

Conversion of Intra-Project Experience Feedback into Organisational Knowledge

A Study of a Regional Office and its use of Company Guideline Documents

Master's thesis in the Master's Programme Design and Construction Project Management

Rickard Edman
Anders Karlsson

MASTER'S THESIS ACEX30-18-21

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ABSTRACT

During the latter half of the 20th century up until today the low productivity of Swedish contractors in the construction industry compared to manufacturing companies has become a well-known notion. Being a project-based industry, most companies in the construction industry struggle with the institutionalisation of knowledge and experience gathered in project, hence experience is lost or gathered by individuals not enhancing future project performance.

The purpose of this Master's thesis is to examine the work regarding experience feedback and the institutionalisation of knowledge of a regional office at a company acting within the construction sector, to be compared with internal guideline documents and company vision. The study is carried out using an abductive and qualitative research approach, thereby including empirics and a literature review within the Swedish construction industry. Empirical findings are then compared with theories suggested by literature and previous studies.

It was concluded that the regional office reflects the Swedish construction industry in typical performance connected to experience feedback. The study showed that individuals are driven by personal gain, therefore incentives must be adapted to fit company vision for future experience feedback. Furthermore, changes have been implemented by management before, however for the institutionalisation of knowledge to take place it must be put in the centre of attention.

Keywords: Construction sector, experience feedback, guideline documents, knowledge creation, knowledge management, organisational knowledge, project-based experience.

Transformation av Projektbaserad Erfarenhetsåterföring till Kunskap för Organisationen

En studie av ett Regionalt Kontor och dess Användning av Interna Dokument

Examensarbete inom Mastersprogrammet Organisering och Ledning i Bygg- och Fastighetssektorn

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SAMMANFATTNING

Under den senare halvan av 1900-talet fram till idag har den låga produktiviteten hos svenska byggföretag jämfört med tillverkningsföretag blivit ett välbekant fenomen. Den projektbaserade naturen hos svenska företag i byggindustrin skapar en svårighet gällande att göra kunskap genererad i projekt institutionaliserad. Därför går mycket av den kunskap och de erfarenheter som genereras i projekt förlorad, eller förbli personanknuten till de aktörerna som varit en del av projektet. Detta kan förklara den bristande utvecklingen av projektprestanda som observerats.

Syftet med denna masteruppsats är att undersöka ett regionalt kontor hos en aktör i byggsektorn med avseende på deras arbete med institutionalisering av erfarenheter som skapas i projekt, vilket jämförs med interna styrdokument och företagets vision. Det är en kvalitativ studie, vilken bygger på en abduktiv metod och innehåller således en litteraturstudie och ett empiriskt inslag. Resultaten från intervjuerna jämförs med litteraturstudien, samt tidigare publikationer i ämnet.

Slutsatsen är att det regionala kontoret som undersöktes speglar den svenska byggindustrins brist på produktivitetsutvecklande åtgärder. Studien visar att individer i företaget drivs av personlig vinning, därför bör framtida incitament anpassas efter företagets vision för erfarenhetsöverföring mellan projekt. Förändringar har drivits igenom av företagsledning tidigare, för att detta ska bli fallet även för institutionalisering av kunskap, krävs att kunskapsöverföring blir företagsledningens högsta prioritet.

Nyckelord: Byggsektorn, institutionaliserad kunskap, kunskapshantering, kunskapsskapande, projektbaserad kunskapsöverföring, styrdokument.

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Preface

The Master's thesis marks the final stage in completing our Master's degree in civil engineering attending the Master's Programme Design and Construction Project Management at Chalmers University of Technology. As this Master's thesis is completed a five-year long education is ended, thus marking the start our new journey. The Master's thesis has provided numerous interesting discoveries from persons spoken to beneficial for the thesis, but also helped facilitating relationships valuable for our future careers.

The thesis has been written under the supervision of professor Christian Koch, whom deserves special thanks. The thesis could not have been completed without his valuable insights and input. We would also like to send some special thanks to our sounding board at Skanska, Sabina Esbjörner and our supervisor at Skanska Robert Ruther, without your support the thesis would not have been completed. Last, we would like to thank all interviewees for their time and valuable responses, insights and knowledge.

Göteborg, June 2018

Rickard Edman



Anders Karlsson



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1 Introduction

This report is a Master's thesis written in accordance with the Architecture and Civil Engineering Department within the Master's program Design and Construction Project Management at Chalmers University of Technology. The following chapter will work as an introduction to the thesis, it will present the background of the research, purpose and project aim, furthermore problem statement, thesis objectives and delimitations are presented.

1.1 Background

Between 1965 and 1996 the average growth for manufacturing companies in productivity were 2.9% per year, while the construction industry corresponded to 1.7% (Atkin, Borgbrant & Josephson, 2003). Driven by the desire to deliver better products to their customers, insights gathered from mistakes were used to improve performance for these successful manufacturing companies (Womack, Jones & Roos, 1990). The construction industry is in need for a productivity improvement, having lost understanding of the importance for experience feedback. Ten years ago, (Josephson, Styhre, & Wasif, 2008A) conducted a report in the subject as a reaction to the lack of information found on the Swedish market regarding project-based organisations. While there are studies that examine feedback between regional offices (Huemer & Östergren, 2000), few studies describe the phenomena occurring within the regional office. Thereby literature fail in describing the processes occurring on a regional level and how they are linked to the parenting company.

Even though this issue was stated many years ago (Atkin et al., 2003), the impression is that there is still a need for further investigation. Hence, improvement by experience feedback remains to be utilised. Meiling, Lundkvist & Magnusson (2011) express critique against the industry, claiming there is need for change of the view within the industry. Today, experience feedback is lacking in the construction industry, while other processes are prioritised. Thereby, instead of occurring on an individual level, experience feedback should be developed into becoming part of long-term company strategies (Meiling et al., 2011). There is an awareness of the low productivity seen within the industry allocated to repeated mistakes (Atkin et al., 2003). This notion is also highlighted by the case company, which expresses a need for mapping their current work, regarding experience feedback.

A smaller regional office of Skanska will act as the case company in this master thesis, the office is defined to be of common size, looking at other offices within Skanska AB, located outside the major cities of Sweden (Skanska, 2018). The project portfolio currently holds about ten to fifteen projects with sizes varying between 20-150 million SEK. The office has expressed difficulties with the utilisation of experience feedback and how it is best implemented in their everyday work. The regional office management is united in the view, that a better use of experience feedback could be implemented, which could improve cost calculation accuracy by eliminating the phenomena of re-inventing the wheel, thereby making future projects run more efficiently. The regional office management wish to have their current work with experience feedback examined in contrast to the guidelines provided from the

Skanska central office. The result of the thesis aims to present a more general view on the work with experience feedback in middle sized offices. With the case company the situation is analysed and carefully evaluated to generate a larger picture with the aim of current information.

The theoretical implication is that although Scarbrough et al. (2004) and Bresnen, Goussevskaia & Jacky (2004) have pointed the way, there is a need for research on project management and organizational learning connected to the construction industry. Projects are examined from a range of perspectives but the ability to learn between and within projects is still little explored (Josephson et al., 2008A) The construction industry produces complicated products through fragmented project organisations. When milestones are completed, and new stages are initiated, project members in key roles are lost. Ögård & Gallstad (1994) consider most projects to be suffering from short term goals, therefore tenders with lowest offers are the most accepted. Focusing on producing a specific product or service for the lowest possible cost affects other aspects included in the project, among these are experience feedback since little or no time for reflection and sharing of experience from neither stage of the project is given (Persson & Sköld, 2006). This is a notion supported by Josephson et al. (2008A) claiming there are no incentives for experience feedback in the current market situation.

1.2 Purpose and project aim

There is a profound difference when examining productivity increases between the manufacturing industry and the construction industry during the last century (Atkin et al., 2008). Not having utilised the potential of feedback-loops is one of the reasons that explains this productivity loss. This motivates the need for a strategy on how methods, tools and techniques enhancing experience feedback can be implemented.

The objective of this Master's thesis is to map the ongoing work regarding experience feedback based on the case company. Findings are to be compared with the internal guidelines provided at Skanska. Thereby, solutions regarding possible actions for improvements should be located, aiming to result in a practical way for dealing with experience feedback in future day-to-day work. If implementation leads to improvement for the case company, the results can be applied to similar situations within Skanska and the industry. The total findings aims at providing a picture of the situation of the case company and draw conclusions to the experience feedback work on a national level to be connected with the construction industry.

Today, Skanska suffer from a lack of experience feedback, which becomes present when leaving and entering new projects. Being a project organisation, the case company could utilise lessons learned from one project when entering a new project. Today, the case company has no clear structure for implementing guidelines on how the experience from any project should be institutionalised to become organisational knowledge. The problems are present both in the local office and in the connection with the rest of the company in the lack of knowledge sharing between districts.

1.3 Problem statement

1. What is the status regarding experience feedback processes within the Swedish construction industry?
2. What are the current directives from the regional office regarding experience feedback and how are these linked to the directives of the company?
3. What actions and incentives motivate involved actors to participate in experience feedback activities?
4. What necessary actions can be made by the region to enhance the motivation for working with experience feedback, thus enhancing the importance of experience feedback?

1.4 Delimitations

The thesis will not investigate the role of the labour force in experience feedback. Instead focus is aimed at how project managers affect the detected experience feedback processes. This is linked to the construction process, in which the early phases are of most interest, regarding experience feedback. The tendering phase and design phase are the most benefitting phases from implementing experience feedback, as they lay the preconditions for the production phase. Most of the problems on-site can be traced back to the design and early purchases (Henderson, Ruikar & Dainty, 2013; Thunberg, Rudberg & Karrbom Gustavsson, 2017). However, information from the production phase will be collected as information on how the early phases reflect and recalls the happenings in the production phase. This delimitation is also motivated by scope limitation. Thereby, focus is on how management handles guidelines provided for experience feedback and how work is carried out accordingly.

As Skanska already is in the forefront of working with health and safety aspects of the production phase of construction. The work conducted for safety aspects are considered as a good example of experience feedback in the sense of learning from previous mistakes and events. It is not in the case company's nor the authors' interest to examine such aspects because of the difference in actual results (accidents) present in the safety aspects. Therefore, health and safety aspects will be disregarded.

Further, the thesis will focus only on one of the regional offices of Skanska. By implementing this limitation, the risk of having too big of a scope is avoided. Thereby limiting the aim for the study and interviews to fit the provided guidelines from Chalmers for producing a Master's thesis. Hence, the thesis' empirical findings in form of interviews will be exclusively from the district which makes the conclusion based on the districts work and not reflect the entire company. However, the empirical findings together with theoretical findings and previous research hopefully will allow the results to address a wider spectrum of receivers than only the examined district.

Furthermore, company culture observed will not be accompanied by any research found in the literature review. The limitation is made according to previously described scope limitations. However, this notion leaves the authors with the ability to discuss findings in a company culture context, as this might explain observations.

2 Method

The following chapter aims to provide an understanding and justification for the methodology used when creating this thesis. In doing so this chapter will work as a description for how the literature framework was developed, furthermore describing the method used for collecting empirical data. The choices made will be described and motivated. In summary, the thesis is based on a qualitative research approach, where empirics are gathered from internal documents, interviews and overt unstructured participative observations.

As a point of origin, literature relevant for the subject was used to map its status regarding experience feedback. Furthermore, a continuous dialog with the supervisor at Chalmers and the supervisors at Skanska was used to pinpoint the problem statement, purpose and delimitations. The input also aided in finding specific literature.

2.1 Research strategy

The connection between theory and empirical work is characterised by three different approaches; deductive, inductive and abductive (Bryman & Bell, 2015). Being the most common description of the relationship between theory and empirical work, the deductive theory is explained as testing empirical research to a hypothesis formulated after examining current theoretical ground. On the contrary, inductive theory uses empirical findings to formulate new data-driven theories. However, Bryman & Bell (2015) emphasise that there is not always a clear-cut distinction between the two. Instead they present a third option, the abductive approach, which has grown in popularity for qualitative research in recent years. The reason according to Bryman & Bell (2015) is that abductive theory, suggests solutions for overcoming the weaknesses allocated to inductive and deductive theory. Instead of moving from theoretical to empirical work (deductive) or empirical to theoretical work (inductive), the abductive approach suggests that researchers should use a back-and-forth process, where theoretical work is mixed with the collection of empirical data, thereby creating an iterative process not limiting researchers to move in a linear direction. This provides a setting where researchers can use the best set of explanations for describing their findings. This thesis uses an abductive research strategy. In doing so, the authors can stay open minded, thus being open to surprises. Otherwise, the authors would be limited to confirming a predetermined focus.

The approach used in this thesis have similarities to *Systematic Combining*, an approach best described by (Dubois & Gadde, 2002). Here, the research analytical framework and research issue are constantly affected and reoriented as new empirical findings are introduced. Thereby, case analysis, empirical work and theoretical framework evolve simultaneously. Dubois & Gadde (2002) claim this is the best suited approach when findings result in the development of new theories. The systematic coming is divided into two different processes. The first deals with matching or mismatching theory with reality, the second deals with direction and re-direction. Thereby, “*Empirical observations might result in identification of unanticipated yet related issues that may be further explored in interviews or by other means of data collection.*” (Dubois & Gadde, 2012, pp. 555). Using systematic

combining is most beneficial when refining existing theories. Dubois & Gadde (2012) emphasises that an abductive approach is most suitable if the original theoretical framework is continuously modified. Therefore, the abductive research approach is considered most suitable for this thesis.

The most frequently used differentiation between strategies for research are; quantitative and qualitative. However, Bryman & Bell (2015) underline that the separation between quantitative research strategy and qualitative research strategy has received a considerable amount of critique. Nevertheless, the most profound distinction, is the occurrence or lack of quantification. Originating from deductive research, quantitative research focuses on numerical data collected from a large sample group. Having known variables, theories are easily tested, validated and confirmed. By contrast, the qualitative research strategy implies an interpretative process, most suitable for the inductive approach. Working with an exploratory research question, which involves an in-depth study, Bryman & Bell (2015) suggest working according to a qualitative research strategy.

2.2 Theoretical framework

The literature framework's primary purpose is to motivate the importance of research (Bryman & Bell, 2015). However, Bryman & Bell (2015) emphasise that the literature research should continue once the empirical data collection is initiated. Applying the abductive qualitative research strategy, this leads to an iterative process where the collection of empirical data and the review of the literature framework are completed simultaneously.

In search for literature used to establish the literature framework of this thesis, initial reading was used to get a better understanding of the subject. Using input from the supervisor of Chalmers University of Technology, the literature framework was built around the subjects of project management, knowledge management and construction management. These are all interlinked with the main subject of the thesis, experience feedback in the construction industry. As most literature regarding project management and knowledge management are found outside the construction industry, search words regarding these two subjects were combined with construction related search words to find articles and studies relevant for the thesis. Acting as a foundation to the thesis is the work of Josephson, Styhre, & Wasif (2008A) completed ten years ago. When choosing literature, publications connected to the Swedish construction industry were prioritised, however international literature is used as a compliment. This selection bears in mind a highly segmented industry, where national standards, rules and regulations impact's day-to-day work. Thereby, irrelevant information should be avoided. The information found was gathered through the databases *Google Scholar* and *Summon* from Chalmers Library. The assessment of the validity of the literature was based on the number of citations, the specificity according to search string and year published.

Search words used: Construction management, experience feedback, knowledge creation, knowledge management, knowledge sharing, organisational learning, project-based organisation, project management.

2.3 Empirical study

The empirical paragraph of the thesis was divided into three separate sections, namely: *internal guideline documents*, *interviews* and *observations*. The following chapters will provide information concerning choices made regarding these three divisions for collecting empirical material. The authors of this thesis have only considered information linked to knowledge management, experience feedback, construction management and project management.

2.3.1 Review internal guideline documents

To provide a contextual setting for developing questions for interviews and working as background knowledge for observations, the internal guidelines of Skanska were examined. Thereby, information regarding policies for experience feedback from one project to the next were found. Gaining access to the intranet of Skanska also provided a better understanding for the procedures used by employees' for finding information connected to experience feedback. The internal guideline documents also provided a setting where a comparison was made between internal guidelines, observations and responses collected in interviews, hence providing a necessary setting for the analysis. Access to the intranet of Skanska includes access to documents guiding the entire company, as well as internal documents guiding the settings for experience feedback in the regional case company office. As most documents found are comprehensive, the same search words used for finding literature were used to scan the document, thus avoiding the time-consuming task of reading all information available.

2.3.2 Interviews

The interviews were accomplished according to the semi structured interview approach, described by Galletta (2013). Performing interviews in a semi-structured manner provides the interviewer with a broad range of possibilities, leaving room for findings that might affect the study focus (Galletta, 2013). Thereby semi-structured interviews are the most suitable approach for conducting interviews for empirical data collection and is considered most suitable when using an abductive research strategy (Galletta, 2013; Bryman & Bell, 2015). Bryman & Bell (2015) further claim that semi structured interviews could be named qualitative interviews, thus further enhancing the motive for using the semi structured method for interviews.

The selection of interviewees was conducted with the help of the supervisors from Skanska and the supervisor from Chalmers. In doing so the authors of the thesis were able to make the most of the interviews, avoiding interviewing people not beneficial for the thesis' progress. The interview process also showed to be beneficial for providing new interview candidates, as many interviewees would recommend further candidates. The complete list of all eight interviewees is displayed below.

Site Manager A – Two years of academical studies for becoming supervisor. Working for Skanska the past five years, therefore categorised as unexperienced.

Site Manager B – No academical studies. Has been working at within the industry for more than 20 years, of which almost ten years at Skanska as a site manager, categorised as experienced.

Site Manager C – No academical studies. Initiated his career as a carpenter and has progressively taken on roles with more responsibility. Has been working at Skanska more than three decades, therefore categorised as highly experienced.

Project Engineer – No academical studies. Has developed through taking on different roles within Skanska, where he/she has worked the last twenty years. Thereby categorised as experienced.

Tender Coordinator – Three years of academical studies resulting in a bachelor's degree in civil engineering. Has been working at Skanska for more than ten years, therefore categorised as experienced.

Project Manager – Three years of academical studies resulting in a bachelor's degree in civil engineering. Has been working at Skanska for more than ten years, therefore categorised as experienced.

V.S.A.A Improvement Leader – Five years of academical studies resulting in a Master's degree in Mechanical Engineering. Has been working at Skanska for almost ten years, thereby categorised as experienced.

V.S.A.A Developer – Five years of academical studies resulting in a Master's degree in industrial economy. Has been working at Skanska for almost ten years, thereby categorised as experienced.

In performing interviews, Kvale (1996) emphasises on the use of seven stages, specifically: *thematizing, designing, interviewing, transcribing, transcribing, analysing, verifying* and *reporting*. The first two stages are aimed for interview preparation (Kvale, 1996). In utilising the steps of Kvale (1996), the authors will use the theoretical framework when preparing interviews. Following the semi structured approach to interviews, a preliminary interview questionnaire was developed, found in Appendix 1 Here the problem statement and research questions acted as guideline, from which questions were formulated. The interviews were voice recorded as consent were given by all interviewees, which meant a stronger focus on interview performance and leaves complete transcribing unnecessary. The fifth step according to Kvale (1996), is the analysis of gathered information. Here, focus is shifted to the codifying of data, where the interviewee's responses are converted into sense making information. The codifying of data is further described in chapter 2.4 Data Analysis. The sixth step, verification is used for confirming the validity of the interview. This can be checked by asking a series of similar questions and compare their answers while looking for anomalies. The final stage, reporting is used for communicating found results which is done through the publication of this report.

2.3.3 Observations

Observations are an essential aspect of qualitative research (Marshall & Rossman, 2015). Observation enables observers to record events in a social setting, thereby providing a compliment to interviews. In doing so, the authors were able to detect

information that informants may be reluctant or unable to share for several different reasons. Observation can be made using numerous different approaches, depending on research goal (Kawulich, 2005). Among these are overt or covert, where Kawulich (2005) emphasises that covert is best avoided considering ethical reasons.

On the one hand, the observation may be guided by pre-determined topics, themes or aspects, called structured observation (Kawulich, 2005). On the other hand, one could also observe what is naturally occurring without pre-determined ideas, called unstructured observation. The latter approach being the most suitable for qualitative research (Marshall & Rossman, 2015). Observations can be completed using different amounts of participation. In doing participative observations, Kawulich (2005) emphasises the importance of objectivity, claiming that when entering an organisation, the observer is easily influenced. One way to remain objective is to make all organisational members aware of your presence (Kawulich, 2005). Kawulich (2005) emphasises that one must preserve the anonymity of all participants, meaning concealing their identity not only in the finished thesis but, in field notes. Acting as a compliment to interviews, participative observations were used in completing this thesis. By participating in different meetings, the authors were able to gain further knowledge in the organisational work of the case company, not enabled solely by interviews.

2.4 Data analysis

Kvale (1996) emphasises on seven different stages for conducting an interview. Here the data analysis is divided into five different methods: *concentration of opinion*, *categorisation of opinion*, *narrative structuring*, *interpretation of opinion* and *ad hoc*. Since interpretation of opinion is not easily completed without authors influencing or misinterpreting answers, this method is best avoided. According to Kvale (1996), this method is most applicative for a deductive research strategy. Kvale (1996) also provides motives for avoiding narrative structuring, since this method require an experienced interviewer to create stories summarising the interview. Instead, the authors will utilise the other three methods named above.

Concentration of opinion is used to formulate short descriptive sentences containing the core of the responses given by the interviewee (Kvale, 1996). Thereby, this method is used to provide a better overview of interviews, containing short concise answers.

Categorisation of opinion means dividing interview answers into categories (Kvale, 1996). The categorisation can be as simple as present or non-present, however more detailed versions exist, where numbers are used to characterise the answer strength (1-5). The categories may be developed beforehand or after the interview is completed. Categorisation also provides the authors with the possibility to present findings through informative tables and charts.

Contrary to concentration of opinion and categorisation of opinion, ad hoc provides no standard method for analysing the gathered interview material (Kvale, 1996). Instead the authors are free to utilise the tools they find necessary for the analysis.

However, being an elective method, the ad hoc approach for analysis means findings are hard to reproduce.

The choice of method was to first use the categorisation of opinion, by categorising findings after interviews. In doing so the authors were able to detect and adjust theoretical research to best suit initial findings. Secondly, a concentration of opinion was made. Having shorter descriptive answers meant an easier overview of the respondents' opinions. Lastly, the ad hoc approach was used. Thus, providing the authors with the possibility to get an overall impression of the responses, while also examining specific statements given by respondents, which indicated different interpretations than the overall impression.

2.5 Ethics

The thesis is developed in accordance with given ethical rules and guidelines provided by the Chalmers University of Technology. Thereby, information regarding interviewees' identities and the specific division of the case company has been anonymised. Completing the thesis in co-operation with Skanska, also means the thesis must comply with their rules of secrecy.

2.6 Method criticism

The choice of research method is made having considered the need of an in-depth analysis of the subject. The authors also consider the quantification of soft answers to be problematic, thus being in favour of the qualitative research strategy. Already described in chapter 2.1 Research Strategy, the abductive research approach is defined by Bryman & Bell (2015) as the most preferred method for this specific research strategy. Utilising the abductive approach, the authors are not limited to answering a predetermined hypothesis, while the theoretical and empirical aspects wideness are limited, as they are constantly being reviewed.

Using categorisation of data as the initial method for analysing interviews, the authors are aware of the risk for losing opinions with low occurrence. Therefore, concentration of opinion is used in concurrence with the ad hoc approach, providing risk reduction. The semi structured interview technique also facilitates this risk reduction, as follow up questions limits the risk for misinterpretation. Lastly, the authors of this thesis recognise that interpretation of semi structured interviews using an abductive research approach will always colour the impressions gathered by the interviewers, thereby making it impossible to deliver an un-coloured picture of the current situation.

Participative observations entail detailed data collection, impossible to be gathered elsewhere, thereby improving the quality of empirical data collection (Kawulich, 2005). The authors are aware of the risk of contaminating data through being bias, understanding that a structured observation would be beneficial in dealing with bias conclusions. However, wanting to utilise the unstructured approach, as it provides a better setting for qualitative studies, the authors used the organisational members to confirm observations. This is a solution already suggested to avoid misinterpretation when conducting interviews.

3 Literature Review

The following chapter will present the theoretical framework of the thesis. The chapter is initiated by a brief description of project management. Further, it provides the reader with information regarding the concepts of knowledge management, construction management and experience feedback. The last segment is used to provide the reader with a summary of the literature review.

3.1 Project management

Project management is explained by Project Management Institution (2017) as the application of tools, techniques and skills to govern project activities, thereby ensuring project success. Project management is divided into five occurring processes: *initiating, planning, execution, monitoring and controlling* and *closing* (Project Management Institute, 2013). The initial process is performed to define a project or project phase. The second process, planning, is used to plan project activities by defining project scope and define critical activities to ensure project success. The execution process aims at completing the project management plan, thereby fulfilling project specifications. The fourth process, monitoring and controlling, is used to monitor and review project progress and performance. Here unforeseen events and changes should be detected and counter actions should be taken. The last process aims at finalising all project activities, thereby closing the project or a project phase.

In defining project management processes, Project Management Institute (2013) emphasises on that project management is seldom a linear event. Instead it should be viewed as an iterative process, where many activities are repeated during the project. This becomes particularly evident when looking at how specific critical activities are handled. Hence, recognising that there is more than one way to act as a project manager when handling a project. This statement illustrates the importance and high impact of the project managers' decisions.

During the life cycle of a project, the Project Management Institute (2013) emphasises on the amount of knowledge that a project produces, which can be analysed and distributed, thereby re-used by project team members and other members of the organisation. During the monitoring and controlling process of a project, knowledge is created, to be recorded and communicated verbally or stored, using reports. The knowledge gathered include the performance of quality aspects and technical solutions, time estimations etcetera. The success in sharing knowledge between the project team the organisation is dependent on organisational communication capabilities, may them be formal or informal. This, is highly dependent on organisational structure. For a complete list of knowledge sharing guidelines between a specific project and its organisation, see the Project Management Institute (2013).

The organisation of a construction company providing the best resemblance to the case company, is described as Pure Product Organisation by Kerzner (2013). Here, the company is branched into separate self-governing units, thus making the central business unit monitoring several different projects through their respective project manager. According to Kerzner (2013), this provides the project manager with line

authority for the entire project, claiming this results in improved communication, since workers will only be communicating with one person, namely the project manager. For an illustration, see Figure 1.

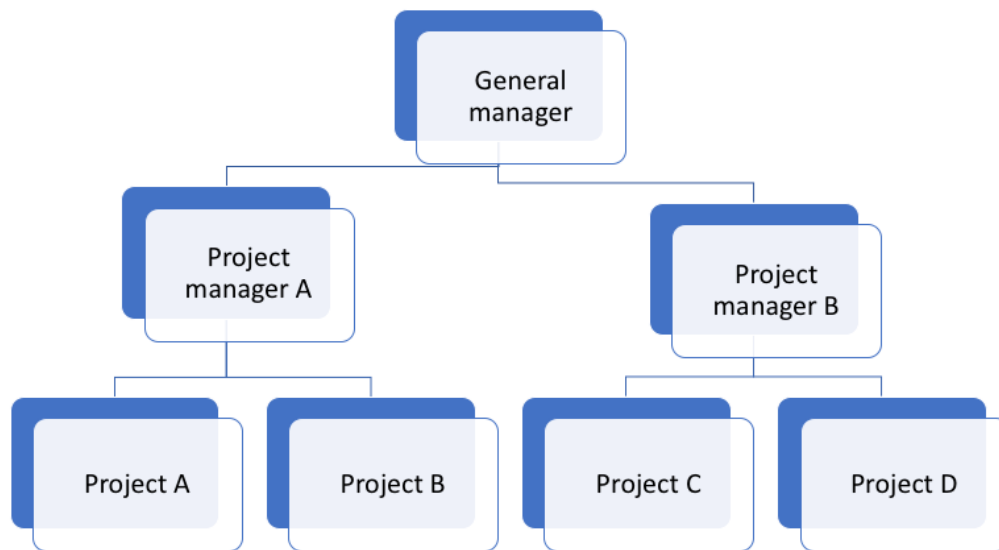


Figure 1. Pure Product Organisation as explained by Kerzner (2013), authors own creation.

Using this structure, other projects within the same organisation have little or no effect on each other. On the one hand, Kerzner (2013) argues that this yield improved performance through shorter lead times, better communication between project members and faster reaction time to changes, among others. On the other hand, Ögård & Gallstad (1994) considers a project organisation to suffer from pursuing short-term goals. Furthermore, Shaw (2011) describes that a Pure Product Organisation may suffer the down side of difficulties in inter-departmental cooperation and communication.

Once a project is completed, the project organisation, which may consist of multiple companies, is dissolved while new organisations are formed. According to Persson & Sköld (2006) this results in a low level of commitment needed for experience feedback. They continue by stating, that while experience feedback is a hard subject for the industry to grasp, it remains important to re-use and develop successful solutions, because in doing so companies will stay competitive.

3.2 Knowledge management

During the last twenty years much discussion has surrounded knowledge management connected to knowledge-based organisations, knowledge intense work, knowledge creating organisations etcetera (Newell et al 2009). That is, because of business advantages, where a better understanding of knowledge sharing translates into accelerated organisational learning (Riege, 2005). Knowledge is explained as something you *have* or something you *do*, where processional knowledge (have) is described by Newell et al. (2009) as a pyramid. Here, the human mind collects data at

the base, which is then evolved into information. Moving towards the top, information can be converted into knowledge, which then evolves into wisdom at the final stage.

The opposite of possessional knowledge is knowledge as practise (do), here knowledge is constructed through social interactions. Newell et al. (2009) illustrates knowledge as practise by a chef cooking, following a recipe. Claiming that any good chef will tell you it is not the recipe that makes the chef, but rather the number of hours spent in the kitchen. Thereby, claiming practice leads to perfection. This leaves a definition that people utilize their knowledge in everything they *do*, but everything they do, they *have* the knowledge of how to do (Newell et al., 2009). Thereby, knowledge can be defined as something you can both possess and practice.

Knowledge is not only defined by how it is used, but rather if it is easily explained to others. In doing so, research differ between tacit and explicit knowledge (Addis, 2016). Tacit knowledge is characterised by being knowledge an individual possesses but cannot express.

“...tacit knowledge is personal know-how primarily acquired through education, training and experience.” (Addis, 2016, pp. 441)

A frequently used example of tacit knowledge is how to ride a bike (Addis, 2016). While knowledge not defined as tacit knowledge are left as explicit knowledge, it remains hard to critically distinguish one from another. Addis (2016) claims this has to do with contextual issues.

3.2.1 Knowledge creation, conversion and transference

One of the most important influencer of knowledge literature is Nonaka & Takeuchi (1996). Their contribution to the concepts of tacit and explicit knowledge has showed that companies tend to focus too much on the latter, which has influenced organizational learning ever since (Nonaka & Takeuchi, 1996). Nonaka & Takeuchi (1996) claim that western companies lacks the knowledge of how knowledge creation take place in organisations, which is a result of defining organisations as *“... a machine for ‘information processing’”* (Nonaka & Takeuchi, 1996, pp. 834). Simultaneously, they claim that organisational learning cannot happen without its individuals, which is supported by the organisational context, where interaction happen between inter- and intra-organisational boundaries.

“Organisational knowledge creation, therefore, should be understood as the process that ‘organizationally’ amplifies the knowledge created by individuals and crystallizes as a part of the knowledge system of the organization” (Nonaka & Takeuchi, 1996, pp. 834)

As previously stated by Addis (2016), Nonaka & Takeuchi (1996) also claim that there is no clear distinction between tacit and explicit knowledge, instead stating that *“...tacit knowledge and explicit knowledge are not totally separate but mutually complimentary entities”* (Nonaka & Takeuchi, 1996, pp. 835). Nonaka & Takeuchi (1996) further claim that knowledge creation is achieved through social interaction between tacit and explicit knowledge. Assuming this is true, Nonaka & Takeuchi

(1996) created the SECI-model, explaining four different modes of knowledge conversion.

The four different modes are explained by Nonaka & Takeuchi (1996) as:

- *Socialisation*, conversion from tacit knowledge to tacit knowledge
- *Externalisation*, conversion from tacit knowledge to explicit knowledge
- *Combination*, conversion from explicit knowledge to explicit knowledge
- *Internalisation*, conversion from explicit knowledge to tacit knowledge

According to Nonaka & Takeuchi (1996) *Socialisation* is explained as the process of sharing tacit knowledge, such as experience. This is illustrated as an apprentice learning his skills through the studying of his master. This is done, not through the use of language, but through observation, imitation and practice.

“*The key to acquiring tacit knowledge is experience*” (Nonaka & Takeuchi, 1996, pp. 836).

Furthermore, Nonaka & Takeuchi (1996) claim that it is almost impossible for one individual to understand someone’s thinking process, without shared experience. This is an important notion for understanding the process of knowledge conversion. In *A theory of organizational knowledge creation*, Nonaka & Takeuchi (1996) illustrate socialisation by three examples from Japanese companies. Here, informal meetings, observation, imitation and practice, are explained as particularly effective for tacit knowledge sharing and are used to create trust among employees, which is a key element for tacit knowledge conversion.

Externalisation is the act of materialising tacit knowledge into explicit knowledge (Nonaka & Takeuchi, 1996). Using metaphors, analogies, concepts or model’s language tacit knowledge is converted into explicit knowledge. However, Nonaka & Takeuchi (1996) claim that while this process is most often insufficient, on the same time it might help promoting interaction and reflective behaviour between individuals. The externalisation mode of knowledge conversion is thereby triggered by conversation and interaction. In reality business concepts using externalisation are rough drawings far from completion, which are created through metaphors or analogies, this is how externalisation is used to create new knowledge.

Combination is a process of combining different forms of explicit knowledge (Nonaka & Takeuchi, 1996). In combination medias such as: documents, computer systems and meetings are used to transfer explicit knowledge between individuals. Nonaka & Takeuchi (1996) claim that the categorisation of such information in systems might result in the creation of new knowledge, stating this is the way formal education take place most frequently. The use of combination is also observable in companies, where middle managers uses a corporate goal or vision in creating new concepts of codified knowledge. In the construction industry, an online catalogue could be used to bring teachings and experience from one project to the next. In implementing a system for knowledge conversion of explicit knowledge, Argyris (1999) emphasises that the system must be easily understood by management. Furthermore, Argyris (1999) claims that management should be involved in the development of the system, thereby being able to convince others to use the system.

The information system should be as safe as possible. Argyris (1999) also states that the system should be adapted to minimize costs, by simplifying the demand for data. His final statement is that the system should be an always occurring part of the introduction to the organisation, where the introduction and education about the system is an ever-evolving process.

The fourth and final mode of the SECI-model is named *internalisation* (Nonaka & Takeuchi, 1996). This is explained by Nonaka & Takeuchi (1996) as “learning by doing”, meaning the conversion of explicit knowledge into tacit knowledge.

“When experiences throughout socialization, externalization, and combination are internalized into individuals’ tacit knowledge bases in the form of shared mental models or technical know-how, they become valuable assets.” (Nonaka & Takeuchi, 1996, pp. 840)

The quote is true for individual learning (Nonaka & Takeuchi, 1996). In order for organisational knowledge creation to be accomplished, the tacit knowledge in individuals must be socialised with other organisational members, thus creating a new spiral of organisational knowledge creation. In practice, the internalisation is cultured in the use of documents, manuals or stories, as this might provide the needed help for individuals to embody what they experienced. This also helps other organisational members, as the documentation provides a way of re-experiencing each other’s experiences.

3.2.2 Knowledge spiral

The Swedish construction industry is heavily based on temporary project constellations, governed by project-based organisation. This organisation requires specific knowledge about every project stage, which is based on individuals having experience from previous projects. Being a key element in project success, knowledge and experience sharing becomes an important aspect for improvement (Zhang & Fai Ng, 2012). Furthermore, knowledge sharing is of importance to the organisation in getting all competences working together towards a successful project. Therefore, Zhang & Fai Ng (2012), argue for the importance of having organisational management encouraging knowledge sharing, claiming that the strategy of the organisation should include means, for motivating employees to share knowledge and experience within the organisation.

Already discussed in the paragraph about internalisation, Nonaka & Takeuchi (1996) emphasise that organisational learning is a spiral, where explicit knowledge and tacit knowledge are interacting, best explained by Figure 2.

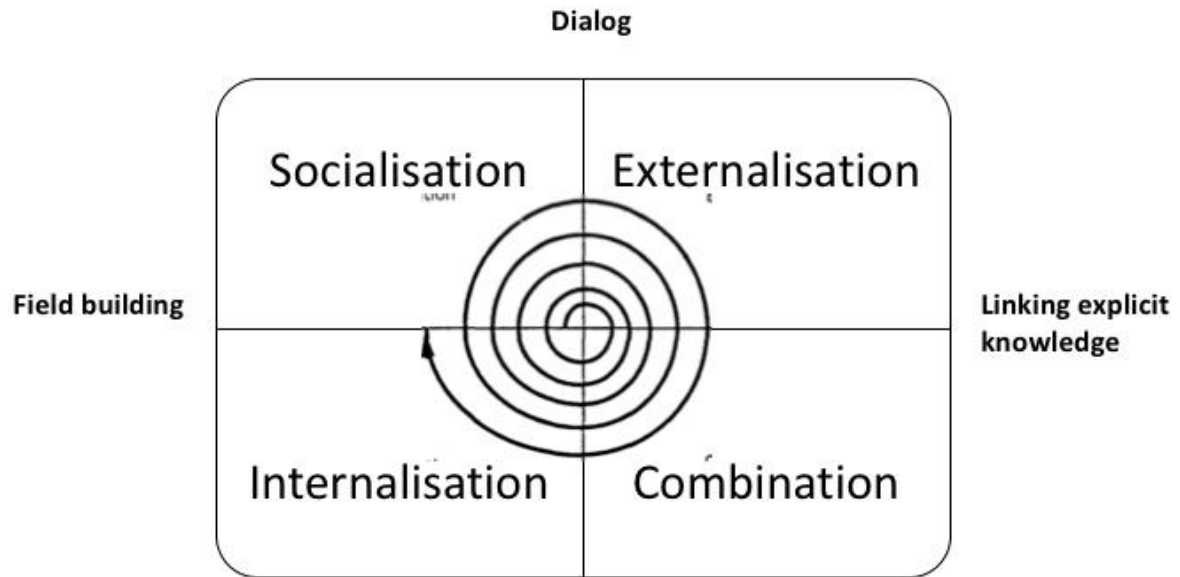


Figure 2. An explanation of the knowledge creating spiral for organisational learning. Authors own creation based on (Nonaka & Takeuchi, Vol. 11, Nos. 7/8, 1996, pp. 84)

An organisation cannot create knowledge by itself (Nonaka & Takeuchi, 1996). Instead, the basis for knowledge creation lies within the tacit knowledge of individuals. The tacit knowledge is institutionalised by the organisation and organisational knowledge creation is the result. Thus, any organisation is highly affected by its members. Thereby, “...organizational knowledge creation is a spiral process, starting at the individual level and moving up through expanding communities of interaction, which crosses sectional, departmental, divisional, and organizational boundaries.” (Nonaka & Takeuchi, 1996, pp. 844).

In illustrating organisational knowledge creation, Nonaka & Takeuchi (1996), describe the processes taking place in the developing of a new product. Here R&D will focus on the technical aspects of the product, whereas other departments within the company will focus on other issues. They illustrate the importance of the socialisation, by showing, that only a part of the different experiences of the departments are expressible in explicit language. Thus, making socialisation and externalisation crucial elements for linking individuals’ tacit knowledge and explicit knowledge. In creating a superior product, it may come in conflict with the overall company vision. This requires another process at management level to maintain company integrity, resulting in another cycle of organisational knowledge creation. This shows according to Nonaka & Takeuchi (1996) that the process of knowledge creation for organisations is not in the hands of specific individuals, but rather everyone in the organisation. They also state, that for learning to take place, managers must shift their focus from the notion that all knowledge are explicit, to focusing on implicit knowledge. Only then can an organisation be transformed into a knowledge-creating organisation.

3.2.3 Knowledge sharing in practice

In describing knowledge conversion, Nonaka & Takeuchi (1996) use cases of Japanese companies as examples for describing knowledge sharing in practice. However, they fail in providing a frame work for explaining how a company should adapt their strategy to maximise both their informal knowledge sharing and formal knowledge sharing. This chapter aims to provide guidelines on how to enhance knowledge sharing across boundaries on any given company. As stated by Mueller (2015): *“The process of knowledge sharing is vital for innovation, organisational learning, the development of new skills and capabilities, increase in productivity, and the maintenance of competitive advantages”* (Mueller, 2015, pp. 55), which illustrates the importance of knowledge sharing.

Informal knowledge sharing

According to Mueller (2015), a shared understanding is important in avoiding confusion and misunderstanding, claiming that different parts of the organisation need to find common ground usable for future interaction and that this remains crucial for the possibility of knowledge sharing. Thereby, organisational culture is of immense importance for the process of knowledge sharing, influencing both if and how knowledge is shared.

Mueller (2015) states the importance of informal knowledge sharing by interviewees regarding informal knowledge share as more important than the formal knowledge sharing. Thereby, claiming that the evolving processes regarding informal knowledge sharing makes their own work easier. Furthermore, Mueller (2015) states that informal knowledge sharing is facilitated by several factors, such as: all employees located in the same building, where the matrix structure of the organisation facilitates the discussion between members in the same hierarchal level but acting on different projects. In participating in these problem-solving activities between project managers, Mueller (2015) claims this help all involved parties, as knowledge sharing takes place. Having the entire entity under the same roof not only helps increasing meetings in unplanned settings; coffee, elevator, lunch, but it enables top management with the ability to point project managers in the direction of other project managers facing the same problem. In doing so, interaction between these are increased, which result in increased informal knowledge sharing. What remains highly important to make informal knowledge sharing take place according to Mueller (2015), is the degree of autonomy and trust. Trust is according to Mueller (2015) most easily created by getting to know other project members personally. Thereby, a project oriented company might be limited in the establishment of trust, where new members are constantly added and removed.

The concept of Communities of Practice (CoP) adds another dimension to informal networks for knowledge sharing. Wenger (2018) defines CoP as: *“Communities of practice are groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly.”* (Wenger, 2018, pp. 1) In defining CoP, Wenger (2018) highlights three characteristics as crucial: *The domain, the community* and *the practice*. This definition suggests a closed environment, where a shared interest creates the domain, separating members from non-members.

Furthermore, Wenger (2018) states that if the domain engages in joint activities and discussions surrounding the domain, this defines the community. The practice aspect of CoP addresses the aspect that all members of a CoP are practitioners (Wenger, 2018). Thereby, members can develop a mutual understanding, based on shared experiences. Other names for CoP are: learning networks, thematic groups or tech clubs. However, CoP is not without limitations. Wenger himself criticises the approach (Wenger, McDermott & M. Snyder, 2002). Stating that the very cornerstones of CoP: trust, shared domain, long standing relationships etcetera, are the pitfalls of the approach for knowledge sharing. Indeed, other researchers (Roberts, 2006) also present arguments against CoP. Roberts (2006) claims that power becomes of great importance in the CoP. While new members are added, older, more experienced members will have more influence of the CoP, leaving some voices unheard. Furthermore, Roberts (2006) also highlights the importance of trust. Without the presence of trust, members will be reluctant to share knowledge. CoP does however, provide a lens for understanding the transference of tacit knowledge between individuals in social settings.

Formal knowledge sharing

Formal knowledge sharing is characterised by being governed by management (Mueller, 2015). According to the empirical study of Mueller (2015), several different approaches can be used to make formal knowledge sharing prosper. In her article she lists several ways for improving knowledge sharing. One is *Flagship projects*, which is a concept explained by Mueller (2015) as formal mechanism aimed at supporting knowledge sharing specifically between project teams. In creating the Flagship projects, management are able to gather employees not working together on a regular basis. In doing so, Flagship project team members are able to engage in conversation, not only about the Flagship project, but other projects as well. However, Mueller (2015) concurrently states that “...as flagship projects are not regarded as part of the daily work, interaction within the flagship project teams are rather limited.” (Mueller, 2015, pp. 58). A second aid in formal knowledge sharing is a *Project report database*. The database is used to share explicit knowledge between different projects without any interaction needed. In doing so, project managers from different projects are provided with key insights from other projects, which may assist them in their current situation. However, the database is only providing previously entered information. This, according to Mueller (2015), means that if time for submitting experiences gained to the database is lacking, the database will not meet its purpose. Thirdly, according to Mueller (2015), *training programs and workshops* can be used as a formal process for knowledge sharing. Attending workshops, employees are able to interact with employees outside their project team, thereby sharing knowledge and experience. Furthermore, workshops can also work as a way of getting to know others. In doing so, hurdles for contacting non-project team members are removed. However, the result of the workshop is highly dependent on the level of commitment of the participants.

Barriers for knowledge sharing

“The identification and recognition of knowledge sharing barriers, may it be a natural part of an organisation’s culture or not, plays an important role in the success of a KM strategy.” (Riege, 2005, pp. 22)

The formerly explained incentives for knowledge sharing caused by formal and informal meetings require a prominent level of intrinsic motivation (Mueller, 2015). If not rewarded, the process of knowledge sharing between different projects becomes highly dependent on the organisational culture. Importantly, according to Riege (2005), there is a difference in culture found between large firms and small and medium-sized enterprises (SMEs), where SMEs tend to provide an environment better suited for knowledge sharing. This, according to Riege (2005) is allocated to *“...size, often single site location, and a closer social relationship of employees, resulting in good communication flows and knowledge sharing.”* (Riege, 2005, pp. 22) He further states that this benefit is lost, if SMEs move to multiple sites, where communication will decrease rapidly. However, SMEs lack strategic focus on knowledge sharing. Instead, organisational members are occupied with day-to-day work. Therefore, SMEs, even though being knowledge generators, struggle with the implementation of a system for developing, capturing and sharing knowledge on an organisational level.

According to Riege (2005), companies tend to fail in their pursuit of implementing knowledge sharing practices, when adapting their culture to fit the knowledge management. Instead Riege (2005) suggests that companies are to adapt knowledge management strategies to fit company goals and company culture. In identifying barriers for knowledge sharing, Riege (2005) separates three different barriers: *individual barriers, organisational barriers and technological barriers.*

The ability for *individuals* to share knowledge is highly dependent on their communication skills (Riege, 2005). Furthermore, there is a clear correlation between an individual’s ability to share knowledge and a person’s social skills and networks. Another potential barrier for knowledge sharing is the employee’s values, practices and symbols, which are influenced by the national culture. As knowledge provide employees with power, organisational members might be reluctant to share specific knowledge, this is allocated to job security, where employees feel replaceable once knowledge is shared. This results in the hoarding of knowledge, rather than sharing, thus hindering knowledge from spreading throughout the organisation. Also promoting the hoarding of knowledge is the lack of time for knowledge sharing in organisations. If knowledge sharing is viewed by employees as a cost factor, people tend to focus on activities more beneficial for them. Therefore, it is important for management to devote effort for the creation of time and space for formal and informal knowledge sharing. Furthermore, individuals are affected by the tolerance from management for making mistakes and thereby improve. According to Riege (2005), this might be allocated to national culture, where some countries have a culture of viewing errors positively. This notion is supported by research made by Nonaka & Takeuchi (1996). Finally, employees might be more willingly to share explicit knowledge over tacit knowledge. This creates barriers for sharing experiences and know-how, which is most easily taught by observing.

For *organisational* learning, Riege (2005) considers the organisational context to be the most important barrier, affected by corporate environment and conditions. If providing accurate settings and infrastructure, management can facilitate knowledge sharing between different organisational units. Furthermore, Riege (2005) considers the financial aspect of knowledge management to be important, since knowledge management in many cases is expensive. Thereby, knowledge management must be adopted to fit overall company strategy, vision and goal. There is however evidence that a flexible organisation provides the best setting for knowledge sharing, thus proving to be more important than organisational culture. Further, another type of organisational barrier for knowledge sharing could be the missing of mechanisms for supporting sharing activities. Riege (2005) stresses the importance of having management working to create an environment where formal and informal knowledge sharing can take place. Thereby, the layout of the company floor and work areas becomes of interest. Management must actively work to create a work space where knowledge-sharing activities take place naturally. This proves a challenge especially for large companies or project organisations spread across distant geographical locations, where basic communication becomes difficult. Here IT systems might help resolving these issues but might also enhance technological barriers.

Technological barriers happen, when technology is implemented as a measure for addressing knowledge management issues, as those allocated to geographical separation (Riege, 2005). Technology provides instant access for all employees to large amounts of data at all times. Thereby, knowledge is more easily spread throughout the organisation. However, when implementing IT solutions for knowledge sharing it is important to choose the right type of software. While one technology might work effectively in one organisation, it might fail in others. Also stated by Riege (2005) is that the fit between people and software is highly important. If not, the implementation of an IT-system, technology itself becomes a barrier, which some employees cannot utilise.

Single-loop and double-loop learning

The concept of single-loop and double-loop learning is a notion first developed by Argyris (1991). He claimed that while many successful companies were excellent problem solvers, few succeeded in looking inwards. In doing so, companies failed at reflecting on their own behaviour, thereby being unable to change how they act. The difference between single-loop and double-loop learning was explained by Argyris (1991) as: *“a thermostat that automatically turns on the heat whenever the temperature in a room drops below 68 degrees is a good example of single-loop learning. A thermostat that could ask, ‘Why am I set at 68 degrees?’ and then explore whether or not some other temperature might more economically achieve the goal of heating the room would be engaging in double-loop learning.* (Argyris, 1999, pp. 5)

Since Argyris (1991) introduced the concept of single-loop and double-loop learning, many authors have contributed with further research (Greenwood, 1998; Korth, 2000; Garcia-Morales, Verdu-Jover & Llorens, 2009; Peeters & Robinson, 2015). In their daily work many professionals are successful in completing their tasks (Argyris, 1999). Being successful, they are able to avoid failing, thereby the ability to learn

from failure is underdeveloped. This, according to Argyris (1991), makes managers and professionals take a defensive stance, whenever their acting is questioned. In doing so, employees become an obstacle for continuous improvement, while claiming being drivers for the same. According to Argyris (1991), this acting is explained by fear, fear by failure itself.

The first step in improvement is according to Argyris (1991), detection. To enable adjustments, the problem must first be identified. Having understood that change is needed, Argyris (1991) emphasises that change must start top-down. If not doing so, the acting of middle management might be seen as aggressive and strange to top management, thereby resulting in opposite results to what is desired. Instead, Argyris (1991) imposes that top management are to connect this program of change to real life business cases. Thereby, they are able to witness the result of the implementation first hand. Organisational learning is just that, a process of learning and the understanding of how development is to be made to best benefit the company (Koskinen, 2012). What characterises a project-based organisation is the nature of the ever-changing business, thereby making each lesson learned, ever more important. This according to Argyris (1991), is the key to company success. To summarise, single loop learning means companies continue following their current policies, thereby achieving their current objectives, whereas double loop learning leads to the transformation of the underlying policies, strategies and objectives.

3.2.4 Organisational learning

The construction sector is characterized as a project-based industry, where a constant stream of new projects contributes to a heterogeneous non-routine production of new buildings, houses, roads etcetera (Bresnen et al., 2004). This results in a complex situation driven by inter-professional and inter-organisational relationships. The industry is also affected by its high extent of decentralisation, where projects are driven by isolated project teams, causing a distinction between project teams and the company organisation.

According to Chron er & Backlund (2015), a learning organisation is defined as an entity able to learn from past experiences, thus retaining and developing their effectiveness. For a project organisation then, it becomes crucial to learn from project experience. This is a process, not merely taking place after a project has finished, Chron er & Backlund (2015) emphasises that the process of learning should take place throughout the entire project cycle, otherwise the project result will be unsatisfactory. Thereby, Chron er & Backlund (2015) identified three aspects of learning in project-based organisations: *Intra-project learning*, *Inter-project learning* and the *process and systematic perspective*.

Intra-project learning is, according to Chron er & Backlund (2015) best achieved by different types of information sharing processes. Here, project meetings could be used to transfer experience between project members once a project is finished. More importantly, in their study of three different construction companies, all respondents considered the experience feedback as an “...essential activity for learning.” (Chron er & Backlund, 2015, pp. 67) However, most managers in the study stated that there is still a long way to go before learning from experience is institutionalised.

Thereby Chron er & Backlund (2015) claim that reports remain nothing but paper if not utilised. Simultaneously, Chron er & Backlund (2015) discovered that no or little time is devoted to experience feedback, since management is forced into taking on new projects as one finishes.

Organisational guidelines can be an efficient way to spread experience throughout the organisation, however according to Chron er & Backlund (2015) the success is dependent on the different support systems provided. Again, the study conducted by Chron er & Backlund (2015) shows that the lack of time is the number one constrain, not only for intra-project learning but for inter-project learning. Instead, time is used for deviation management. Here, deviation management is claimed to be an important aspect of project management. Thereby, the time-consuming task of meeting short perspective goals is prioritised, while lessons learned while doing so is not carried forward. While ICT-systems can be utilised to carry explicit information forward, Chron er & Backlund (2015) emphasise that meeting face-to-face was the preferred way for sharing experience among interviewed project managers.

In the previously discussed article by Chron er & Backlund (2015), there is a lack of systematic approach for how experience is shared. Employees from all three case companies consider the word-of-mouth approach to be superior to any ICT-system available. Claiming the role of an apprentice, project managers to come are able to observe, thereby gaining not only explicit, but tacit knowledge through the learning process.

For an organisation to learn, Chron er & Backlund (2015) emphasise that organisational members must “... *take their learning back to the system*” (Marsik & Watkins, 1999, pp. 12) Furthermore, management in project organisations should focus on developing a systematic learning process. Chron er & Backlund (2015) suggest the adding of another process to the project –thinking in project management. This process is to be govern by a “process owner”, whom is to control the process of learning from projects and the growing of company culture, where inter-project and intra-project learning can take place.

3.2.5 Individual learning

Individual learning is a prerequisite for organisational learning (Josephson, Styhre, & Wasif, 2008B). Josephson et al. (2008B) argue that the complex nature of construction projects, where standard solutions are hard to apply, imposes a need for individual learning, as it would help actors in handling the complexity of a construction project. They further state that construction company organisations must learn to evolve and stay competitive, a notion also supported by others (Holt, Love & Heng, 2000). Hence, knowledge acquisition is an important aspect of organisational work. Josephson et al. (2008B) claim that organisational learning, only can be accomplished either from its current employees, or by investment in new employees, holding a new set of knowledge to be implemented in the organisation.

Research show that, while construction companies in the construction industry actively gather information, there is a clear structure missing for how information is used (Scott & Harris, 1998). Utilising this information are individuals, the project

team learning remains unsatisfied (Atkin et al., 2008). Josephson et al. (2008B) identified five different approaches for learning taking place in construction companies, namely:

1. *Learning from individual networks*
2. *Learning through organising*
3. *Learning from experimenting*
4. *Learning through reading*
5. *Learning through attending courses and seminars*

When problems arise in production, Josephson et al. (2008B) claim individuals are learning from problem solving. If unable to solve the problem on their own employees tend to utilise individual networks, as contacting others were viewed as a weakness by case study interviewees. Interesting enough, interviewees also expressed that while learning takes place when mistakes are made and corrected, many could be avoided if information had been collected from other people involved in similar projects.

A second approach to learning is described by Josephson et al. (2008B) as learning through organising. Here project meetings is highlighted as an opportunity to become familiar with other project teams, while providing a forum for problem solving through discussion. While these positive effects are achieved through meetings, they also discovered that meetings could provide an unproductive atmosphere, where project members are unwilling to criticise each other's work. Another important observation by Josephson et al. (2008B) were that project team members might be unwilling to reveal bad project experiences to clients.

Thirdly, while not appreciated as a way of learning, due to excessive costs for failing, individuals at the case companies were learning from experimenting (Josephson et al., 2008B). However, most respondents were unwilling to use new materials as the long-term quality of new materials are unknown. Since experimenting with new materials imposes a financial risk to clients and project managers, especially in smaller projects, experimenting is best avoided. Instead, project members are more interested in gathering information from journals related to construction, thereby learning through reading. However, there was a spread detected among different professionals, were construction workers were not exposed to literature while other professions were.

Lastly, individuals can learn from attending courses and seminars. This was according to Josephson et al. (2008B) the most appreciated way to harvest up to date knowledge. However, they further state that it is important that courses remain relevant to each profession and interesting, otherwise people will be reluctant to participate. Courses and seminars are also a way of facilitating meetings between different professionals, thereby enhancing their networks.

In investigating individual learning, research concludes that there is a profound difference among different professions and their approach to learning (Josephson et al., 2008B). On the one hand, clients, architects and designers show an interest in participating in activities used for learning and experience sharing. On the other hand,

site managers, construction workers and sub-contractors are reluctant to be a part of these activities. This behaviour was previously described as a result of parties wanting to show strength or simply not understanding the benefit of experience sharing. To change the acting of the industry Josephson et al. (2008B) suggest that site managers and workers are more involved in meetings with other actors, thereby creating a stronger sense of belonging to the project team. In doing so, professionals are also able to share experience about different solutions to project problems, recalling that organisational learning is the result of individual learning from dealing with emerging problems and challenges.

3.2.6 Summary of knowledge management

Knowledge is separated into tacit and explicit knowledge (Addis, 2016). The Swedish construction industry is based on project constellations, where knowledge sharing is important for creating unity among project team members (Zhang & Fai Ng, 2012). Therefore Zhang & Fai Ng (2012) emphasise that organisational management must actively work to facilitate knowledge sharing, by motivating actors to share knowledge and experience with the organisation, which can result in a knowledge creating spiral (Nonaka & Takeuchi, 1996). On the one hand, knowledge sharing can take place through formal settings aiming at facilitating knowledge sharing, governed by management, such as flagship projects, project report databases, training programs and workshops (Mueller, 2015). On the other hand, Mueller (2015) considers informal knowledge sharing as equally important, where CoP adds another dimension to informal networks. Recalling that there are barriers for knowledge sharing, Riege (2005) claims that knowledge sharing strategy and company culture must be aligned. Otherwise companies tend to lose knowledge, especially from organisational units, operating in remote locations and if experience feedback is not on the time schedule.

According to Argyris (1991) companies should reflect on their actions and development, thereby engaging in double-loop learning. This is defined by Koskinen (2012) as organisational learning, where adaptation of current company strategies are made as additional information is introduced. Furthermore, organisational learning is divided into inter-project learning and intra-project learning, where meetings are important in facilitating sharing between actors (Chron er & Backlund, 2015). Lastly, organisations are built by their members, therefore making individual learning important for organisational learning (Josephson, et al. 2008B).

3.3 Construction management

The low performance of the construction sector is a well-known notion, both in Sweden (Atkin et al., 2008; Thunberg et al., 2017;  freds, 2018) and abroad (Addis, 2016). Performance related problems, occurring during on-site production is according to Thunberg et al. (2017) connected to a poor “...*construction project process or the supply chain*” (Thunberg et al., 2017, pp. 90) They further state, that problems allocated to low performance derive from: lack of information sharing and poor communication between project team members.

Examining the construction sector using the lens of supply chain management, uncertainties are reflected in delivery reliability (Thunberg et al., 2017). Thunberg et

al. (2017) emphasise that these two are connected by stating that: “*Decisions that are made early in the construction project process, for example, concerning specific types of technology or materials, will affect both the supply chain and the construction project process.*” (Thunberg et al., 2017, pp. 91). Construction management focuses on both the pre-construction phase and the construction phase (Thunberg et al., 2017). The complexity of construction projects separates them from other types of projects (Jackson, 2010). Hence, the need for construction management to supervise and govern this complex process. Construction management then is the management of planning, scheduling, evaluation and controlling of construction, thereby handling the project cost, time and quality. The main purpose of construction management is to increase project performance and efficiency, connected to the construction process.

In a construction project, project team members are often replaced, added and lost throughout the completion process (Radosavljevic & Bennett, 2012). Being responsible for project performance, the project manager is responsible for enhancing actor performance. Thus, according to Radosavljevic & Bennet (2012) enabling people involved in the separate phases of a construction project perform the best possible result. Having many different players involved in the process forming a construction project, actors might attend the project with different agendas. Thereby, enhancing the importance of the project manager role.

The tendering stage often decides the processes and cost estimation for a project (Clough, et al., 2015). Acting in the early stage of the project, the contractor is often only given one chance to estimate project budget and project schedule. The conditions given from the tendering process decides the conditions for the project manager when leading the project. Thereby, the project manager is left with a pre-set condition, from which whom is to produce the best possible project outcome. This according to Clough et al. (2015), leaves the project manager unable to control the setting where whom is to find an effective way of executing the project. Therefore, the main obstacle with the construction processes is, according to Radosavljevic & Bennett (2012) allocated to inherent difficulties. These are present in all phases of the construction process, thus providing the greatest challenge for the construction team. Besides the inherent difficulties, construction projects are often a subject for sudden changes allocated to changed circumstances. These occur with short or no foresight, thus leaving the project manager in the role of a firefighter, fighting off errors by extinguishing fires (Clough et al., 2015).

A construction project will go through several phases during the project lifecycle, where different people and different approaches are needed for each specific phase (Clough et al., 2015). A construction project typically starts with the client defining the project scope, thereby expressing project requirements. These typically include the purpose with the project, project activities, delimitations and budget. Depending on the procurement, this phase may also include design sketches and design requirements. Thereby, depending on the type of contract and procurement the client can decide the design themselves or let it be part of the basis for the tendering process. In recent years, the interest for using the Design Build (DB) concept has grown (Radosavljevic & Bennett, 2012). The main driver for moving away from the more traditional Design Bid Build (DBB) towards DB is that when using DB, the

main contractor is controlling not only the construction phase of the project, but the design phase too, making construction management an easier task.

When engaging in the tendering process, cost accuracy is significant (Radosavljevic & Bennett, 2012). Since the tendering process might not always result in project acceptance by client, it becomes of utter most importance that the cost for taking part in the tendering process is minimised while tendering accuracy is maximised. Therefore, contractors seek to maximise the trade-off between tender cost and tender accuracy. If awarded the contract, the contractor initiates the process of detailed project planning and buying services not performed by themselves. This process is used to estimate and decide the required man-power, sub-contractors, building process, material needed etcetera to the production phase. It is a well-known notion that, if the project basis provided from the client is clear, well organised and communicated together with a extensive planning process, then project success is more likely (Radosavljevic & Bennett, 2012). Radosavljevic & Bennet (2012) explain both a worst-case scenario and the perfectly managed construction project, thereby highlighting that project success is dependent on the project complexity and the experience of the company on taking on similar projects. Furthermore, Radosavljevic & Bennet (2012) describe that a well organised working process and straight forward communication also is important for project success. When the planning process is completed, the work is handed to a site manager, who will be in charge of the production phase of the project. The outcome of the production phase is dependent on the site managers ability to act as a leading force, thereby tracking the day-to-day work of the workforce, arranging work in the most effective way possible. If provided with an accurate budget and schedule, the site manager has a better chance of delivering a successful project. However, this is not always the case, the building industry is well-known for both cost overruns and delays (Radosavljevic & Bennett, 2012).

To summarise, construction projects are composed of a chain of several different phases, which together forms the project (Radosavljevic & Bennett, 2012). Actors responsible for project success will shift during the separate phases, this is highly dependent on procurement, contract and project complexity, hence creating the uniqueness seen in the construction projects where communication becomes important. Therefore, the use of experience and double loop learning becomes important for developing a better construction management for organisations. Thus, the early phases of the project such as the tendering process utilise experience from previous projects to estimate costs for new projects. Therefore, Radosavljevic & Bennet (2012) emphasise on the importance of feedback for decision-making, as utilising experience will enhance performance in future projects, thereby ensuring project success.

3.4 Experience feedback in the construction industry

There are several definitions to the term experience feedback (Bertalanffy, 1968; Stacey, 1996). The definition of experience feedback used in this thesis is provided by Kjellen, Albrechtsen & Taylor (2017) as *“The process by which information on the results of an activity is fed back to decision-makers as new input to modify and*

improve subsequent activities” (Kjellen et al., 2017, pp. 91). Bertalanffy (1968) emphasises that if experience is used as an input to influence future output and correct deviations, the term negative feedback is most suitable. If instead the process itself is altered, Stacey (1996) speaks of positive feedback. Hence, experience feedback could consist of both negative feedback and positive feedback. Recalling the definition provided by Bertalanffy (1968), Kjellen et al. (2017) suggest positive feedback to be more suitable for a company or organisation wishing to evolve from experience. Importantly, feedback is not only about reporting mistakes made by the organisation (Kjellen et al., 2017). The experience feedback is built on an information collection, where information channels transfer the knowledge and information from the individuals to be embraced by the organisation.

Experience feedback can be traced in the three subjects of project management, knowledge management and construction management. To get an understanding of the basics and contextualise experience feedback a background in the three subjects are necessary. The construction industry is based on projects, where constant work with project management in the concept of experience feedback is made, thereby connecting experience feedback and construction management. Having previously described knowledge management, the connection between experience feedback and knowledge management should be obvious, since information is constantly flowing both on the individual level and the organisational level.

Coudert, Béler, Geneste & Kamsu Foguem (2008) state that experience feedback is different from knowledge management in the sense that experience feedback must be collected over a period of time. Thereby, experience feedback is something deriving both from explicit knowledge and tacit knowledge. The process boils down to three steps: collection of information from a certain situation or an event occurred, analysing the situation and contextualises the problem and lastly the implementation of counter measures against the occurred problem. Henderson et al. (2013) claim that if improving the organisational work regarding experience feedback, the organisation can utilise the benefits of double loop learning, stating that today the single loop is used frequently in so called “firefighting” connected to the current project. The problem is that these problems are most of the time only solved and not evaluated or investigated. The double loop learning in this case would be to investigate the problem, find the problem origin and together with the organisation and people in the earlier phases make sure that the problem is learnt from, thereby not repeated.

Construction projects are often said to be unique, as a consequence a high degree of information and communication needed in each project (Josephson et al., 2008A; Wen & Qiang, 2016). Josephson et al. (2008A) made a report on the Swedish market focusing on learning and knowledge sharing in construction projects. Wen & Qiang (2016) look at the knowledge sharing within construction companies, knowledge sharing covering both within the project team and transfer to company learning. The investigation is not mainly addressing experience feedback, but it is included in the scope of knowledge sharing within project-based organisations. Despite being eight years apart, both authors of the article claim the experience feedback is being highly requested and invested in, despite the results for construction sectors being poor. Wen & Qiang (2016) investigated what could be a necessity to reach a successful work

with experience feedback, namely the knowledge sharing within a project. The authors concluded that projects can be executed with poor knowledge sharing, however the project will be more easily coordinated when implementing a higher degree of knowledge sharing. They also found that having poor knowledge sharing within a project, the organisational learning is highly impacted in a negative way.

There are Barriers for experience feedback, (Henderson et al., 2013) present several reasons to explain the insufficient usage or obstacles for experience feedback. The barriers for knowledge sharing are important to understand to fully grasp the scope of the subject and the inherent problems of the construction industry. Riege (2005) presents barriers specific to knowledge sharing and divides them into individual, organisational and IT, which are all connected to construction projects. Furthermore, Josephson et al. (2008A) found factors which worked as barriers for experience feedback. The authors claim that the most repeating statement about why experience feedback does not work, is that the construction industry is conservative and that every construction project is unique. Josephson et al. (2008A) further state that they believe that these two statements are more of an excuse for the industry, not representing the truth. They state that the entire construction industry suffers from this notion, but also that project team members and especially actors on-site, use these statements both as an excuse and as proof, thereby being reluctant to change. On the individual level Zhang & Fai Ng (2012) and Josephson et al. (2008A) claim that individuals may have a problem with sharing negative experiences from the projects. Instead, examples of good leadership and smart solutions are communicated rather than the issues, that would be beneficial to learn from. This connects to the single loop and double loop learning illustrated by knowledge management, where individual learning occurs between people on site performing firefighting (single loop learning), however the experience is not forwarded to organisation (lack of double loop learning) (Henderson et al., 2013). Josephson et al. (2008A) express a problem with learning and reflection with the actors they met during the investigation, claiming that persons in the project team on site does not give satisfying answers to questions about knowledge and transfer of experience. A clear example is the answer to the question of what is carried forward from previous projects to the next? Simply: nothing. They further state that this is a result of learning not being discussed, thereby having a low priority among actors in the construction industry. One reason for this is the lack of reflection in the construction industry, which is a barrier on the organisational level that are connected to the current climate where construction projects operates, here the focus is on time and money, thereby local projects have short term objectives as main priorities (Josephson et al., 2008A; Henderson et al., 2013). The short term thinking in the local projects and fast solutions on newly discovered problems have low connection to the centralised long-term strategies (Henderson et al., 2013).

4 Empirical Studies

This chapter will present all the relevant findings collected from the empirical studies. The findings communicated will be a mixture of discoveries from internal document published on the intranet of Skanska, observations and information gathered from interviews.

4.1 V.S.A.A

V.S.A.A (Vårt Sätt Att Arbeta) is Swedish, which translates to: “Our Way of Working”. According to the V.S.A.A Developer, the document was first created by Skanska Sweden which aimed at creating a document working as a guideline for all operations occurring within the company, thereby V.S.A.A is seen as the “bible” for the day-to-day work. Skanska’s main purpose with the document is to create a handbook for how day-to-day work should be executed by being adapted to the overall company strategy and vision. Thereby, the V.S.A.A Improvement Leader explains that the document aims at strengthening the core business, by striving towards having all employees working in the same manner and direction, resulting in higher profitability by having a higher ratio of successful projects. Having a document creating unity within the company is an old notion dated to when the company was first founded, however the digital document was introduced approximately ten years ago. The document is divided and adapted to fit the different branches of the company, where every division have a specific subcategory describing their way of working. This dividing into branches means that each division has a separate V.S.A.A Improvement Leader (V.S.A.A Improvement Leader). The improvement leader is responsible for continuously developing and updating the extensive document V.S.A.A has become. The input for updates is given from three diverse sources, namely; Skanska Board of Directions, the unit for operational efficiency and from all employees at Skanska. In the bottom of the document there is a link called: *improve* where employees are encouraged to contribute to the document development. According to both the V.S.A.A Developer and the V.S.A.A Improvement Leader, this function is of importance, as it encourage employees to improve the document. The vision of the V.S.A.A Improvement Leader is that the document should create an “aha-moment” for workers, where a prominent level of recognition should be present, stating that the long term goal is to create a document which describes the day-to-day work of employees. However, the V.S.A.A Improvement Leader also states that the company are far from achieving the vision. Today, employees are reluctant to contribute in the development of the document. Here, there is a profound difference between various categories of employees, which is confirmed by the fact that all three site managers not having used the development tool. This is, according to the V.S.A.A Improvement Leader the reason for Skanska creating the operational efficiency unit one year ago. Their main purpose is to create awareness about Skanska’s vision about V.S.A.A in all regions of the company. This is done through having an Operational Leader (OL) evaluating current projects on how well they are following the V.S.A.A document on twenty specific points. The points are developed by the operational efficiency unit and are constantly reviewed, where points which are redundant due to improvements are replaced by new currently more important ones. Thereby the OL can give each project grades between 1-4 depending on project performance, where 4

is in complete accordance with V.S.A.A standards. Having only been used for one year it is too soon to evaluate if they have had the desired effect in spreading the word of V.S.A.A (V.S.A.A Developer).

Performing the initial key word search of V.S.A.A made it obvious that the document had no specific chapter for describing neither experience feedback nor knowledge management. Furthermore, there is no chapter devoted to explaining how experience and knowledge gathered by team members in one project are to be carried from the project to the organisation, between individual projects or how to carry them forward to future projects. However, the concepts of experience feedback are briefly mentioned if compiling information scattered over several pages. The notion was confirmed by all interviewees, where no one was able to recall what the document explicitly stated about knowledge management or experience feedback.

Searching the document, the first finding about experience feedback, is allocated to the tendering process (Skanska, 2018). Here, the documents' essence is that the insights gathered during the tendering process, including budget calculations, should be handed over to the production team, thus providing a detailed description of the work cost estimation, thereby information not only about how a specific solution in production should be implemented is transferred, but why a solution should be implemented. All site managers considered the why as important as the how, as explanations of why gave a understanding for the design phase of the project, resulting in better project performance (Site Manager A, Site Manager B, Site Manager C). The segment in the document further explains what kind of meetings that should take place during the project and how the project is to be followed up through a project completion meeting (Skanska, 2018). Remembering that the segment provides information for the tendering process, the segment further states who should oversee the follow up of a project once it is finished and deliver this information back to the organisation, which is made through documentation in a project folder only available online for the specific region.

Later found in V.S.A.A is a tool for experience feedback. The tool is comprised of several checklists and was created with the intention to act as aid for employees working with purchases for projects (Skanska, 2018). The tool is mainly developed for purchases, however employees not working within the purchase division might also utilise the information provided by the checklists. The checklists are divided into categories of methods and materials, where one example is the description for how employees should act when procuring a sub-contractor for delivering and installing elevators. The checklists are thereby a combination of governmental rules and regulations, internal guidelines and examples of complementing information. While most checklists provide guidelines for the procurement of sub-contractors, only two checklists will aid the procurement for special materials (Skanska, 2018). Acting as a complement, a list with frame agreements of unconventional materials and the specific supplier is found attached to the checklists. Furthermore, the section governing how to procure sub-contractors in the production phase presents a notice about experience feedback (Skanska, 2018). The sections states that the production leader, head of purchase for the project, the project engineer for the product and, if present, the specialist purchaser should be present at a follow up meeting with the

sub-contractor or material supplier. The benefit of having everyone present, is that experience feedback should be archived for all disciplines (Site Manager A). Further, to govern experience feedback, this section also provides a meeting agenda which should be used on all follow up meetings. To suit all types of project teams, the agenda is found both in Swedish and English. Lastly, the section holds information about suppliers and sub-contractors, which is evaluated in a database for suppliers within Skanska. Thereby, project feedback regarding sub-contractor or supplier performance is recorded for others to utilise in future procurement. To ensure this specific type of feedback, an internal mail is sent to remind the person responsible for the process. Once the meeting is complete the information is stored in a project folder for others within the project to utilise.

Further, the V.S.A.A document has a chapter specifically addressing partnering projects, which includes some references to experience feedback (Skanska, 2018). Again, the first point about experience feedback regards guidelines for completing the tendering process for partnering projects. Here, the document holds information stating that after the tender interview, the tendering leader should gather the project team and evaluate the interview. The second point is that a feedback meeting with the client must occur. The information gathered during this meeting should be documented and communicated orally or through documentation in the project folder to the tendering group. Further, the same type of experience feedback to the tendering group should be completed during the design phase and the project sum up meeting. Thereby, the tendering group is ensuring that information and experience gathered from the project is documented throughout various project stages. Lastly, guidelines for experience feedback within partnering projects regard the production phase state that an end meeting with all project team members must occur. This meeting should evaluate the entire project, not only budget results and if the project was a success or not, but rather lessons learned. However, when interviewing different actors (Site Manager A, Site Manager B, Site Manager C and Project Engineer) within the organisation working in the production phase of projects, it became clear that these meetings are rarely held. All actors listed above considered this to be due to time constraints, since when one project finishes the next has already begun, making time allocation for sum up meetings are rarely made.

Furthermore, in V.S.A.A there is a section called job planning's, which is a tool used for planning different tasks in the production phase of a project (Skanska, 2018). The tool is thoroughly described in V.S.A.A and there is also a complementing information video to explain how to use the tool. The job planning's should first be filled in by the site manager to be supplemented before the task is initiated by the supervisor and involving personnel in completing the task. There are distinct headlines that must be included in every job planning, these headlines also hold questions which must be answered before the task is initiated. The complete list of headlines and questions are found below (Skanska, 2018):

- *Start and End* – What is the status for the upcoming work and what will be the desired result?

- *Method* – What is the most desirable way to perform the task? The response must consider possible dangers and counter measures, production aspects, environmental aspects, quality and profitability.
- *Structure and Way of Working* – Must describe a structured plan on how the work will be performed to fulfil the all requirements specified in the headlines above.
- *Capacity and Interference* – Should illustrate an optimisation of the decided tasks with supplementing risk analysis and appropriate counter actions. Further, this headline also specifies decisions about self-controls that should be made when the task is executed and completed.
- *Resources* – Should specify resources necessary to complete the task. This includes which sub-contractors to use, own personnel assign to the task and materials needed. Furthermore, logistical solutions needed to perform the task should be described.

Utilising the job planning's provided by Skanska when planning a task makes tasks and job planning's become standardised and more easily executed (Site Manager A). When the job planning is completed it must be signed and approved by the production leader, who then communicates it to involved personnel. When the task is completed, the supervisor must evaluate the job plan (Skanska, 2018). The evaluation is used to control how the tasks were completed, thereby detecting anomalies in how each task was executed. During the evaluation the task must also be compared against the calculated hours set for completing the task, the hours used for completing the task is also demanded by Swedish labour unions. Thereby, the evaluation is completed to get a better overview of how well the plan corresponded with actual task performance. In doing so, the job planning's create a basis for changes necessary to improve future work. The last step in working with job planning's is for the site manager to upload them to the project folder, thereby making them accessible for all other site managers within the region. Dating three years back, site managers must upload a specific number of job planning's each year to be given their bonuses, which is an incentive added by the regional office (Site Manager A). When introducing this requirement, regional management also added the requirement that job planning's must be uploaded to an internal platform called VBB, later described in 4.2. Importantly none of the interviewees (Site Manager A, Site Manager B & Site Manager C) considered quality to be an issue when uploading their job planning's, since quantity was the only requirement for receiving bonus. Furthermore, interviewees claimed little or no time was allocated to perform the evaluation of job planning's, since focus is shifted to the next task as one task is completed. Site Manager C further explains that it is not frequently that he uses old job planning's from other colleagues, as these are often un-complete. Instead Site Manager C tend to use job planning's completed by himself in previous project, if the current project has a similar task. This is independent of if the job planning's are evaluated or not, as he can recall the result of the execution of the specific task. Lastly, all site managers interviewed consider job planning's as a frequently used and much appreciated tool, since it has simplified and standardised the production procedures for all actors. The job planning's also create a contextual

setting for sum up meetings held when the project is finished, thus making it easier to remember completed tasks (Skanska, 2018). Sum up meetings are according to the Tender Coordinator, the best way for conduction experience feedback, however the Tender Coordinator simultaneously states that these are not held after all projects are finished, as new projects are initiated beforehand that demand full attention.

Site Manager A, Site Manager B, Site Manager C and the Project Engineer all expressed the opinion that V.S.A.A is a document which is hard to navigate. Therefore, all of them are reluctant to utilise existing information, as navigating the document looking for a specific paragraph is a time-consuming effort. This problem was also highlighted by the Tender Coordinator, who claimed that education in how to navigate the document might be needed, especially for more senior personnel, as these are more reluctant to use IT-tools. Previously Skanska had class room education in V.S.A.A, with desired result for junior employees, however senior employees were reluctant to learn, why this type of education was cancelled (V.S.A.A Improvement Leader). The problem with understanding V.S.A.A has also been detected by the V.S.A.A Development Leader who now works actively in developing V.S.A.A into become more easily accessed and understandable. The understandable aspect aims at developing the document into something which enables all employees to understand how they could utilise the document in their day-to-day work, whereas the accessibility aspects is to make it available through modern portals such as tablets and smartphones through a newly developed application (V.S.A.A Development Leader). Until today there has not been any evaluation if the introduction of the application has given the desired result. Apart from the application, Skanska has just launched a project called Dream Big, which is the vision for the future V.S.A.A. One idea of Dream Big is a new software which communicate with the current software's and becomes more of a total project software. The purpose is to get all necessary information at one place instead of finding it in V.S.A.A first and then apply it. If the vision is met, the V.S.A.A Development Leader thinks V.S.A.A will become a much appreciated process tool able to gather information throughout all different phases of each project. Although, the vision can be used as a total database with all info in one place the V.S.A.A Development Leader stress that a bid data database is not an option for further development. Meaning that such a database will be hard to coordinate and identify the useful material.

4.2 VBB - Database holding methods and experiences gathered on a regional level

VBB is an acronym for “Världens Bästa Byggare”, which is best translated into “The World’s Best Builder”. In 2008, one of the regional offices of Skanska wanted to create a regional database for complimenting the V.S.A.A document with good examples and best practice, to be shared throughout the region (Skanska, 2018). The initiative came from a development group, wanting to enhance regional project performance and the tool is still available for all employees in the region today. VBB is meant to work as an online folder for anyone within the region to use in the purpose of searching for material and upload material. Today, VBB is a database in the form of a web page were material is uploaded and categorised, where different folders are

allocated to separate phases within a construction project. The seven categories that are present in the database are (Skanska, 2018):

- *Job Planning's / Work Moments*
- *Establishments* of temporary offices used on the construction site during the production phase of the project.
- *Reference Examples / Other*
- *Project*
- *Leadership*
- *Working Environment*
- *Quality and Environment*
- *Resources*

The uploads have a broad spectrum of information spanning from regional newsletters to how to install a window (Skanska, 2018). The database currently holds approximately 2600 articles in total out of which approximately 1600 articles are uploaded job planning's. The job planning's are categorised to fit separate building components, such as ground work or walls. According to the Tender Coordinator, this enables users with a better overview of the web page, thereby making it a more user-friendly environment. Entering the wall category, 103 articles about job planning's appear, shown in an alphabetically arranged list (Skanska, 2018). The information displayed contains the topic of the job planning and a short descriptive sentence explaining its content, furthermore some articles appearing has a small picture attached to its description.

Having separated articles regarding job planning's, approximately 1000 articles remain out of which approximately 570 are allocated to the resource category, whereas the remaining articles are evenly shared by remaining categorise (Skanska, 2018). Further examination of the resource category showed that the high number of articles, compared to the remaining categorise apart from job planning's, could be explained by job planning documents having been uploaded to the wrong category. Taking this notion into account, the result is somewhat 2000 job planning articles and 600 articles in other categories. The vast amount of job planning's could according to Site Manager A, be explained by an initiative from Skanska regional management stating that one criteria for collecting bonus for individuals was to upload a specific number of job planning articles to the VBB database. From initially holding a group of reference examples of job planning's, the initiative soon multiplied the number of job planning's available which made the database hard to navigate. According to the Tender Coordinator, the initiative was taken to grant users with more data and this goal was met, however the result was also that reference examples now were mixed with un-finished and not evaluated job planning's, which made it hard for users to separate preferable examples from non-preferable ones. The database's complexity was also affected by the alphabetical order, as no grading system was available for separation users found it impossible to find what they were looking for, which

according to Site Manager A, Site Manager B, Site Manager C and the Project Engineer became the beginning of the end for regular use of the database. However, both Site Manager A, Site Manager B, Tender Coordinator and the Project Engineer still consider it to be an upright initiative to create the database in the first place. Further, Site Manager A and the Tender Coordinator still utilise the database as a supplement to phone calls on a weekly basis, thereby collect information mainly used to solve problems encountered in their current work. Lastly, the Project Engineer considers there to be an age barrier when looking at IT-tools such as the VBB database, claiming older people with more experience of the production phase of projects are reluctant to utilise them and instead tend to work based on old habits.

4.3 Current work

As previously described in the V.S.A.A chapter 4.1, this internal guideline document clearly states that all projects must have sum up meetings after they are finished. This was highlighted by all interviewees as the best forum for sharing experience between project team members. These meetings should according to the V.S.A.A guidelines be based on the job planning's created throughout the project. Mistakes, countermeasures and how they are best avoided in the future are communicated but also discoveries and successful solutions and actions. However, according to most interviewees (Site Manager A, Site Manager B, Site Manager C, Tender Coordinator and Project Engineer) these meetings are not always held, further if they are held all project team members are rarely present as they are occupied by other projects. This notion especially considers sub-contractors and project team members involved in the early phase of the project, whereas the site manager and Skanska workers are likely to be present. Therefore, some project specific knowledge is not transferred between all team members, meaning some information is lost. Furthermore, Site Manager A explicitly expresses that sum up meetings might not be the most preferable tool to share experience, further stating that the utilisation of sum up meetings means focus is put on the problems and solutions discovered in the later phases of the project. This is independent of how critical the problem or finding was for project performance. Site Manager A speculates that this is because project members tend to forget early phases of the projects as most projects has a time span of several years. Some project team members also have moved on to other projects, further enhancing the risk of not remembering. To further concretise the problematics regarding the use of sum up meetings as the main source for experience feedback, sub-contractors are rarely present at them, leaving out experience and the knowledge creation possibilities (Site Manager A). According to the Tender Coordinator, project team members participating in the sum up meetings tend to have different focus and different agendas, this statement is also supported by Site Manager B who claims that site management and workers normally have more interest in discussing problems and solutions connected to the production aspect of the project, whereas the Tendering Coordinator is more interested in focusing on budget evaluation, time and resources consumed. Therefore, the Project Engineer states that sum up meetings normally are time consuming, where only a small part interests him, therefore making him and others reluctant to participate. Site Manager C expressed that if some of the

installation sub-contractors are participating they are most interested in evaluating their own work and sketches, hence creating a complex meeting agenda.

The sum up meeting result in a document, which holds the agenda and notes from the meeting. According to the Project Engineer, the sum up meetings and resulting document is a respectable example of how Skanska is working with experience feedback. However, examining several of the finished sum up meeting documents reveal that they almost exclusively describe the production phase of projects, where most input is from the contractor with little or no input from sub-contractors. Further, problems that arose during the project and their solutions was only presented through short sentences and not commented on or discussed further. Site Manager C claimed that there had been more discussions about “*lessons learned*” during the project, but that they had failed in making these parts of the document. Site Manager A considers one meeting to sum up the project to be insufficient, therefore Site Manager A initiate's meetings after specific phases of the project is finished, claiming this result in that experience is gathered instead of forgotten. Furthermore, according to Site Manager A these meetings have been very appreciated as they are being held with strict focus on the specific method or phase, making all actors, including sub-contractors, interested in contributing. Site Manager A illustrates this with the example of a meeting held when the ground work for the current project was completed. Here all actors involved in the ground work was involved and were able to reflect about the completed work. In doing so the meeting participants were able to share experience which led to several possible improvements to future casting in future projects. Site Manager A highlights that this meeting and its effect could not have been obtained if not all actors was present, if the meeting was not held this specific time and if not all actors able to learn from it. However, the information shared between meeting participants remained oral as the discussion was not documented. Instead a document was created, using only a few sentences to describe experience feedback, according to Site Manager A this was as the chosen format as all actors already has good insight in the project. This document was later added to the project folder, accessible only for project team members and others within the organisation granted access by a project member.

A tool which could be used in the production phase and calculation phase is the “Timuppföljningsmall” (Tender Coordinator). This is a tool which was first developed by the region but is now widely used within several other regions and translates into “*Hour Follow Up Template*”, HFUT. Utilising the HFUT, project team members are able to use data collected in previous projects to calculate the approximate time and cost for performing certain tasks by making adjustments to project specifications. The HFUT is an excel framework document, where actual hours can be added as project progress are made, thereby making it a real time description of project progress where project members easily can follow project performance in accordance to project budget and predicted hours. This tool is dependent on workers keeping track of their hours in specific phases, otherwise there is a risk of hours being allocated to the wrong phase making the tool useless (Site Manager A). As the tool provides the project with a clear project prognosis it is highly appreciated by the project team, however some workers expressed problems with allocating hours to the right phase. This notion was strengthened, as it was brought up

during the interview with the V.S.A.A Developer, claiming that workers need IT tools to better allocate time spent to the proper phase as proper categorise online will make it easier for workers to categorise hours correctly. Furthermore, the HFTU is frequently used during meetings held by the production team and the project team, as it provides a prognosis for project performance, both in time and cost. HFTU can therefore be used to explain poor or preferred project performance. However according to the Tender Coordinator, the data collected in the HFTU is only compiled by the individual responsible for the budget. This person is then responsible for updating the HFTU with the additional information, thus being responsible for evolving the tool. Apart from the budget person, the production team may see how the hours were originally calculated, thus enabling them with a better understanding of pre-production discussions (Site Manager A).

4.3.1 Experience feedback in early phases of projects

According to both the Tender Coordinator and the Project Manager, project performance is better if the project team is familiar with project production and pre-production methods, thereby emphasising how important experience is to all project phases. According to the Tender Coordinator, the current way of implementing experience gathered from completed projects into new projects is the utilisation of experience when submitting tenders. If similar projects or methods have been executed before, the tenders submitted will be more accurate both cost and time wise.

Skanska currently has two system tools that can be used by any organisational member in need of help in the early stage of a project (Skanska, 2018). The first tool is called EMPIRI, which is a database specifically developed for house building projects, displaying finished projects with their cost per unit, such as cost per square meter (Tender Coordinator). Examining previous projects and their unit cost, a hint for the current project cost is provided, thereby EMPIRI is considered a beneficial tool for budget calculation (Site Manager B). However, according to Site Manager B the database is complicated, therefore he is reluctant to contribute by uploading information to the database from his projects, a notion also supported by the V.S.A.A Developer claiming that some of the tools provided by Skanska are not user friendly for the not computer experienced personnel. Furthermore, employees in the region have different terms in their employment contracts, where adding information to EMPIRI is demanded for receiving a bonus for some. According to the V.S.A.A Improvement Leader, this is reflected in the amount of uploaded information to the database, where a higher degree of involvement is seen for individuals where bonus is given for uploads. Site Manager B is not restricted by not getting his bonus if failing to upload information to the EMPIRI database.

The second tool provided by Skanska is a database providing standardised building parts, methods and processes called “Vårt Sätt Att Bygga”, translating in to “Our Way of Building”, OWB. The tool provides preferred solutions that are both time efficient and quality enhancing for all parts of housing projects and was first created by Skanska Technology (Skanska, 2018), which according to the Tender Coordinator enables the design team to calculate the budget more accurately while using less time for calculation. Further, the tool provides several positive consequences for the

projects, the first being a more efficient tendering process which can be shortened because of a more efficient design team. Secondly, utilisation of previously known methods will help workers improve their efficiency in the production phase of the project (Tender Coordinator). Depending on the type of building contractual context of the project, Skanska actively try to influence the client into choosing the solutions that are part of the OWB. Furthermore, Skanska has a vision of involving the production personnel in the ending part of the design phase of their projects (Site Manager B & Site Manager C). According to Site Manager C, the handover from the design and budget team to the production team is important, where sensemaking is important to bridge the two teams. Thereby production personnel will understand not only how certain solutions are to be implemented, but why. The Project Manager considers that lack of understanding will slow down project performance, making it costlier. He further states that if the production personnel is only engaged with the design personnel through one meeting, project specific knowledge will remain with the design team. Involving workers in the early phase of the project will also enhance the understanding for how the design team operates for the workers. Thereby, the workers will develop a better understanding for decisions made in the early phases, making it easier to contribute with their experience.

4.3.2 Perception of experience feedback

All eight interviewees claimed that experience feedback is an important notion both within the construction industry and within the case company to improve future project performance. However, asking about experience feedback during the interviews, the interviewees answered in different manor where focus shifted depending on if the interviewee was working within the production phase of a project or not. Here, Site Manager A, Site Manager B and Site Manager C considered the most important aspect of experience feedback being related to not repeating the same errors in performing technical solutions in the production phase, whereas the Project Engineer, Project Manager and Tender Coordinator focused on earlier phases of the project and project economy. Summarising the answers, the essence is that experience feedback is about learning from previous experiences and not repeat mistakes, only the Tender Coordinator explicitly expressed the importance of also carrying forward positive feedback. When asked about the guidelines provided by Skanska regarding experience feedback, V.S.A.A was mentioned by all interviewees, but only the Tender Coordinator could explicitly explain what the document said. However, the Tender Coordinator had prepared herself before the interview, thus making her response misleading. As part of her preparation, she had asked colleagues within the region about experience feedback, however this was useless as none of them had any knowledge about the subject. Furthermore, the Project Engineer prepared himself before the interview by bringing a protocol to the meeting, displaying notes from a sum up meeting. The Project Manager had prepared himself by examining the V.S.A.A document before the interview, thus making his knowledge about what the internal guidelines for V.S.A.A state up to date. Although experience feedback was known by name and was considered to be preferable, no interviewee apart from the V.S.A.A Improvement leader had reflected on how experience feedback could be implemented in the daily work. However, Site Manager C considered meetings to be important for sharing experiences, claiming that knowledge cannot be transferred

through documents or databases. He further states that meetings are the only way for facilitating trust among actors, which is needed if experience sharing should be facilitated, otherwise he claims there is a risk of actors being reluctant to share past negative experiences, as they display weakness in performance. Furthermore, Site Manager C suggested an apprenticeship to be implemented within the organisation which should be focusing on making experience travel between project team members, claiming that the best way for sharing experience is through observing experienced personnel.

According to the Tender Coordinator and Project Engineer it is important to utilise experience gathered from other project teams throughout the region. Therefore, the Tender Coordinator has implemented meetings with other actors working with tenders, resulting in the delivery of more accurate tenders in the future. The Project Engineer considers that meeting people from other project teams helps facilitating trust among actors. Thereby, these meetings can build relationships for future collaboration and experience feedback. However, there are currently no initiative taken from regional management for bridging project teams, the initiative for tender actors to meet was first made by the Tender Coordinator. Lastly, as the interviews were given in a broader context, it was soon understood that reflection and follow-up of experiences is a small or absent part in the everyday work. The overall impression is that the attitude towards the subject is: if a solution works then use it, and if a problem occurs, solve it and move on. Furthermore, Site Manager A, Site Manager B and Site Manager C considered that reflection is what is first neglected if there is a time pressure to finish within the deadline. Not being part of the standard process for completing building projects, the work with experience is considered extra effort added to an already stressful environment. Observing site management approaches, there was a significant difference in acting between the three different Site Managers, where Site Manager A was more devoted in implementing notions from other project team members.

5 Analysis

The aim of this chapter is to compare empirical findings compiled in 4 Empirical Studies, with the theoretical aspects of the thesis found under 3 Literature . The chapters are not arranged in accordance with their importance.

5.1 Knowledge management, project management and organisational learning

Riege (2005) explained that knowledge sharing translates into accelerated organisational learning, thus creating business advantages over competitors. Indeed, all interviewees claimed that the construction sector in general suffer from poor knowledge sharing, where experience feedback is a non-existing event in most projects. While Addis (2016) explains that knowledge can be divided into explicit knowledge and tacit knowledge, interviewee's working in the production phase tend to focus on the latter claiming that the best way to share experience is through apprenticeships (Site Manager C), otherwise explained by (Nonaka & Takeuchi, 1996) as socialisation, where the apprentice is able to learn the trade by observation, imitation and practise. This stands in contrast to the vision of Skanska, aiming at using externalisation and combination for the transfer of tacit knowledge and explicit knowledge gathered in projects into explicit knowledge, which can then be transferred throughout the organisation through manuals, documents and databases such as V.S.A.A. Indeed apprenticeships only facilitates personal knowledge where the individual is growing, but the organisational knowledge remains un-evolved. However, apprenticeships also facilitate trust, which Site Manager C claimed important for knowledge sharing to take place, this notion is also supported by (Nonaka & Takeuchi, 1996), claiming that trust is a key element in tacit knowledge sharing.

Being part of the Swedish construction sector, Skanska is heavily based on temporary project constellations, making successful projects important for company success. According to (Zhang & Fai Ng, 2012), knowledge sharing and individuals having experience drawn from previous projects is the key to project success, therefore highlighting organisational learning as an important notion. Zhang & Fai Ng (2012) further describe the importance of having organisational management motivating employees to share knowledge throughout the organisation. Interviewing the V.S.A.A Improvement Leader and the V.S.A.A Developer, made it clear that there is a vision for how Skanska wants experience to be shared. However, the information from the interviews also showed that experience feedback is not the most prioritised part of the company agenda. This was also shown through interviews in projects, where Site Manager A, Site Manager B and Site Manager C all said that experience feedback is neglected if there are time constrains connected to a project. There was a profound difference in attitude between different actors to the subject, where Site Manager A was most interested in the subject. Therefore, he had created his own process for organisational knowledge creation, by involving workers in knowledge creating meetings planned in the day-to-day work and visually displayed in the project Gantt-chart, thus making them part of the critical path leading to project completion. The notion is that the approach by Site Manager A influenced the project where he was located and created a situation where knowledge sharing was facilitated. However, the

knowledge gained through the introduction of meetings after each project phase remained locally bound to the project, just as an island is isolated from the mainland, the knowledge gained and experience shared within the project team remained isolated from the organisation. Recalling that Site Manager A was the least experienced site manager interviewed, there might be a personal reason for introducing these meetings, as no thought was given to how this knowledge were to be shared to the organisation. This gives the overall appearance that the approach was chosen for personal gain.

The region chosen is wide spread geographically, however remains small when looking at the number of employees, compared to other regions within the case company (Skanska, 2018). Mueller (2015) emphasises that knowledge sharing can take place through informal and formal events. The former is facilitated by several factors, such as having all employees located in the same building as this increases the chance of informal meetings in coffee rooms etcetera. The organisational structure of the project-based organisation of Skanska creates a setting where knowledge sharing in specific projects is facilitated, here the success in knowledge sharing between different projects and within the projects is dependent on the organisational communication capabilities, both formal and informal (Project Management Institute, 2017). Mueller (2015) argues that trust is the most crucial factor in creating a setting where informal knowledge sharing can take place. However, having projects in remote locations hinders project team members to interact with project team members from other projects, thereby hindering the process of informal knowledge sharing (Riege, 2005; Mueller, 2015). Indeed, the Project Engineer highlighted the importance of meeting actors from other projects, claiming this facilitates relationships which creates a setting for future knowledge sharing. The Tender Coordinator also emphasised on the importance of meetings for knowledge sharing, where actors working with tenders throughout the region meets on regular basis to share experience regarding calculation. However, there is no given structure provided by senior management for knowledge sharing through meetings, as the tender collaboration is an initiative by tender actors, therefore, information flow between project teams is hindered. Speculating why, the regions geographical spread might give reason for the lack of collaboration, however a smaller organisation at the regional office should mean fewer actors to coordinate making meetings possible. The formal knowledge sharing activities of Skanska are few, Mueller (2015) suggests three activities for knowledge sharing, namely: flagship projects, workshops and a project report database, the last is later discussed under 5.3. Having remotely located actors, Mueller (2015) argues that flagship projects and workshops could be used to bring actors together, making them contribute in formal inter-project knowledge sharing activities. This could develop the systematic learning process, which according to Chron er & Backlund (2015) should be prioritised by management. However, the strategy for knowledge management must be adapted to fit overall company vision and culture (Riege, 2005).

Experience feedback currently take place on an intra-project level, where project team members can share information and knowledge through formal and informal meetings. This corresponds well with Henderson et al. (2013), which emphasise that the construction industry is better performing in single loop learning, whereas double

loop learning is lacking. This is a well known notion, also discovered by Josephson et al. (2008A) in their study of case companies and by this thesis empirical episode. Asking production-oriented project team members about their experience of lacking information provided by the organisation, they all asked for more “how to” examples, however none of them contributed into making the database more extensive, by adding examples themselves. The documentation of project performance is made by gathering notes from meetings, both in the early and later phase of a project to be put in a project folder online. However, this information is not made available for all organisational members active within the case company, which also highlights the claim that the construction industry lacks double loop learning. Instead, people allocated by the organisation to a specific project are granted access to the online folder, leaving more senior personnel with access to more folders, thus controlling a larger share of company knowledge. Senior personnel also benefit from a wider network, which becomes important if not knowing how to solve a project specific task (Site Manager A). These two notions make it impossible for junior personnel to become senior if not following the same path where knowledge, a high number of accessible folders and a wide network is given by spending much time at the company and preferably in the apprenticeship of other more senior personnel. This makes junior personnel somewhat dependent of senior personnel and in terms the company. Thereby, leaving room for speculation if the company really were to benefit from introducing double loop learning and what the effect would be if senior personnel is lost due to retirement or leaving for other companies.

5.2 Company culture, incentives and its effect on experience feedback

Connecting site management and project management to knowledge sharing and experience feedback shows that much of what is done or not done in the subject is dependent on the individual actor. While no guidelines are given from regional management, some project groups showed significantly better attitude towards the subject. This emphasise the role of the employee for sharing experience and knowledge within each project team, if un-motivated or if not seeing the benefit of sharing experience, no experience is shared. This leads to the belief that company culture and project culture is crucial for influencing the attitude towards knowledge sharing. On the one hand, where Site Manager B and Site Manager C consider themselves to be fire fighters or problem solver, they are not focusing on the prevention of future errors or improvement of future project performance. On the other hand, Site Manager A and the Tender Coordinator are less experienced, both in their respective roles and from work life, therefore they are more eager to learn from others and engage in knowledge creation. This is driven by their eager for obtaining knowledge, thereby no intention is found regardless of work life experience to engage in organisational learning. This observation is connected to CoP, where a group is created by people who share a passion for something (Wenger, 2018). The previously mentioned experience sharing between actors handling tenders, is also a CoP, where actors can share knowledge informally. Remaining is the notion from Josephson et al. (2008B) claiming individual learning is a prerequisite for organisational learning, thereby some project organisations has taken the first step towards organisational learning. Not previously described, company culture becomes an interesting

observation. As some interviewees does consider all projects to be unique activities, they fail in understanding the possible effect of improvements that experience feedback contribute to. Josephson et al. (2008B) argue that construction projects are not unique, but rather the uniqueness characterising projects is allocated to the distribution of activities creating the project. This notion decreases all organisations acting within the construction industry's productivity, as uniqueness is used to explain deviations from project schedule, especially for production personnel. The opinion of Josephson, et al. (2008B) correspond with empirical findings. To change the attitude towards knowledge sharing and experience feedback require a change of company culture. If management does not display the importance of the subject, it will remain a notion treated by some projects, while in other projects it will be absent. Skanska has employed OL to monitor the development of certain important aspects of V.S.A.A, however experience feedback is currently not high on the agenda, which again is explained by the company culture. If the company want to enhance experience feedback and knowledge creation, they need to adapt the company culture and show the importance of these adaptations, like a tree grows from its roots company culture is initiated from senior management.

Examining company culture, all site managers claimed that during sum up meetings all project team members were reluctant to talk about errors, instead focusing on positive feedback. This notion was explained by interviewees as a defence mechanism, where actors were reluctant to show weakness facing other actors. Combined with sum up meetings in the latter part of project progress, this provides a non-optimal setting for knowledge sharing. Here Site Manager A showed example of influencing inter-project culture, by putting experience feedback high on the agenda, he demonstrated the importance of experience feedback and a culture where time was used for experience feedback. As a leading example, Site Manager A proved with his action that company culture is not necessarily the project culture and that not only having sum up meetings, but rather after each phase helps facilitating the experience feedback culture. Indeed Zhang & Faing (2012), conclude that culture is an important aspects of why some organisations or project teams lacks experience and knowledge sharing.

Jackson (2010) emphasises that construction projects are complex and therefore need construction management to control the planning, scheduling and evaluation of construction. As tenders are not always accepted by the client, contractors seek to maximise the trade-off between tender cost and tender accuracy. Aiding the process of submitting tenders, is the experience gathered in previous projects by organisational members (Tender Coordinator). Therefore, if experience gathered from evaluating the HFUT is used, more accurate tenders could be submitted. Therefore, it becomes important that the evaluation of HFUT is made properly and that there is a coordination between project team members working in the production phase of the project, and the design team and Tender Coordinator present in the early stage of the project, ensuring information flow. Today there are no punishments for not fulfilling the requirement of ensuring information flowing in both directions. Instead findings indicate a situation resembling what is described by Koch (2004) as the "Tyranny of Projects". The concept shows that management initiatives have difficulties in impacting the knowledge creating in projects, this creates a tension between corporate

management and project management. While there might be room for experience feedback and innovative activities to take place in projects, the projects are evaluated on a financial basis. As the organisation is affected by several mechanisms governing past and future projects, the most important notion becomes the completion of the specific project, thus rendering inter-project related collaboration less important. Therefore, as long as projects will be finished successfully the organisation will let the individual site manager and project manager act freely. This creates a balance of strength between the two parties, where no incentive is given to the organisation or individual to change their behaviour. However, if the balance of forces were to change due to bad project performance etcetera, this would imply a different future setting. The logic of project economy is obviously a limitation for project learning. This notion, that corporate management accept that their initiatives are not followed is mainly for the good of the company. Thereby, creating a somewhat unholy alliance between project management and organisational management, where both actors promise to not overspend corporate funding's.

In growing or changing company culture, incentives is needed (V.S.A.A Improvement Leader). By making individuals benefit from performing a certain task, they are more entitled to perform it. This notion was argued by all three site managers, the V.S.A.A Improvement Leader and the Tender Coordinator. As an example, there was a significant difference in how much contribution was made to the internal database VBB once an economic incentive was introduced. Having consisted of a few examples of how to perform certain tasks, the database was flooded with examples when one of the demands for personnel to be able to collect their individual bonus, was to upload a certain number of job planning's to VBB. The same experience was recorded by the Tender Coordinator not having a bonus agreement, which did not contribute to the database herself, but had witnessed other contribute which had a bonus agreement, an argument also supported by Zhang & Faing (2012). Recalling that a certain number of uploaded job planning's was needed to obtain bonus, no effort was made from the organisation in controlling their validity or quality. This explains why VBB went from a highly appreciated database, to becoming a not used database once the demands for bonus were changed. Further examining company culture, the health and safety vision of Skanska can be used to discuss the importance of having important notions high on the agenda. A few years back, Skanska management wanted to become a company without injuries and fatal accidents occurring on their construction sites, thereby all future work should follow a slogan stating that the employees of Skanska should work in a safe environment or not work at all. By making this the first and former focus of the company, Skanska management could change company culture, resulting in their current reputation as the company in the Swedish construction industry leading the development of health and safety. Skanska management could implement the same change in terms of experience feedback, simply by making it the top priority of company agenda.

5.3 Documents and databases for knowledge sharing and experience feedback.

The vision of the V.S.A.A Developer and V.S.A.A Improvement Leader is for V.S.A.A to become a document with a high degree of recognition factor, describing

the day-to-day work of all employees at Skanska. However, the attitude towards this governing document varies between the different actors interviewed. On the one hand, inexperienced actors are more willing to utilise the document to gather knowledge to be used in the specific project. On the other hand, experienced personnel showed reluctance to utilise the document, claiming the document is not up to date and instead manage the projects as they always have. The scepticism was created when V.S.A.A was first created, since then there has been several improvements according to the V.S.A.A Developer, however the scepticism remains. The reason for neglecting the V.S.A.A document could also be explained by difficulties allocated to technology (Riege, 2005). Riege (2005) further states that information is tough to process if actors are not familiar with technology linked to it. This notion is supported by empirical findings, as some senior actors claimed to have difficulties with finding specific chapters in the document, even though the document is divided into separate paragraphs describing various aspects of projects and the presence of a search function.

The examination of the document quickly revealed the absence of a specific paragraph for how experience is to be institutionalised by being transferred from projects to the organisation. Instead there is a focus in the document on the sum up meetings to be held once the project is finished, governing the meeting agenda, however not explaining institutionalisation of knowledge. Furthermore, the document tends to focus on the tendering aspect of projects, where much attention is devoted into making better tenders in the future. According to the V.S.A.A Improvement Leader, the vision for V.S.A.A is to make it a big data database, accessible for all employees at all times. In contrast, today V.S.A.A provides guidelines that states project knowledge and documents are to be uploaded to the project folder, as previously stated only accessible for project team member, which creates a gap between vision and current way of working. Arguably, the Tender Coordinator after reflecting some time, concluded that V.S.A.A is experience feedback, a document developed throughout the years as experience is obtained. This emphasise the importance of having actors in the organisation contributing to the document. While the V.S.A.A Improvement Leader considers the contribution made by organisational members highly important, none of the interviewees in production (Site Manager A, Site Manager B & Site Manager C) did contribute themselves, again illustrating gap between vision and current work. According to the V.S.A.A Improvement Leader, the document has been built by two different sides of the company, where production personnel is separated from non-production personnel. This makes the document able to cover the entire process of completing a project, thereby the vision is that actors utilising V.S.A.A will deliver successful projects, a notion also supported by the Tender Coordinator, recalling that the document should reflect company best practice. Currently, the V.S.A.A Improvement Leader thinks much improvement could be made, by ensuring contribution by all organisational members. Indeed, Site Manager B tended to utilise his own solutions for the production phase of projects, as these have been successful in the past. Not sharing these solutions by actively working to improve V.S.A.A makes the goal of striving towards a best practice un-met.

Viewing V.S.A.A as a constantly developing guiding document, that is updated when new wisdom is found, the document can be considered a foundation for organisational

learning. However, Chronéer & Backlund (2015) consider institutionalisation of information problematic, claiming that systematic work with experience feedback in projects is often neglected where focus instead is shifted towards short term goals. Another barrier for institutionalisation of knowledge mentioned by Chronéer & Backlund (2015) is that actors in the construction sector tend to prefer personal information sharing, instead of sharing knowledge using IT-systems, a notion supported by Site Manager A, Site Manager B, Site Manager C and the Project Engineer. However, since some organisational members do contribute to the document, it can be viewed as an organisational try for implementing double loop learning (Henderson et al., 2013), since preferable examples are made into practice.

At a regional level, the company has created their own database called VBB, which consisted of straight forward documentation of preferable examples for handling production specific tasks. As previously explained, the VBB database was first a much-appreciated initiative from regional management, however as the incentives changed for uploading material, the page was flooded with information, leading to actors not utilising the information found. This is an important observation, as none of the preferable examples were removed, they were only made harder to find. Today, the regional vision for the database is blurry, whereas some interviewees (Site Manager A & Tender Coordinator) still utilise it, others (Site Manager B, Project Engineer & Site Manager C) are reluctant to use the information found. The incentive to make actors upload more information, otherwise losing their bonuses, backfired. To rescue the VBB database the V.S.A.A Improvement Leader suggest a database moderator, who could make the database more user-friendly. Here, the first step is to remove all poor examples or job planning's which does not represent best practice or is not evaluated properly once the task is executed. If these countermeasures are introduced, there is a chance for the database to become an ever-improving database, where new experiences are shared between actors. However, these actions are time consuming and are therefore costly to implement. Another solution could therefore be to re-shape the database into a contact list, where regional organisational members are able to find information about projects and a contact person, as personal connection might enhance knowledge sharing and facilitate trust among actors. One solution could also be to abandon the database entirely. The database was not created on the initiative of the entire company, but rather on the initiative of regional management. Today Skanska has developed a similar database, OWB which has the same type of information, but without the regional connection.

6 Conclusion

Ten years ago, it was concluded that the Swedish construction industry suffer from lack of experience feedback, resulting in loss of productivity compared to other industries. The aim of this Master's thesis was to map the current work regarding experience feedback at a regional office of a construction company, by comparing a literature review with empirical findings using a qualitative abductive research strategy, thereby drawing conclusions about the status of the Swedish construction sector.

Knowledge sharing processes are divided into informal and formal processes. While both occur in the intra-project based setting, Skanska as a company solely focus on trying to implement formal experience feedback processes. This is made evident by the company's focus on the creation and development of their internal database. The same focus is found at the regional office, where management introduced and prioritised their own internal database, not made available for the parenting company. While the development of these databases can be considered tries to facilitate inter-project knowledge sharing, they are neither prioritised by actors in projects, nor by management. This claim is supported by the interviewees, as other tasks are considered more important. Furthermore, the creation and shift of focus to the internal database by the regional office, can be viewed as regional management not prioritising the parent company strategy, thereby the regional office fail in contributing to the parent company strategy. This results in a divided focus, leaving actors reluctant to contribute to neither database. Furthermore, no initiative is taken by regional management to use other processes for formal knowledge sharing. Therefore, it is suggested that management should implement flagship projects and workshops in their strategy for knowledge management, thereby making actors from all parts of the region participate in knowledge sharing activities. This would highlight the prioritisation by management of experience feedback and is a simple way of aligning action with company vision. Furthermore, the interaction between actors throughout the region will facilitate trust, a component identified as important for knowledge sharing, thereby supporting the creation of a knowledge spiral. Furthermore, the listed actions are a chance for management to enhance the perception, that experience feedback is important for delivering successful projects in the future, therefore important for future regional and company performance.

While internal guideline documents can be used to facilitate explicit knowledge sharing among actors, it is limited by the contribution of the actors using it. Skanska has a vision of developing their document into a best practice guidebook for executing projects. Aiming to accomplish their vision of having a best practise document (V.S.A.A), accessible for all employees always, the company must ensure that all regional offices are collaborating in the contribution to the database. Today, project experience is uploaded to a project portfolio only accessible for project members, thus leaving all other actors without access. With a further development of the document it could be integrated in the everyday work together with others software's used. If achieved the outcome will be a two-way communication by integrating guidelines in the software's and the god examples can be communicated to V.S.A.A directly. For this to become reality there need to be a person responsible for the conversion of

knowledge. The OL is an initiative taken by Skanska, and a future evaluation will show their effect. However, someone responsible is needed, otherwise Skanska will not be able to accomplish their vision of generating a tool for the institutionalisation of knowledge.

Apart from the demand that job planning's are to be uploaded on the project portfolio, there are no incentives for individuals to share experience between actors, instead knowledge is saved on a personal level, making actors having worked more years far superior their junior colleagues. If experience is only gained by spending more years within the industry, there is no possibility for productivity development neither for the case company, nor for the Swedish construction industry as the senior actors of today will have the same knowledge as the senior actors of tomorrow. Economic incentives changed the behaviour of actors towards the contribution of job planning's to VBB. While this experiment failed, it shows that actors have a tendency of wanting to contribute, if there is a possibility for personal gain. Therefore, the conclusion is to adapt incentives to meet the company or regional office vision, thereby showing the importance of experience feedback. In doing so, the company will be able to initiate a change in attitude towards experience feedback, which could initiate the time-consuming process of changing company culture. While the literature claim company vision and strategy should be adapted to company culture, the overall impression is that a change is needed to push the company and industry into the desired direction. Therefore, management must make change of attitude towards the subject of experience feedback their top priority, only then change will happen.

The perception about the Swedish construction sector remains solid, confirmed by empirical findings and the literature review of this thesis. To bridge the gap, which has grown between manufacturing industries and the construction industry, it is concluded that experience feedback must not only be implemented by management, it must be given a more central role of attention. By include experience feedback in the strategies of the company employees will understand the subject and how it is connected to the company. With knowledge and implementation of further development will be more motivated and understood, the development will more likely be a combined effort in the same direction within the company. The construction industry suffers from the conservative perception among actors that the uniqueness of construction projects hampers the possibility of sharing experience. However, while projects in themselves are unique, they are created by the same set of activities where the mix of activities are what create the project uniqueness. Therefore, actors on site must stop considering themselves as firefighters and understand the importance of their contribution in changing the industry.

7 Recommendations for further research

Limited by the scope of the thesis, no investigation has been made in how the incentives from Skanska should be formulated. Furthermore, the thesis highlights the importance for connecting experience feedback to economical measurements. If the benefit of experience feedback could be quantified into time savings or money saved, this could create an incentive for all companies within the construction sector to implement experience feedback on their agenda.

Furthermore, the thesis is based on a single region, examining a single company within the construction sector. Therefore, there would be beneficial to conduct further studies including more regions and more actors within the Swedish construction sector. To further broaden a future study, it would also be interesting to examining other markets abroad.

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Appendix 1

Example of questioner from the interview conducted during the investigation for the thesis. This is specifically for production leader and with the same basis the other questions were custom made for each interview.

Intervju med PC

Introduktion till intervju.

- Presentera oss själva, masterprogram etc.
- Undersöker produktivitetsspekter för Skanska Hus Väst
- Jämförelse med tidigare rapporter, teori och den empiri som vi nu insamlar. Detta sker genom observationer och intervjuer
- Anonymitet samt konfidentiell information, inget av det som sägs kommer gå att knyta till dig som person. Jobbar enligt Skanskas sekretessregler samt enligt anvisningar från Chalmers.
- Är det okej om vi spelar in intervjun för att slippa anteckna? Sker för eget bruk, ska funka som underlag i rapporten.

Bakgrund

Vad har du för utbildning och hur ser din yrkeskarriär ut?

Hur hamnade du där du är idag?

Vilka är dina nuvarande projekt?

Vad är de största fördelarna respektive utmaningarna du stöter på i ditt jobb?

Hur ser de projekt ut som du jobbat med tidigare? Ev. röd tråd? Varför?

Medvetna karriärsval?

Daglig verksamhet

Hur tidigt i processen kommer du in i projekteringen av ett nytt projekt?

- Och hur mycket känner du att du kan påverka den processen?

På vilket sätt samverkar projektering med produktion?

- Vilka styrkor?
- Vilka svagheter?
- Hur prioriterat är samarbetet?

Vilken typ av entreprenadform föredrar du och varför?

- Vilka är de största skillnaderna?

Vilka problem förekommer i produktion och hur tacklar man dessa?

Känner du att de finns bra processer att få hjälp med problem och hur använder du detta?

- Kan du be om hjälp? Vem ber du om hjälp?

Vilka förbättringsområden känner du att de finns inom Skanska för att underlätta den dagliga verksamheten?

Erfarenhetsåterföring

Vad är erfarenhetsåterföring för dig?

Hur tar du med dig erfarenheter mellan projekt?

Hur återförs kunskaper som har uppkommit under ett projekt till organisationen?

Vad sker vid avslutande av projekt?

På vilket sätt kan arbetet med erfarenhetsåterföring utvecklas?

- IT?
- Processer?
- Startmöten/Slutmöten?

Hur fungerar timuppföljningsverktyget ni använder er av?

Är du nöjd med hur arbetet med erfarenhetsåterföring används på Skanska?

Vilka IT- hjälpmedel finns kopplat till erfarenhetsåterföring?

Har du fått den utbildning du känner att du behöver för att klara av dina arbetsuppgifter på bästa sätt?

Vad säger Skanska interna dokument om erfarenhetsåterföring?

Vilka grunder finns för att utveckla arbetet med erfarenhetsåterföring?

Vilka åtgärder tycker du att distriktskontoret bör införa för att främja arbetet med kunskapsöverföring, dels tillbaka till organisationen, samt mellan projekten i distriktet?

Känner du till VBB?

Avslutningsvis

Presentera vad vi skriver ex-jobbet om, vilka aspekter vi studerar.

- Erfarenhetsåterföring i Skanska Hus Skaraborg jämfört med de riktlinjer som finns från Skanska.
- Kartlägga hur ni jobbar med erfarenhetsåterföring?
- Hur väl fungerar erfarenhetsåterföring, vad blir resultatet?
- Vilka förbättringsåtgärder kan göras och hur kan dessa implementeras?
 - Vilka verktyg kan användas för att skapa engagemang och driv för erfarenhetsåterföring, eller ska arbetet inte göras alls?

Hur förberedde du dig inför denna intervju? Läste du på något innan?

Har du några övriga upplysningar eller tankar gällande ämnet?

Är det någonting du anser att vi har missat som du tänker på?

Har du någon fråga till oss som uppkommit under intervjun? Vad som helst

Har du någon kontakt du anser lämplig som intervjuobjekt i ämnet?

Något vi ska tänka på vid kommande intervjuer?