharing – A difficult thing is to understand what is worth sharing or transferring to others. Something that seem not to be that important might be crucial for others with different circumstances. Therefore, it is essential to get an overall understanding of the processes that is going on. To do that, a comprehensive education must be given so that employees could get a clear idea of processes that they are/will be part of. It is also recommended that the newly graduated employees get an introduction thoroughly for each project that they will be a part of. Furthermore, getting to know the environment that they will be working in and the framework that is valid should be introduced.

Another part is the technical knowledge that the newly graduated employees have when they start. It is subjective what people need to know. Depending on the job, it might be useful to start for instance at the Specialist Department or such. Aftermarket department knows how a house is functioning after years and where mistakes could take place while constructing buildings. For this reason, it is recommended that during the interviews that there might be

useful learnings and grasping a better overall understanding for the newly graduated employee.

Along with general role description for different tasks, it is also recommended that there are more detailed role descriptions so that newly graduated employees can have a better understanding of what is expected from them and perform accordingly. The employees should get parts of the tasks, maybe two or three, and show that they can handle those correctly. First after then, they should be given additional tasks. All these learning processes should be supported with supervision of an experienced employee and by giving enough time for the newly graduated employees. Lastly, for knowledge as a possession, it is also recommended that newly graduated employees are familiarized with budget, risks and possibilities that exist within their project organization.

5.2 Process: Responsibilities and Structure

Knowledge as a Process focuses on the transfer of knowledge. In this context, processes entail the necessity of an appropriate structure and clear responsibilities.

5.2.1 Current Situation

As the investigated department is one of the largest departments at the case study's company, the communication between different functions seems to be less coordinated and therefore not efficient. As a result, employees don't know each other and where the needed knowledge resides is unknown. During the interviews, an unclarity regarding who is responsible for different things is mentioned, even though some responsibilities were clearly defined as described in the next paragraphs. These responsibilities relate to the quality, the structuring of the organization and the overall improvements at the department.

For supporting activities, there is an operational manager who is improving the interconnections through meetings so that the different subsections are functioning in alignment to each other. The responsibility of the operational manager is to develop and implement different operations and processes, so a sufficient overall quality within the department within the department is reached. By establishing a sustainable strategy, a long-term competitiveness is the aspiration.

The responsibility of recruiting a new employee is mainly up to the technical employee that the novice will work with. The human resources department has a supportive role, for instance arranging a meeting or dealing with required documents. Hence, they have no mandate of the

decision of hiring the person and a standardized system and selection procedure does not exist.

Learning by doing – When newly graduated employees start at the investigated department, there is a common way of giving them small tasks in the beginning so that they can easily get comfortable with their working environment. These small tasks are mainly supervised by a more experienced colleague or a manager. As time passes and the newly graduated employees improve their skills, they are given more responsibilities. Although this behaviour is common, it is not the formalized praxis. During the data collection for this thesis, another approach teaching newly graduated employees was to give all the responsibility to them so that they experience the real work situation.

5.2.2 Advantages and disadvantages of the current KM situation

When the knowledge is seen as a process, it can be noted that the operational manager is in charge for the general improvement of KM processes at the investigated department. To support the operational manager, there is also a Lean Manager who is providing the department with Lean methodology and with Lean Knowledge Management. Besides these two distinct roles, the experienced employees feel obligated to support their colleagues (both newly graduated and experienced ones) with required knowledge.

On the negative side, the KM process at the department is interpreted as unstructured, and from time to time ad hoc. Several employees express that the time pressure with their regular tasks are hinder when it comes to transferring knowledge to others. Having unclear expectations regarding what knowledge to transfer and to whom also slows down the knowledge transfer process. Another problem that is identified is that the employees who are working on construction site feel separated from the rest of the employees at the department. This is understood as a natural process within the construction industry, however, the problem with transferring knowledge to and from the construction site remains. Finally, not every employee feels motivated to transfer knowledge as they do not think that it is their primary task.

5.2.3 Interviewees' Recommendations

Seeing knowledge as a process, the first recommendation would be to create right setting for curiosity for the newly graduated employees so that they do not hold back of asking questions to their colleagues. Furthermore, newly graduated employees should get feedback so that they are aware of their progress.

5.3 Practice: Socialization

Knowledge as a Practice emphasizes the need of socialization for KM. Human interaction can be used to support knowledge sharing in a tacit and explicit form.

5.3.1 Current Situation

The company provides a setting for socialization. In the current situation, this is limited to a few occasions and occurs without a focus on sharing knowledge and experience to newly graduated employees. Yet, these social settings provide a milieu where newly graduated employees can meet and get to know people so that they broaden their network within the company. This later makes it easier for the newly graduated employees to contact experienced employees and ask them questions if required. The KM practices at the investigated department based on social activities can be divided into three subsections. In the following these are introduced as Project-Based Socialization, Formalized Initiatives and lastly Informal Initiatives.

Project-based Socialization

This type of socialization is mainly due to the nature of the project organizations and it is an essential way to communicate within the projects. There are some regular meetings at the investigated department. These meetings are generally planned and the purpose with these meetings are briefing the rest of the organization. The shared knowledge is varying depending on the projects, but the common part is usually what went good or bad with projects. There are four meetings where the top management (including the managing director and the production managers) where the participants briefly inform about their projects. The aftermarket department also has regular meetings where all aftermarket managers at NCC Sweden meet twice a year and share knowledge and experiences with each other. Furthermore, there are meetings after each completed project. The purpose of these meetings is to share the experiences and important things that happened during the project. The Aftermarket Department has upon those physical meetings twice a year, also have video conference/phone meetings where all aftermarket managers at NCC Sweden speak with each other.

Formalized initiatives

The case study's company is providing the newly graduated employees with a variety of activities. Like the socialization in project-based meetings, the main purpose of these meetings is not to socialize the employees with each other but rather create right circumstances of working environment. These activities are as follows:

Internships - At the investigated department, students who are close to graduate are hired as interns during the summer with the main purpose of hiring these students later after their graduation. By doing so, the summer intern is acquainted with the company and some initial difficulties that arise with every new employment is taken care of.

Mentorship - There is an established mentorship program at the case study's company that has been going on for many years. However, in practice, it is possible to identify two different types of mentorships. The first one is the official one, where a newly graduated employee and an experienced employee are paired. In this type of mentorship, the mentor and the adept could be placed in two different locations in Sweden. These people are having some phone/video/mail communication occasionally and they also have usually physical meetings twice a year. The other type of the mentorship is more an informal one where an experienced employee is helping a newly graduated employee with practical knowledge. This type of mentorship usually takes place between two employees who work together (or worked together previously)

General courses/ lectures - There are also some general introductory courses given to newly graduated employees regarding the company, rules and regulations related to work, for instance safety courses.

Informal initiatives

The necessity to have an open and functioning communication channel arose for two functions. These functions experienced the lack of communication with people having similar tasks throughout Sweden and therefore used a group chat software (Microsoft Teams) where people with similar tasks feel closer to each other and can share experiences and ask questions to each other within the group. All the case study's company's employees in Sweden within these functions are invited to the respective groups. Besides these, some newly graduated employees formed a group on social media (Facebook) to share experiences and support each other.

5.3.2 Advantages and disadvantages of the current KM situation

The advantages and disadvantages that are identified at the department when seeing knowledge as a practice is narrowed down into three different parts. This is partly for making the reading easier but mainly for separating different socialization practices from each other.

Project-based socialization

At the investigated department, project organizations have a positive culture when it comes to share knowledge and see that as a practice. It is a common understanding that sharing knowledge within the project group benefits to the overall efficiency for the project. It is also part of the project culture that learning from other's mistakes and successes is a good manner. Getting to know other employees in project organization is interpreted as positive. A final positive finding when it comes to project-based socialization at the department, a very positive thing is that there are regular meetings throughout the project within project organization. On the other side, as it was with the knowledge as a process, the time pressure seems to be a dominating factor to explain why knowledge transfer from time fails within project organizations. The fact that construction site is locally separated limits the knowledge transfer to and from the project. Furthermore, the lack of engagement could also be mentioned as a negative finding. Lastly, learning by doing is required in project-based organizations so that the knowledge transfer can be efficient.

Formalized initiatives

The case study's company organizes interactions with students which promotes for a good knowledge management transfer culture. Interaction with future employees, usually students at university who has a semester, or a year left are through student events are created. This allows the case study's company to shape their future employees and provide them with knowledge already when they are students. The experienced employees feel appreciated when they can share their knowledge with students. This setting also provides for socialization and broadening the network at the company. The negative findings with this setting is that is understood as unstructured. As mentioned in earlier chapters, the lack of time, lack of engagement and unclear expectations are mentioned by the employees.

Informal initiatives

Some employees at the case study's company took informal initiatives and built a network for themselves. Two functions at the investigated department created accounts for a group chat software (or were actively participating during the process) for all employees within those functions in the case study's company in Sweden. The main purpose was that the employees needed a structured way of communicating and sharing knowledge and experiences with each other. These groups arranged the group chat software's interface so that there are forums for different things (such as asking specific questions) so that it enhances knowledge and experience transfer within the groups. Another finding was that newly graduated employees created a social media group in which they share experience with each other. These three initiatives show that the case study's company has employees that felt the need for an effective

knowledge sharing system and solved it with their commitment. A negative finding is that, although the solution is fine, that the employees needed to solve this problem themselves with platforms outside of the case study's company's intranet. The main reason is that the intranet is operated centrally and there is no room for adapting that to small functions needs.

5.3.3 Interviewees' Recommendations

When knowledge is seen as practice, the recommendations are again divided into three categories to be consequent with previous chapters.

Project-based socialization

In project-based organizations, socialization is extremely important when carrying out daily tasks. Discussing with colleagues, asking questions to them and answering to their questions are fundamental part of working in a successful project-based organization. The project teams should be put together in such a way that the group is complementing each other. Furthermore, the communication to other employees with similar tasks in other project organizations should also be supported. This includes not only projects of the investigated department, but also other of the case study's company's departments. Best practices should be shared between different project organizations and newly graduated employees should be encouraged to participate in such meetings.

Formalized initiatives

As mentioned in previous chapter, formalized initiatives are big part of socialization. Although the main purpose is not to have such initiatives as a KM-tool, if planned with caution, these initiatives could contribute to an overall improvement of the KM situation for newly graduated employees. If such initiatives are carried out with great caution, so that number of participants is not too many, such events can contribute to learning. However, if the number of participants is too much, then such an event turns into a social event without that much learning. Participants should be getting feedback after such events. As a part of these formalized initiatives, it should be aimed that students are also introduced to working life. Summer internships should be available so that students already then start to get used to the case study's company and build up a network. The power or visual leadership is recommended to be used in such student events so that young employees of future are already in contact with managers.

Socialization is a fundamental part of *mentorship* programs although socialization is not the first concern, it is crucial for the successful outcome. The mentor and the adept should communicate in a constructive way. The mentor should support the adept and gradually

increase the intensity of work load. As adept tackles small tasks, the amount of work should be increased. To be successful with mentorship, it is recommended that each mentor should volunteer for the mentorship program and this should not be forced. The pairing of the mentor and adept should also be carried out with focus on personalities of the mentor and the adept. The mentors not necessarily need to have long working experience. If the mentor is experienced and can guide the adept, it is also fine since the such a mentor would understand the actual situation of the adept better as he/she were in similar situations recently. How much time the mentorship should take place is individual and should not be restrained in the beginning of such a program. It is recommended that the number of meetings can be more in the beginning of the program and later number of physical meetings could be reduced and number of phone/skype meetings could be increased. Both mentor and the adept should revise what they feel about the program. Regarding the mentorship program, it is recommended that there should be a guideline, which is not too restricting but allow the mentor and the adept to meet and exchange experiences. It is recommended to have more mentors, since occasional communication seem to contribute to newly graduated employees' learning. Furthermore, there should be a network for mentors as well so that they can learn from each other. Mentorship does not necessarily need to be between a mentor and an adept, it could also be in groups, where one mentor could meet several adepts together. By doing so, not only a mentor could have more than one adept but also it opens for even more socialization in the group which will contribute to increased network among adepts. One crucial recommendation is that employees who are close to retirement should be asked to be mentors, especially to newly graduated employees so that knowledge gap would be minimum. To manage this, these experienced employees should be asked about their opinions about how to shape such a mentorship program. During the interviews, the researchers found that, the elder employees would like to share their knowledge and experience with young ones on the condition that they are working close to each other. Separated working places would not be optimum for this kind of knowledge and experience transfer.

During the data gathering, it was also recommended that newly graduated employees are shadowing experienced employees. *Shadowing* is similar to mentorship in a way that an inexperienced employee follows and observes an employee. Shadowing is more common in some practical positions; however, it was recommended that all newly graduated employees shadow experienced employees in different positions so that the new ones could get a better understanding of the company's way of working. Such a shadowing would also contribute to the networking of the newly graduated employees. When it comes to shadowing, the recommendations from the interviews are split. One group says that it is better to follow someone with the same position and some suggest that it is better for the overall understanding

of understanding the company structure along with contributions to networking so that newly graduated employees should follow couple of different roles, such as carpenters, foremen and site managers. When shadowing someone, how the responsibility should be given to newly graduated employees is also split. Some of the interviewees suggest that the responsibility should be given gradually, and some suggest that all responsibilities should be given from the beginning and the experienced employee should control the newly graduated employee. Therefore, the suggestion is that, with a dialog between the experienced and newly graduated employee to find what they feel comfortable with and plan accordingly. Shadowing is believed to be the fastest and the most efficient way of getting comfortable with a task.

Informal initiatives

Regarding the recommendations when seeing knowledge as a practice with informal initiatives that employees had, it is recommended by the interviewees that the case study's company should provide a sufficient structure regarding knowledge and experience sharing so that employees would focus on their actual work instead of putting time and effort on something that the case study's company should have provided in the first place. Secondly, since the initiative is taken by the employees, it only fulfils the needs of the groups and might not have an overview perspective or be aligned with the rest of the KM system. Along with the interviews, during the exploratory workshop, it was also discussed and recommended that the main issue regarding transferring knowledge and experience among employees is to give enough time for employees so that knowledge could first be generated in the organization and secondly that it could be transferred among employees. As can be seen in Figure 10 below, giving time to create knowledge is the major hinder of knowledge and experience transfer in the organization since it affects mentorship, networking and project organizations.

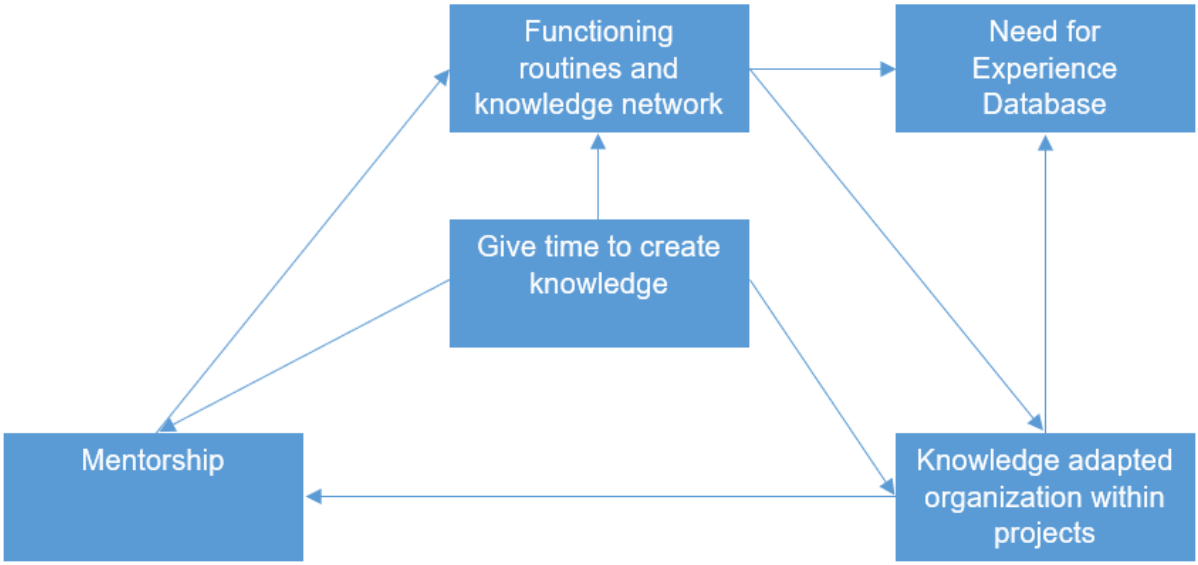

Figure 10: Simplified result from the exploratory workshop

6 Discussion

In this chapter, a discussion is going to be made. Firstly, major findings will be highlighted, secondly, the findings are going to be compared to other similar results and after that a critical discussion to this research is going to be presented along with the validity of the research and limitations.

Major findings and comparison to previous works

Many of the interviewees preferred knowledge transfer through socialization since it is more effective. However, it was suggested that a good structure in the databases was just as important for those who would rather look at databases to find information and knowledge. Therefore, the blue-sky research (Walker, 2016) mentioned in the literature review in subchapter 2.3.2 Construction industry-based studies seems to be important. The current KM situation at the department could be presented very well with by seeing knowledge in three different phases, namely as possession, process and practice according to Hislop (2009) and Newell, et al. (2009). The suggestions can be divided into three major parts, first regarding the existing material, secondly the structure and thirdly socialization and this division could be traced back to those KM concepts. One major finding in this research was that, one solution just does not fit all. Therefore, the department needs to provide its employees with different compatible solutions.

One of the findings was that employees through own initiative started different groups in which the employees share and transfer knowledge to each other, ask questions and get support. As mentioned in 5.3.1 Current Situation, two of these groups using a group chat software and a social media group. In the group chat software, all employees with the same work tasks in the case study's company in Sweden are in and there are some administrators for these groups. The employees can ask questions to people with similar tasks and since the group members have similar tasks, they are feeling affinity to each other. Therefore, the employees like this platform and this way of information and knowledge transfer. In the social media groups, the newly graduated employees took the initiative and started this group to support each other with the difficulties that they experience at work. This way of communication and to support each other was initiated since the case study's company did not provide such a platform for communication within different roles. Since the affinity to each other as newly graduated supervisors working in different project organizations that are located apart from each other was a hinder for these employees' socialization, such an initiative was used. The members of this group understand and support each other mainly because they are or were in similar situation as some other group members, which brings them closer to each other and make them feel connected to each other.

As it was mentioned in the literature (Hislop, 2009; Newell, et al., 2009), the overlap between the three perspectives of the knowledge, especially between knowledge as a process and knowledge as a practice is mentioned in the exploratory workshop. Nonaka´s distinction of knowledge (Nonaka, 1994) as being explicit and tacit is touched upon repeatedly during the research. The explicit knowledge is considered what an employee already knows and for newly graduated employees, this is mainly what they learned at university. The tacit knowledge on the other hand is hard to define and share. Therefore, the interviewees suggested solutions as socialization, shadowing, starting with smaller work tasks which are monitored and increased step by step after giving feedback to the employees and learning by doing. By providing a newly graduated employee with these tools, they could be able to identify and gain tacit knowledge regarding the tasks.

As discussed in *Kunskapsöverföring & Knowledge Management* (Jonsson, 2012), one of the major findings is not to have a general solution but rather to provide the organization with an awareness about the topic and make the employees commit to knowledge and experience transfer work in the long run by letting them discuss the topic. The solution might be close by, yet not actively or fully explored. This research is intended for a general improvement of the current KM situation and was not intended to improve a certain amount within a given time frame. Neither economical gains were calculated and discussed. Furthermore, since this research only focuses on the investigated department, and how to improve knowledge and experience transfer to newly graduated employees, the results may be generalized within the department for other roles as well. However, the generalization of the findings may not be applicable in other departments and in organizations, since every organization has its way of working. As mentioned earlier in 3.3.1 Exploratory workshop, discussing the current KM situation may increase the awareness (Alänge, 2009).

Similar studies were carried out in different organizations, both in construction industry and in other industries (see 2.3 Former studies), but since the research regarding this topic is based on the structure of the organizations as well as the level of the knowledge needed to be transferred varies along with the needs for the KM system varies over time, there is no general solution for the problem. Therefore, findings usually change between organizations. Although using an exploratory workshop when dealing with KM in large departments is not that common, it can be pointed out that this method gives a quick and reliable result, not only to analyse the current KM situation in different organizations but also to suggest improvement ideas.

Evaluation and further research

A top-down approach was adopted in this research meaning that both experienced employees' knowledge that needs to be known as well as newly graduated employees that know what they need to know is considered and considered. During the research ten interviews were conducted. The interviewees were mainly from different functions within the department although for two functions, both experienced and newly graduated employees were interviewed. The selection of the functions and participants were done in close collaboration with the Operations Manager, who knows the department very well. Although much effort is put when selecting these interviewees, ten people might not represent the whole department. Although, many newly graduated employees start as foremen and generally not having close collaboration with other functions that were not actively involved in this research, the results may not be fully representative for the department since the perception and results are dependent on the participants. Learning from other departments of the case study's company was out of scope for this research but it would be useful to further investigate with other organizations of the case study's company if and what they could learn from each other.

This research is a qualitative research described by Bryman and Bell (2015). Handling of data in qualitative research is extremely important. The researchers handled the data carefully as recommended by Bryman and Bell (2015). However, due to time limitations, no transcription was done. The data is analysed according to other recommendations, namely as summarizing the interviews and coding key topics. Furthermore, from time to time, there were language barriers, since not all participants were native speakers of the Swedish language. Communication might therefore be limited to what opinion can be shared by the participant and what is perceived by the researchers. The amount of data that was gathered during the interviews and in the exploratory workshop may not be enough to conclude results. Besides, the subject was narrowed down to only the department of the investigated department and to newly graduated employees. For these reasons, the results may not be applicable in a broader setting.

The intranet that was available when the research initiated was excluded from the researchers own perception and analysis since it was under reconstruction and would be completed to the very last stages of the time frame for the research. However, criticism was given by the interviewed employees to the old version of the intranet, not only that it was difficult to find things in it, but also because it was operated centrally, and local adaptations were not allowed. The new version of the intranet was introduced after the interviews were carried out, which is why no considerations about it can be given. A questionnaire for bigger data sampling was neither carried out due to time restrictions.

This research is limited to only one department of the case study's company, namely NCC Building Väst which is a part of NCC Sweden. It can be concluded that the studied department may not represent the whole company. Furthermore, savings in terms of time and money were not considered. According to the findings and recommendations in this research, recommendations for future work will be presented. The first recommendation is to carry out a quantitative research, or at least be complemented with quantitative data to analyse how much improvement of KM is possible. Secondly, a study of implementing a KM system is recommended so that the knowledge and experience transfer within the company is structured in a systematic manner. Thirdly, a KM study for the case study's company in Sweden is recommended, which not only focuses on newly graduated employees but also the experienced employees. In this study, knowledge in case of employees' absence must be considered, such as job dismissal, vacation, pregnancy, illness and such in a transparent way.

7 Conclusion

The purpose of the master thesis was to study the current KM situation at the investigated department on the organizational level to enhance knowledge and experience to newly graduated employees. To accomplish this, the current state analysis is carried out thoroughly. This was necessary to answer the first research question: "*What KM tools need to be provided for newly graduated employees to gain the knowledge that they need to fulfil their tasks?"* The answer to the first research question revealed that the case study's company does many good KM initiatives, however, the newly graduated employees are not necessarily a part of these initiatives. For instance, to maintain a good level of knowledge from different projects, there are held meetings after each finished project in which the participants share the difficulties and success factors with each other. Furthermore, there are four meetings per year that discussion about the departments projects are carried out. These meetings enhance the knowledge transfer within the department. However, newly graduated employees are usually not planned to participate in these meetings. The benefits of newly graduates to participate in these meetings are firstly that they are acquiring the knowledge directly and secondly that their network in the organization expands. Although many of these KM initiatives in the current situation are good, not all of them are complementing each other very well. This leads to the second research question: *How can the strengths and weaknesses of the existing KM system be utilized to support the department's overall efficiency?* If the KM initiatives that exists are analysed well and could be aligned with each other, a broader and more complete KM system will be gained for newly graduated employees. The amount of existing material and the lack of structure is a problem for newly graduated employees since it is difficult to find relevant information. Furthermore, there are a lot of socialization activities that newly graduated employees can use to expand their network in the department.

One main conclusion that can be summarised is that, despite how good different initiatives are, there will not be a single solution that fits all. This is since some employees prefer to receive knowledge through social contacts, while others are more comfortable with learning digitally through the support of the intranet and the documents that exist there. For this reason, knowledge must be provided both in a structured way in a database as well as well-functioning channels for knowledge provision through a social context. Lastly, the needs of the organization must be taken into consideration. As time passes, the needs and necessities of the organizations change. Therefore, the department must regularly go through the existing documents and decide what is relevant or not to keep them up to date.

References

Alänge, S., 2009. *The Affinity-Interrelationship Method AIM,* Gothenburg: Technology Management and Economics, Division of Quality Sciences, Chalmers University of Technology.

Alavi, M. & Leidner, D. E., 2001. Knowledge Management and Knowledge Management Systems: Conceptual Foundations and Research Issues. *MIS Quarterly,* 25(1), pp. 107-136.

Allen, T. J., 2007. Architecture and Communication among Product Development Engineers. *California Management Review,* 49(2), pp. 23-41.

Association for Project Management, 2018. *Apm.org.uk.* [Online]
Available at: https://www.apm.org.uk/resources/find-a-resource/knowledge-management/what-is-knowledge-anyway-and-why-does-it-matter/
[Accessed 16 May 2018].

Berggren, C. B. A. B. L. H. M. a. S. J. (., 2011. *Knowledge Integration & Innovation – Critical Challenges Facing International Technology-Based Firms.* Oxford: Oxford University Press.

Bresnen, M., Goussevskaia, A. & Swan, J., 2016. Embedding New Management Knowledge in Project-Based Organizations. *Organization Studies,* 25(9), pp. 1535-1555.

Bröchner, J., 2013. Construction patents and university-industry research interaction: an analysis of Nordic region data. *Construction Innovation,* 13(4), pp. 410-423.

Brown, J. & Duguid, P., 1991. Organizational learning and communities of practice: Toward a unified view of working, learning and innovation. *Organization Science,* 2(1), pp. 40-57.

Brown, J. & Duguid, P., 2001. Knowledge and organization: A social-practice perspective. *Organization Science,* 12(2), pp. 198-213.

Bryman, A. & Bell, E., 2015. *Business Research Methods.* 4th ed. Oxford: Oxford University Press.

Carrillo, P., 2004. Managing knowledge: lessons from the oil and gas sector. *Construction Management and Economics,* Volume 22, pp. 631-642.

Cook, S. D. N. & Brown, J. S., 1999. Bridging Epistemologies: The Generative Dance between Organizational Knowledge and Organizational Knowing. *Organization Science,* 10(4), pp. 381-400.

Dale, E., 1969. *Audio-Visual Methods in Teaching.* 3rd ed. New York: Holt, Rinehart & Winston.

DeFillippi, R., Arthur, M. & Lindsay, V., 2006. *Knowledge work: Creative collaboration in the global economy.* Oxford: Blackwell.

Dubois, A. & Gadde, L.-E., 2002. The constuction industry as a loosely coupled system: implications for productivity and innovation. *Construction Management and Economics,* 20(7), pp. 621-631.

Easterby-Smith, M. & Lyles, M., 2003. Introduction: Watersheds of organisational learning and knowledge management. In: *The Blackwell handbook of organizational learning and knowledge management.* Malden: Blackwell, pp. 1-16.

Falk, M. & Wallberg, M., 2015. *A Lean Perspective Analysis of the Design Phase in a Swedish Construction Company.* Gothenburg: Chalmers University of Technology.

Gherardi, S., 2000. Practice-based theorizing on learning and knowing in organizations. *Organization,* 7(2), pp. 211-223.

Grant, R., 1996. Toward a knowledge-based theory of the firm. *Strategic Management Journal,* Issue 17, pp. 109-122.

Hislop, D., 2009. *Knowledge Management in Organizations.* 2nd ed. Oxford: Oxford University Press.

Holmquist, F., 2013. *Industrialised building processes for platforms.* Gothenburg: Chalmers University of Technology.

Ibert, O., 2007. Towards a Geography of Knowledge Creation: The Ambivalences between ‘Knowledge as an Object’ and ‘Knowing in Practice’. *Regional Studies,* 41(1), pp. 103-114.

Jonsson, A., 2012. *Kunskapsöverföring & Knowledge Management.* 1st ed. Malmö: Liber AB.

Jørgensen, B. & Emmitt, S., 2009. Investigating the Integration of Design and Construction from a "Lean" Perspective. *Construction Innovation,* 9(2), pp. 225-240.

Lave, J. & Wenger, E., 1991. *Situated Learning: Legitimate peripheral participation.* Cambridge: Cambridge University Press.

Modig, N. & Åhlström, P., 2013. *Detta är Lean.* 2nd ed. Stockholm: Stockholm School of Economics Institute for Research.

NCC Sverige AB, 2018. *NCC AB.* [Online]
Available at: https://www.ncc.group/about-ncc/about-the-group/our-organisation/
[Accessed 28 May 2018].

NCC Sverige AB, 2018. *NCC AB.* [Online]
Available at: https://www.ncc.group/about-ncc/ncc-building/
[Accessed 28 May 2018].

Newell, S., Robertson, M., Scarbrough, H. & Swan, J., 2009. *Managing knowledge work and innovation.* 2nd ed. Basingstoke: Palgrave Macmillan.

Nonaka, I., 1994. A dynamic theory of organizational knowledge creation. *Organization Science,* 5(1), pp. 14-37.

Nonaka, I., Toyama, R. & Konno, N., 2000. SECI, Ba and Leadership: A unified model of dynnamic knowledge creation. *Long Range Planning,* 33(1), pp. 404-428.

Orlikowski, W., 2002. Knowing in practice: Enacting a collective capability in distributed organizing. *Organization Science,* 13(3), pp. 249-273.

Pauldén, A. & Stureson, C., 2015. *Project Based Organizations' Challenges when Absorbing Knowledge from Joint R and D Projects Between Industry and Academia: A Case Study from the Perspective of a Contractor Firm.* Luleå: Luleå University of Technology.

Polanyi, M., 1966. *The Tacit Dimension.* London: Routledge & Kegan Paul.

Sörqvist, L., 2013. *Lean - Processutveckling med Fokus på Kundvärde och Effektiva Flöden.* 1st ed. Lund: Studentlitteratur AB.

Styhre, A., 2009. *Managing Knowledge in the Construction Industry.* 1st ed. New York: Taylor & Francis.

Sveriges Byggindustrier, 2017. *Sveriges Byggindustrier.* [Online]
Available at: https://www.sverigesbyggindustrier.se/UserFiles/Files/BI_Analys/170315-Faktablad-Byggarbetsmarknaden.pdf
[Accessed 28 January 2018].

Walker, D. H. T., 2016. Reflecting on 10 years of focus on innovation, organisational learning and knowledge management literature in a construction project management context. *Construction Innovation,* 16(2), pp. 114-126.

Wenger, E., 2004. Knowledge management as a doughnut: Shaping your knowledge strategy through communities of practice. *Ivey Business Journal,* p. 1.

Wenger, E., McDermott, R. & Snyder, W. M., 2002. *Cultivating Communities of Practice.* 1st ed. s.l.:Harvard Business Press.

Wenger-Trayner, E. & Wenger-Trayner, B., 2015. *www.wenger-trayner.com.* [Online]
Available at: http://wenger-trayner.com/wp-content/uploads/2015/04/07-Brief-introduction-to-

communities-of-practice.pdf
[Accessed 17 May 2018].

Winch, G. & Carr, B., 2011. Processes, Maps and Protocols: Understanding the Shape of the Construction Process. *Construction Management and Economics,* 19(5), pp. 519-531.

Womack, J. P., Jones, D. T. & Roos, D., 1990. *The Machine that Changed the World.* New York: Rawson Associates.

Zahra, S. & George, G., 2002. Absorptive capacity: A Review, Reconceptualization, and Extension. *Academy of Management Review,* 27(2), pp. 185-203.

Intervjumall för [Position], XX.04.2018

1. Vad innebär din position som projektchef?
   1.1. Hur lång erfarenhet har du som projektchef? Hur länge har du varit anställd på NCC?
   1.2. Hur lång relevant arbetslivserfarenhet har du?
2. Hur jobbar du med kunskap- och erfarenhetsöverföring för nyutexaminerade?
   2.1. Hur effektivt är det?
   2.2. Vad finns det för svårigheter när det gäller att föra vidare kunskap/erfarenhet till nyutexaminerade?
3. Har du andra rekommendationer för att effektivisera kunskap och erfarenhetsåterföringen till de nyutexaminerade anställda så att de kan komma in i sina arbetsroller?
4. Vad för samarbete inom kunskapsöverföring finns det mellan din funktion och andra? *(ex produktion, SE och affär)*
   4.1. Hur påverkar NCC:s organisationsstruktur till detta?
5. Finns det tydliga arbetsrollsbeskrivningar för de nyutexaminerade? Om ja, vad tycker du om dem? Om nej, hur tycker du att det borde utformas?
   5.1. Finns det manualer/checklistor om deras arbetsuppgifter när en nyutexaminerad anställs? Om ja, vad tycker du om dem? Om nej, tycker du att det borde finnas?
6. Hur borde kunskap/erfarenheter presenteras till den nyutexaminerad?
   6.1. Hur kan de nyutexaminerade hitta den kunskap de behöver?
   6.2. Finns det någon nätverksplattform där man kan byta erfarenheter med varandra? Hur funkar dessa?
7. Vad tycker du om mentorskap?
   7.1. Hur funkar mentorskap idag på avdelningen?
   7.2. Vad tycker du om att de nyanställda ska börja sin anställning med att gå bredvid en med samma position? Hur borde den utformas?
8. Som projektchef, vad kan de nyutexaminerade lära sig från dig/din roll?

Intervjumall för Trainee, XX.04.2018

- Kan du berätta lite generellt om traineeprogrammet?
- Vilka avdelningar var du på? Hur länge?
- Valde du dessa själv? Hade du kunnat göra annorlunda med facit i hand?
- Hur tyckte du ditt lärande gick?
- Vad bidrog traineeprogrammet med till ditt lärande? Och hur?
- Vilka uppgifter fick du?
- Fick du en mentor? Hur var ansvaret under programmet? En på varje rotation eller en allmän ansvarig?
- Fick du tydliga uppgifter? Var de svåra?
- Vad tror du att du lärde dig under programmets gång som du inte hade kunnat lära dig ifall du började som vanlig anställd?
- Finns det nätverk för traineer? Fick du del av något nätverk?
- Har du förbättrings ideer kring traineeprogrammet?
- Har du förslag om hur man kan göra så att de nyanställda får en bra och effektiv inlärningsperiod som nyutexad anställd?
- Hur var det med återkoppling/feedback? På delmomenten och över hela programmet?