



CHALMERS
UNIVERSITY OF TECHNOLOGY

A practice perspective on knowledge sharing between projects

A construction case study

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

ANTON NILSSON

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Abstract

Organisations competitive advantages and ability to compete in the business arena is recognised to be highly related to organisational knowledge and knowledge management (KM). Knowledge sharing between projects is essential for project-based organisations to prevent that knowledge gets isolated in separate projects. The purpose of this thesis is to evaluate knowledge sharing practices at a case organisation and the aim is to provide the organisation with two proposals of KM initiatives, which could improve between project knowledge sharing practices.

This qualitative study takes a practice perspective on knowledge sharing between projects in a construction organisation to identify practices and underlying social dynamics affecting these practices. The theoretical framework derives from practice theory and is used as a lens of inquiry when analysing the interview and observation data.

Two normative and co-dependent practices are found to permeate the organisation and to be affecting knowledge sharing practices between projects, *searching* and *involvement*. Both of these normative practices are found to be of mainly informal nature and highly related to the social and cultural context. Within the organisation, four knowledge brokers are identified to be highly related to the organisational knowledge sharing. These brokers are found to facilitate the normative sharing practices and is utilising both informal and formal arenas. Several of the formal arenas is found to facilitate the two normative practices and enable the development of informal sharing practices and connections between individuals in the organisation.

In order for KM initiatives to be successful, the organisation needs to evaluate practices and understand the underlying social dynamics to align the initiative with the organisational conditions. The findings of this study provide the case organisation with the basis for two KM initiatives and further highlight the importance of practice from a KM perspective. This thesis adds to an area which is receiving limited attention and offers a starting point for future researches to evaluate practices in other organisations or industries.

Key words: construction industry, knowledge management, knowledge management initiative, knowledge sharing, practice-based perspective, practice theory, project-based organisation, project knowledge management

Ett i-praktiken-perspektiv på kunskapsdelning mellan projekt
En fallstudie inom byggsektorn

Examensarbete inom mastersprogrammet Design and Construction Project Management

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Sammanfattning

Organisationers konkurrensfördelar och förmåga att konkurrera på marknaden erkänns vara mycket relaterad till organisatorisk kunskap och organisationers kunskapshantering. Kunskapsdelning mellan projekt är grundläggande för projektbaserade organisationer för att förhindra att kunskap blir isolerad i separata projekt. Syftet med denna avhandling är att utvärdera kunskapsdelning i praktiken vid en fallorganisation. Målet är att till organisationen presentera två kunskapshanteringsinitiativ som skulle kunna förbättra kunskapsutbytet mellan projekt.

Denna kvalitativa studie tar ett i-praktiken-perspektiv på kunskapsdelning mellan projekt i ett byggföretag för att identifiera praxis och underliggande sociala dynamik som påverkar dessa metoder. Det teoretiska ramverket härstammar från practice theory och används som en undersökningslins för att analysera intervju- och observationsdata.

Två normativa och sammankopplade metoder förefaller genomsyra organisationen och påverka kunskapsdelningen mellan projekt, sökning och engagemang. Båda dessa normativa metoder tycks huvudsakligen vara av informell karaktär och högst relaterade till det sociala och kulturella sammanhanget. Inom organisationen identifieras fyra kunskapsmäklare vara mycket relevanta för den organisatoriska kunskapsdelningen. Dessa mäklare främjar de normativa delningsmetoderna och använder både informella och formella arenor. Flera av de formella arenorna understödjer de två normativa metoderna och möjliggör utvecklandet av informella delningsmetoder och relationer mellan individer i organisationen.

För att kunskapshanteringsinitiativ ska lyckas måste organisationen utvärdera praxis och förstå den underliggande sociala dynamiken för att anpassa initiativet till de organisatoriska förhållandena. Resultaten av denna studie ger fallorganisationen en grund för två kunskapshanteringsinitiativ och belyser vidare vikten av praxis från ett kunskapshanteringsperspektiv. Denna avhandling bidrar till ett område som fått begränsad uppmärksamhet och ger grund till framtida undersökningar för att utvärdera praxis i andra organisationer eller branscher.

Nyckelord: byggbranschen, kunskapshantering, kunskapshantering i projekt kunskapshanteringsinitiativ, kunskapsdelning, praktikbaserat perspektiv, projektbaserad organisation

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Preface

This master thesis is part of the M.Sc. programme in Civil engineering, Design and Construction Project Management, DCPM, at Chalmers University of Technology, Gothenburg. The study has been conducted during the spring semester of 2018.

The study has been conducted in collaboration with another university student, Finn Andersson, from the master's programme in Management at the School of Business, Economics and Law, University of Gothenburg. Thank you Finn for a rewarding and great time!

I would like to thank my supervisor Mathias Gustafsson, associate professor at the division of construction management at Chalmers, for the support and input during this process. Furthermore, a big thanks to all interviewees, supervisor at the case organisation and others who all have been very welcoming and designated their time and knowledge to make this study possible.

Gothenburg May 2018

Anton Nilsson

Notations

| | |
|-----|------------------------------|
| CoP | Community of Practice |
| KM | Knowledge Management |
| PBO | Project-based organisation |
| PKM | Project Knowledge Management |
| R&D | Research and Development |

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1 Introduction

In contemporary economic society, organisations competitive advantages and ability to perform in the business arena is recognised to be highly related to the organisational knowledge and human capital (McIver, Lengnick-Hall, & Ramachandran, 2013). The economic development influence the way of how organisations conduct business by the de-materialisation in many value chains, de-valuing labour and increasing the value of knowledge (Hanisch, Lindner, Mueller, & Wald, 2009). This leads to growing attention of how organisations handle knowledge and perform knowledge management, KM. How well an organisation deals with internal and external knowledge is likely to be a crucial part of the organisation's success, or even survival (Dave & Koskela, 2009).

KM is increasingly recognised as a core concern for project-based organisations, PBOs, for example in the construction industry (Kamara, Augenbroe, Anumba, & Carrillo, 2002). The temporary nature of projects in the construction industry leads to an increased risk of failure in capturing, transferring and retaining knowledge. Conducting work in project form is associated with, e.g. a short term orientation, project uniqueness and discontinuous personnel composition (Hanisch et al., 2009). This can lead to reduced innovation capacity, wasted activity and the need to recurrently “reinvent the wheel”. For the construction industry, the need for innovation, improved construction efficiency, business performance and client satisfaction serves as the imperative for implementing effective KM (Dave & Koskela, 2009; Kamara et al., 2002).

However, as pointed out by e.g. Mueller (2015) and Boh (2007), PBOs have, compared to permanent organisational forms, the possibility to be more flexible, innovative and quick to react to changes in their environment. That is, if the organisation is able to be effective in conducting knowledge sharing (Mueller, 2015). The R&D divisions within large companies are often project-based due to the innovative nature of the conducted work and need for flexibility in these divisions. But if there is no connection or knowledge sharing to the rest of the organisation, then the knowledge gained in one project is isolated to that specific project and the group of that project team (Boh, 2007). The construction industry is a project-based industry and face a structural dilemma as the autonomy of the projects is needed to conduct the work but the structure negatively affects the knowledge sharing between projects (Kamara et al., 2002). Insufficient knowledge sharing between projects can lead to the recurrence of reinventing the same solution in each project. However, both the industry and KM literature focus largely on intra-project knowledge sharing and focus less on the knowledge sharing between projects and project teams. Hence, ignoring a crucial aspect of project-based organisational KM.

The reason for organisations to implement KM initiatives are many and multi-layered but often the aim from the organisation is to improve the business process, make financial savings and increase competitiveness (Ajmal, Helo, & Kekäle, 2010). Ajmal et al. (2010) stresses the importance of taking the corporate culture, work process, senior management support and integrated knowledge of teams into account when launching a KM initiative, especially in PBOs. Lindner and Wald (2011) show in their quantitative study of 8000 employees in different project-based industries that the organisational culture was by far the most important factor for

successful knowledge management. Thus, how and what sort of KM initiative an organisation aims to implement, the organisation needs to adhere to local and existing conditions and context in order to successfully reach the goals of the KM initiative.

Knowledge sharing practices between projects and project teams in PBOs is an area of research which is given limited attention in literature and research. This study takes a practice-based approach on knowledge sharing activities at one case study organisation in the construction industry.

1.1 Research Purpose and Aim

The practice-based perspective is founded in practice theory, a theory which has a strong focus on practice and a clear bottom-up approach to organisational life (Nicolini, 2017). Also, the theory provides a holistic way of describing the interaction between social and work related practices, not in terms of individuals but as a group performing collective and recurring actions. The purpose is, through the lens of practice, to describe and evaluate the practices found in the case organisation related to knowledge sharing between projects. As described above, a vital success factor for KM initiative is the organisational culture. The practice perspective on knowledge provide the tools to show that knowledge sharing practices is highly embodied by the organisational practitioners and embedded with organisational culture (Mueller, 2015). By understanding the underlying reasons for how the organisations project team members perform knowledge sharing practices, the aim is to provide the case organisation with two proposals of KM initiatives for improved knowledge sharing between projects and project teams.

Thus, the purpose is to identify the case organisations ongoing practices related to knowledge sharing between projects and the underlying social dynamics affecting these practices. The aim is to provide the case organisation with two proposals of KM initiatives, that is aligned with the organisational culture and specific context, aimed at improving the knowledge sharing practices between projects.

1.2 Thesis Outline

In section 2, relevant literature on KM is presented, addressing the relevance of knowledge in an organisational context. A set of different views and interpretations of KM in general, the relevance of IT in KM and a model of four different KM approaches is described. Also, KM in temporary and PBOs is highlighted.

Section 3 contains the theoretical framework used in this study, a framework which builds upon practice theory and knowledge in practice. The framework is used as an analytical lens when evaluating the empirical data. The methodology is presented in section 4. Section 5 contains a brief description of the construction industry and the concept of partnering which is the work method of the case organisation.

The results are presented in section 6. The section is divided in two parts. The first part describes the internal knowledge sharing at the project A site. The second part describes the knowledge sharing between several projects and project teams. The results are analysed and discussed in section 7. The practice-based perspective together with KM literature is used to highlight the found practices and explain how and why the practices are interconnected. The section is divided into three subsections. Two KM initiatives to further facilitate knowledge sharing practices between project teams are offered in section 8 and the conclusions are presented in section 9.

2 Knowledge Management

In the knowledge-based economy, knowledge is recognised as a core asset and an organisations competitiveness, performance, success or even continued existence is highly dependent on how well the organisation is able to manage knowledge (Dave & Koskela, 2009; Hanisch et al., 2009; Ren, Deng, & Liang, 2017). Due to the recognition of knowledge as an intellectual asset or valued commodity, it has created a global interest to the area of KM in recent years, spanning over a wide array of sectors (Dalkir, 2011). KM can be represented by the systematic way of utilising the organisational knowledge base, united with individual expertise, thoughts, innovation capacity and new ideas in order to perform more effectively and efficiently (Dalkir, 2011).

The core concept of KM and its advocates have been around for a while, for example, the work of F.W Taylor and the emergence of scientific management in 1911 was essentially an attempt at KM in making the tacit dimension of work and knowledge explicit (Clegg, Kornberger, & Pitsis, 2016). However, there is lacking consensus regarding how to define KM as well as different approaches to KM in general. Depending on the field of research and perspective taken, e.g. focusing on the social or technological aspect of KM, there is a broad range of different definitions (Dalkir, 2011; Geisler & Wickramasinghe, 2009; Hislop, 2013). For example, early knowledge management had a strong focus on managerial and behaviour control and this approach to KM has been widely used through the twentieth century (Hislop, 2013). A more indirect approach towards KM is the attitudinal-based management perspective which focus on shaping the attitudes and norms of an organisations workforce, rather than controlling behaviour. Hence, there are as many definitions on knowledge management as there are researchers and approaches. However, Hislop (2013, p. 56) attempts to provide a generic definition that would, principally, encapsulate the core essence of what the term KM means:

Knowledge Management is an umbrella term which refers to any deliberate effort to manage the knowledge of an organisations workforce, which can be achieved via a wide range of methods including directly, through the use of particular information and communication technology (ICT), or more indirectly through the management of social processes, the structuring of organisations in particular ways or via the use of particular culture and people management practices.

What the word “knowledge” means in the research area of KM varies depending on the approach. Knowledge is described as, according to the Oxford-Dictionaries (2018), “*Facts, information, and skills acquired through experience or education; the theoretical or practical understanding of a subject*”. The dictionary does not specify who possesses the knowledge or the nature of knowledge. However, there are traces of an (implicit) assumption that knowledge is an object and a cognitive property. Depending on the epistemology, the term knowledge is assigned quite different characteristics (Hislop, 2013). The two main schools of thought on knowledge are the objectivists epistemology of possession and the epistemology of practice. The objectivist perceives knowledge to be an object, a possession of an individual or group, that can be detached from persons and, through codification, be an independent entity. There are however two types of knowledge, the explicit and tacit knowledge, concepts first

introduced by Polanyi (1966). In general, tacit knowledge is the kind of knowledge that is hard to put into words or explain to another person, e.g. how to ride a bike or tie your shoes. The tacit knowledge is much harder to codify as it is deemed highly personal and subjective, based on experiences and emotional impression. Explicit knowledge is, on the other hand, the knowledge that is easily written down and often relates to facts and information, e.g. the knowledge that Stockholm is the capital of Sweden. The other epistemology, the epistemology of practice, perceives knowledge to be embedded in the actions and performances of organisational practitioners (Hislop, 2013). Knowledge is highly interconnected with systems of practices and inseparable from the social and cultural processes and interactions of the organisational context. Contrary to the epistemology of possession, the epistemology of practice describes knowledge as an activity (Cox, 2012). Hence, knowledge is not an codifiable object of tacit or explicit nature, it is a process of both tacit and explicit components. Depending on the school of thought, the ascribed understanding of knowledge varies and thus its role in KM.

The management side of KM also involves a variety of approaches, focusing more on the managerial aspects of KM. Hislop (2013) present a set of different approaches to KM that is connected to the “management” in KM. Also, Dalkir (2011) provide a rather comprehensive set of different KM models which takes, to some extent, different approaches to KM. One typology of knowledge management strategies that is well referenced is the conceptual framework on four different approaches to KM developed by Alvesson and Kärreman (2001). The framework operates around two dimensions, the managerial intervention (co-ordination vs. control) and the medium of intervention (normative vs. behavioural domain), creating a matrix of four boxes, see Figure 2.1.

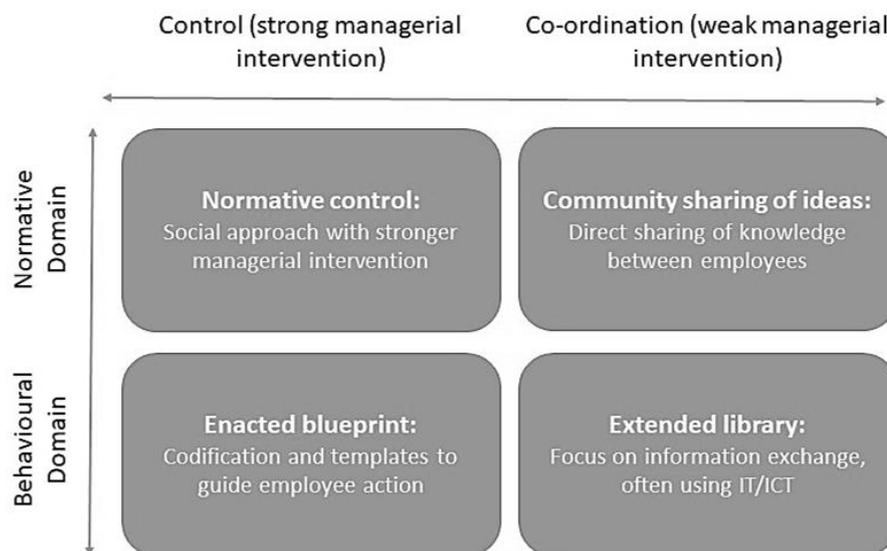


Figure 2.1. Framework of approaches to KM. Adapted from Alvesson and Kärreman (2001).

The notion of *community sharing of ideas* adheres to the relatively soft aspects of management and is rather difficult for management to address in an instrumental way as the community

formation is fundamentally organic, need long term commitment to establish and high social quality (Alvesson & Kärreman, 2001). This approach to KM focus on creating an environment and social context that encourages the direct sharing of ideas between employees and gives limited attention to IT systems and other technical tools (Hislop, 2013). The managerial intervention is weak and the position deals with matters of social diversity and attitudes. Management attempts to facilitate, for example, the development of communities in practice, a more detailed explanation of the term is provided in the theoretical framework section. The *normative control* takes a stronger managerial approach but still demonstrate the social focus. For example, companies who work effectively with corporate culture, KM via culture management, show some success in modulating the organisational boundaries by creating a wide spanning social identity (Alvesson & Kärreman, 2001). A positive corporate culture, in terms of KM, can help building the trust and co-operation willingness supporting the experience of community and participation in the social knowledge processes. The *extended library* approach revolves around and has a strong technological focus. The use of various databases and communication systems is common tools and the approach is closely related to bureaucracy. The systems are often centrally controlled and of a top-down character. The IT systems are often searchable and accessible for employees, providing guidance in forms of general information, past experiences, methodologies etc., supporting the employees search for knowledge. Also, the *enacted blueprint* often has a IT and techno-structural focus but is taking a stronger managerial control approach. The approach promotes the codification and storage of knowledge in databases. As the normative control, the managerial effort is significant, however, the focus of the effort is not on creating norms and values but on steering behaviours. The KM approach aims to provide templates and course of action to effectively obtain the desired results and, to some extent, removing the autonomy of the acting employee.

In terms of practical implications and KM initiatives, Alvesson and Kärreman (2001) argue that an organisation is unlikely do fully adopt a single “box” in their approach to KM and also that they probably should not. As organisational situations and conditions are unique for every organisation, KM initiative implementation needs to be fine-tuned in accordance with the fundamental social practices and organisational culture. Thus, the content of the KM initiatives need to be multidimensional and accommodate the specific organisation.

The identification of influential factors, often termed barriers or enablers, to effective KM and KM implementation is the focus of several studies (see e.g. Ajmal et al., 2010; Akhavan, Zahedi, & Hosein, 2014; Lindner & Wald, 2011; Miklosik & Zak, 2015). Ajmal et al. (2010) provides a comprehensive literature review and summarise the findings of barriers and enablers for KM initiatives by previous authors. The study reveals that culture (described as “friendly” or “open” etc.), IT or information systems and top management commitment are among the most predominant enabling factors. These enabling factors have also been identified by other scholars (e.g. Lindner & Wald, 2011; Okere, 2017). Barriers for effective KM are found to be revolving around IT, culture, systems of handling knowledge and incentives. Hence, some factors are identified as both enabler and barrier. Ajmal et al. (2010) claims that whether a factor is an enabler or barrier depends on how well the KM initiative is aligned and compatible with e.g. the corporate culture. To acknowledge and be able to identify enablers and barriers of

KM is of great importance to organisations when implementing KM initiatives (Miklosik & Zak, 2015; Riege, 2005).

2.1 Project Knowledge Management

Project knowledge management, PKM, is the application of KM in a project-based or temporary organisation and constitute the link between KM research and project management (Hanisch et al., 2009; Sareminia, Shamizanjani, Mousakhani, & Manian, 2016). KM was originally developed under the assumption of relative stable environments and organisational settings (Lindner & Wald, 2011). However, PBOs and their inherent characteristics and specific nature provides the area of KM with, to some extent, additional set of challenges. Projects are often temporary and hold a certain level of uniqueness (Bresnen, Edelman, Newell, Scarbrough, & Swan, 2003). PBOs thus face the challenge of developing organisational routines, organisational memory and in extension, organisational learning in an continually changing environment (Bresnen et al., 2003; Hanisch et al., 2009). It is well recognised that PBOs face difficulties in sharing knowledge from one project to another and thus problems to create and build up knowledge capabilities (Boh, 2007). Also, fragmentation due to discontinuous project teams and work force lead to knowledge integration challenges between the individuals and the organisation (Lindner & Wald, 2011). Moreover, for these reasons it is difficult for PBO's to gain economics of scale, resource coordination and facilitating organisation wide development (Boh, 2007). Thus, general KM need adaptation to fit in a project environment.

A variety of different tool are available for KM and PKM, many with a focus on IT and ICT (Anumba, Egbu, & Carrillo, 2005; Dave & Koskela, 2009). Technology is an important aspect in KM work but is frequently described as a support function the KM and not a solution in itself. Organisations often encounter difficulties in choosing the right tools and even if the technology is of high quality and its functions high performance, the corporate culture needs to encourage the use of the provided IT solution or tool (Hanisch et al., 2009). Otherwise, the tool servers as a barrier rather than an enabler for PKM. If the technology is not supported and embraced by the organisation, studies show that it could have a negative impact on the organisational KM (Dave & Koskela, 2009). Other factors, e.g. cost for investment in IT infrastructure, education and service of the systems needs to be taken into consideration when implementing technological tools (Anumba et al., 2005). Additionally, IT tools mainly focus on the explicit side of knowledge and codification of knowledge into information, e.g. information transfer via databases. To summarise, IT and ICT can be effective in KM and PKM if the technology is aligned with the organisational culture and is adjusted to the context but it should not be considered as an end in itself (Hanisch et al., 2009).

3 Theoretical Framework

The theoretical framework for this study draws upon the theoretical space of the practice-based perspective on social science. The central concept of the practice-based approach is the concept of practice. It is pointed out that the term “practice” can be interpreted in various ways and differently labelled. The meaning of the term has slightly shifted over time and research communities (see e.g. Corradi, Gherardi, & Verzelloni, 2010; Nicolini, 2017). For example, practice is viewed as the meaningful actions taking place in a specific group context. Also, as an “empirical object”, focusing on the content of the practice and its attachment to material arrangement. Further, practices can be analysed by looking at the performances intertwined with the practice, the social consistency and normative element. However, Corradi et al. (2010) conclude that the concepts of practice revolve around three dimensions and when taking one or the other, it would provide the researcher with differing access to organisational reality. The first dimension focus on activity and the interconnectivity of activities that, if socially recognised, provide guidance for collective action. The second dimension relates to the process of sense-making in which accountability is created by the shared meaning of a practice within a group of practitioners. The third dimension focus on the circuit of practice reproduction and how social effects are the result of interconnectivity with social practises. Corradi et al. (2010) highlight that practices are interconnected in a system of practice and that the reproduction of practices is what separates a practice from an isolated action. The third dimension would provide the tools to analyse and show that:

The dynamic of the everyday reproduction of practices is not a mechanical iteration of the same activities: on the contrary, it is a process of innovation by repetition, that is, constant adaptation to changing circumstances, and innovation engendered by practice (Corradi et al., 2010, p. 278).

Practice theory is the underlying theory of the practice-based perspective and, as argued by Nicolini (2017), this approach is appealing due to its capacity to describe the important features of organisational life through the reproduction of actions, discourse, use of tools and work. The theory is highly processual as it focuses on the dynamics of a wide array of socially tangled actions over time. It is constructive and has a clear bottom-up approach as the practices are the performances of the organisational members. The focus is not on individuals nor the work of individual but rather on the shared practices found through individuals as a group or team. This highlight one of the core ideas of practice theory. The individual is not forgotten or neglected but is regarded as a carrier of practice and embodiment of social practices (Nicolini, 2013). Further, for researchers it is important not to reduce the practice theory to a mere description of what people do (Nicolini, 2017). Although the description of organisational life is an important part of the procedure, the strong framework of the theory strives to not only describe the actions but disclose the underlying social matters which support the actions.

The practice-based approach to knowledge is based on a few key assumptions regarding the nature of knowledge which separate the practice-based view from the objectivists view on knowledge. According to Gherardi and Nicolini (2000), knowledge is conceived as mainly a social and cultural phenomenon, situated in a system of practices. Thus, moving away from the

objectivist perception of knowledge as an codifiable object or entity that can be separated from people (Hislop, 2013). This is considered a core difference between the two distinguished views on knowledge. Knowledge is inseparable from human activity and all activity contain and involve some mode of knowledge. Hence, knowledge is embedded in practices and is part of a highly social and dynamic process (Hislop, 2013). Further, based on the practice perspective, knowledge is multidimensional, embodied in people, socially constructed and culturally embedded. The multidimensional characteristics of knowledge challenges the duality of the tacit versus explicit dimension of knowledge. The tacit/explicit duality, a concept first introduced by Polanyi (1966) and commonly used (in e.g. the SECI model by Nonaka and Takeuchi (1995)), follows a either or logic. Knowledge is tacit or it is explicit. By taking a practice-based approach on knowledge, the separation and division of knowledge as two independent elements becomes redundant as knowledge is perceived to be highly interconnected, both tacit and explicit (Hislop, 2013). Thus, being the two sides of the same coin.

A highly influential contribution to the area of practice based studies is the concept of Community of Practice, CoP, initially developed by Wenger (1998). The core idea and argument is that learning is not something that is spontaneously occurring in an individual's mind or in organisations but is a process taking place in social learning systems (Clegg et al., 2016). Communities are social systems where the membership of the community is mainly based on participation and not necessarily bound by organisational affiliations (Ruikar, Koskela, & Sexton, 2009). Further, communities are the building blocks of the learning system and inside the community, the definition of competences take place. A competence is defined by three elements; sense of joint enterprise, relationships of mutuality and a shared repertoire (Clegg et al., 2016). A community of practice is highly influenced by intrafirm network and would therefore be affected by how professional become connected (Wanberg, Taylor, & Javernick-Will, 2017). Personal relations and network is a central element in CoP knowledge sharing. Similar work tasks or shared office is a natural connection surfaces and can possibly create a community. In PBOs, assigning employees to a project could hence be a powerful mechanism for initiating connections within the project. The concept of CoPs is further developed by Brown and Duguid (2001) who argues that CoPs is a useful unit of analysis but should put increased attention towards the practice and less on the idea of community.

Koch and Thuesen (2013) presents a ethnographical study and adopts a practice-based approach to the mechanisms of knowledge sharing practice between different CoPs in a construction project. Knowledge sharing between CoPs revolve around mainly three facilitating elements; boundary objects, brokers and arenas. The element of boundary objects, or artefacts, are tangible or intangible objects that cross the confines between CoPs, passed on from one group to another or serves as a mediator between the communities (Koch & Thuesen, 2013; Mueller, 2015). These could for example be drawings, budgets or other artefacts that can interact by rectification. Brokers is the second type of interaction in CoPs, interaction by participation (Koch & Thuesen, 2013). The broker is a person who actively take part in several CoPs and performs what Gherardi and Nicolini (2002) call *brokering*. A broker interacts with several CoPs and has the possibility to introduce, transfer and translate new elements into the

group, coordinate knowledge sharing, and influence the practice in one or more communities. Usually the broker is not one of the core members of the communities but work in the edges of the CoP boundaries and move between them. The final facilitating element is what Koch and Thuesen (2013) label arenas. Arenas are the context and places where brokers and boundary objects are active. These arenas can either be of a formal nature, e.g. meetings, or they can be informal, e.g. small-talk in the office corridor. The authors argue that inter-project knowledge sharing practices between CoPs is highly context dependent due to the situated nature of knowledge.

Mueller (2015) investigates the process of knowledge sharing between project teams. She argues that by focusing on practice it is possible to analyse human activity in a specific context and include the use of artefacts, behaviours, language and the social engagement which the practice perspective is based upon. The author takes a practice perspective on knowledge sharing because:

This perspective extends beyond the functional management perspective, which focuses on formal ways of knowledge sharing (e.g. official roles of the project management office or the use of documents), taking into equal consideration informal practices developed by employees. (Mueller, 2015, p.54).

Further, it is argued that the knowledge sharing process is mutually dependent with the organisational culture and that the characteristics of the particular culture can serve a function in knowledge management. Among the strongest knowledge cultural characteristics which positively influence the knowledge sharing between project teams is trust in colleagues and the trust from top management in their employees (Mueller, 2012, 2015). Also, it is found that formal initiatives, intended or not intended for knowledge sharing between project teams, can foster informal practices of knowledge sharing between project teams. Formal practices can serve as a basis for development of informal practises if project members perceive it to be a certain level of trust and autonomy in the organisation (Mueller, 2015). Having the specific process of knowledge sharing in mind, the managerial role is to facilitate the process by providing beneficial conditions. Facilitating communication and social interaction processes would allow several of the favourable knowledge sharing processes to take place (Hislop, 2013).

Relating back to the research purpose and aim of this thesis, by using the core concepts of practice theory and the practice-based perspective on knowledge as a starting point, it provides the necessary analytic tools to untangle the actions performed by organisational members. Distilling it down to the underlying practices related to organisational knowledge sharing. Knowledge sharing practices are the reoccurring and reproduction of actions by the individuals of the organisation. The individual is not neglected but viewed as a carrier or the practice and take part in the social system in which the practice is created, developed and has effect. The KM literature is vast but rarely focus on knowledge sharing practices between projects and project teams. The KM literature in general, PKM and construction in particular, and the barriers and enablers related to KM initiatives provides the basic arguments for how a KM initiative at the case company can be implemented. The aim of the thesis is to provide insight

on how to improve the knowledge sharing practices at the company. The initiatives need to be aligned with the underlying dynamics of present practices, organisational culture and social systems in order to be successful.

4 Methodology

An inductive qualitative research methodology was used in this study. A core concept of qualitative research is to try to understand people from their own frame of reference, their point of view and how they perceive their reality as they experience it (Taylor, Bogdan, & DeVault, 2016). Based on the very multifaceted nature of the research topic and research questions, it provided a rationale for using a qualitative approach. Knowledge, KM and practice are, as pointed out by numerous previous scholars (e.g. Corradi et al., 2010; Hislop, 2013; Nicolini, 2017), difficult concepts to define and is highly subjective; and it is therefore important to contextualise. By applying a qualitative approach on organisational studies in general and the KM area in particular, this approach can be fruitful in conceptualising practices and attitudes (Alves de Sousa & Heniks, 2006; Graham & Thomas, 2008).

4.1 Study Design and Case Selection

The data gathering work has been conducted as a joint effort with another university student, Finn Andersson. Finn was undertaking a master's degree in Management at the School of Business, Economics and Law, University of Gothenburg. As mentioned, the data collection and parts of the analysis has been a cooperative process but with a, to some extent, different approach and research purpose. Hereafter me (Anton) and Finn will be referred to as "the researchers" in sections where we performed collaborative work. However, the reports were written separately and I am the single author of this thesis. This cooperation has been approved by the administration at both Chalmers University of Technology and the University of Gothenburg.

This study was conducted as a case study of a construction company active in Sweden. The use of a case study was chosen because it is a valid way of performing qualitative research in the area of KM and other social, relational and organisational research as pointed out by Flyvbjerg (2006). Also, that case study research provided the closeness needed to gain deeper understanding of the underlying dynamics of social life. From the author of this thesis' perspective, the closeness of the case method in studying real-life situations and its high density of details provided important justification. As argued by Gherardi and Nicolini (2000), knowledge is rooted in the context of interaction and social situations in which organisational members participate. Through the closeness with the case and the people which are under the loupe, we got a more nuanced view of the reality and provided the researcher with deeper understanding of human behaviour and the relation between thoughts and action (Flyvbjerg, 2006; Woodside, 2010).

Building on the argument of staying close to the case, the selection of case organisation was made with this in mind. One important and critical aspect when choosing a beneficial research settings was to provide the researcher with easy access. To quickly establish an close relationship with informants and the ability to gather data directly related to the research interests (Taylor et al., 2016). Hence, it was practical to conduct the research in an organisation where the author already had access and a professional relation to the organisational members. This provided the opportunity to directly initiate qualitative data gathering. Also, practical aspects as, for example, access to the organisations internal documents etc. was pre-arranged.

4.2 Data Collection

The researchers used three methods of data gathering; interviews, observations and internal document review. The use of multiple methods is called “triangulation”. As described by Woodside (2010), the use of three methods strengthen the validity of the study as data sets from each method provide further insight and deeper understanding of the studied subject or area.

Interviews were held with 15 practitioners who are employed at the studied company or are closely involved in one of the company’s construction projects or has a close collaboration with the company organisation. For reason of anonymity, the case company was given the alias Partners Inc. and the interviewees was given pseudonyms or remained undisclosed. The researchers gathered information from several organisational levels and individuals from different projects and regions, see Figure 4.1. Boxes with sharp edges means that the persons were employed at Partners Inc. Also, the individual named Sullivan was not interviewed but a distinguished individual in the organisation. To simplify comprehension of the relations within the organisation, Sullivan was added in Figure 4.1.

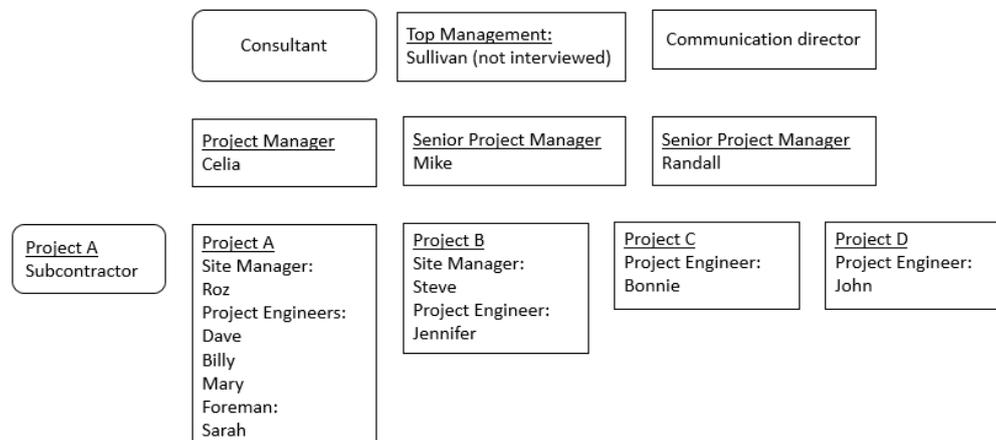


Figure 4.1. Overview of the interviewees and their associated project or title. Note that Sullivan was not interviewed.

All interviews were conducted in a semi-structured fashion with a structure based on an interview guide, see the Appendix. Throughout the process of performing the interviews, some questions were rephrased, replaced or removed from the original structure. This was done to customise the questions to be relevant for the interviewed employee’s position in the company. The interviews were semi-structured and the interviewer did repetitively add spontaneous questions in the moment when a statement, for some reason, caught the interviewers’ attention or was deemed interesting for the study. The interview time was within the span of twenty-five to fifty minutes in length. All interviews were recorded and transcribed.

Nicolini (2017) pointed out that there might be a level of dissonance between what interviewees say and what they in fact do. However, the reason for making interviews in this qualitative study was to gain a deeper understanding of the practitioner’s perspective, lived experience and the meaning the interviewee makes of that experience (Taylor et al., 2016). Also,

observations and an internal document review was conducted and served as a compliment to the interview data.

The second method of data gathering was observations. Throughout the study, the researchers have continuously been observing the individuals, activities, events and ongoing at, mainly, one of Partners Inc.'s project site. The aim of these observations was to capture the day-to-day events taking place. Also, to contextualise the situations as it provided a useful tool to either confirm or contradict what was stated in the interviews. However, isolated observations in themselves did provide valuable data for this study. The observations included cultural aspects of the project organisation, apart from the individuals' accounts, and how these symbols etc. could be interpreted by the author in relation to the used perspective. The majority of observations was conducted at the project A site, amongst members of the project A team. However, the project B team and other Partners Inc. members frequently worked from the project A office. Therefore, direct observations of knowledge sharing between projects was made possible. The interviews with project B team members was conducted at the project A office. The observations include notes from free observations, project meetings, notes taken after personal conversations and one day of the company's internal education events called "academy module".

The third method of the data collection process was a review of a selection of the company's internal documents. Twenty-nine documents were reviewed, including e.g. project checklists, meeting protocols and the organisational handbook. The document review was done to provide the researchers with a basic understanding of how Partners Inc. used formalised and documented KM related procedures.

4.3 Data Analysis

The analysis was conducted using a grounded theory influenced thematic method, identifying and comparing themes which emerged from the data (Taylor et al., 2016). The transcripts from the interviews, observation notes and internal documents was openly coded in a line by line fashion by the researchers, staying close to the data, using MS Nvivo software. When the open coding was completed, the researcher moved on to axial and selective coding. The theoretical framework was used as support tool to identify themes and derive the subsequent practices throughout the process of analysis. The themes helped describe in what ways and how knowledge sharing activities, both within and between projects, occurred at Partners Inc. After further conceptualising of the themes, the underlying practices, social dynamics and interconnectivity between the themes was analysed.

4.4 Ethical Considerations and Possible Conflict of Interest

Ethical considerations are necessary for any field research (Taylor et al., 2016). It was the researcher's responsibility to adhere to specific ethical aspects of the research work and towards the research subject(s). The researchers were fully transparent about the work we were conducting. Thus, it was not a covert study. When participating in meetings and day-to-day work among the company and project members they knew who we were and what we were doing there; collecting data for this study.

Before each interview the interviewee was asked if he/she was comfortable with being recorded, the interviewee was informed that their identity would be kept anonymous and that statements could be quoted in the thesis. Further, before submitting the final version of the thesis, the organisational supervisor was offered the opportunity to review the text to ensure that the anonymity agreement had been honoured. The internal documents were provided by the company management and used in good faith. Also, in section 5.1, no references regarding Partners Inc.'s working methods, basic financial data or overall organisational description was added due to reasons of anonymity. The information was collected from the organisation's own website or provided by the supervisor.

There was a potential conflict of interest as the author of this thesis was and are currently employed at the company. It provided reason to keep a clear distinction on when I was working, as an employee, or when I was present in my role as a researcher. Also, there was a risk of bias when studying colleagues and an organisation towards which I hold a sense of loyalty. These risk has been taken in consideration and mitigated to the extent the researchers considered necessary. For example, Finn conducted the interviews with the persons who was my direct supervisors in the company.

5 Case Context: The Construction Industry

The construction industry is mainly a project-based industry, hence multifaceted from a KM perspective. The construction industry and a construction project require the utilisation of a number of firms and actors to produce a product which is highly specific and unique (Dave & Koskela, 2009; Kamara et al., 2002). Large quantities of knowledge need to be managed in each project and transferred between actors and throughout the project. A project is characterised by a clear time span in which a number of tasks are executed, related to each project phase, to meet the project goal. The construction project organisation is, in most cases, multidisciplinary and involve a large number of stakeholders who needs to collaborate, exchange information and harmonise over the different project phases during the project lifecycle (Kamara et al., 2002). See Figure 5.1. below for a simplified conventional project lifecycle and associated phases.

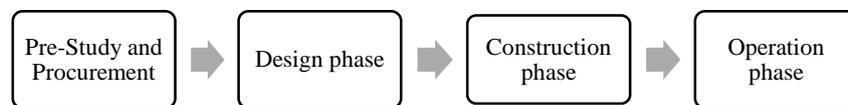


Figure 5.1. Simplified project lifecycle scheme.

Each one of these phases involve specific technical knowledge and processual knowledge. Depending on the contract strategy used by the client; phases, division and structure of project may vary. Thus, the division of a construction projects into different phases demonstrate additional challenges from a KM perspective, in addition to the previously described difficulties for PBOs in general.

5.1 Selected Organisation and The Partnering Concept

The construction business is, as stated above, very dynamic and involve a great number of moving part. Hence, it is also full of potential problems that could endanger project success. These problems or areas of concern involve, for example, lacking cooperation, low trust and inadequate communication (Chan et al., 2004; Dave & Koskela, 2009; Laan, Noorderhaven, Voordijk, & Dewulf, 2011). However, the partnering concept is developed as a procurement strategy to overcome these problems. There are several definitions and meanings of partnering but the fundamental principles of the partnering concept builds on inter-organisational cooperation, trust amongst project actors and consideration of the interest of all parties (Chan et al., 2004; Koch & Thuesen, 2013).

Partners Inc. exclusively partake in partnering projects as part of the organisational strategy. According to the organisation's own website, the partnering working method with integrated project teams stimulate creativity, improving technical innovation and enhance conflict management. Also, compared to a traditional project lifecycle scheme, the project phases would "overlap" to a greater extent and thus the project time could be reduced and the handover between project phases simplified. The project scheme in Figure 5.2. is an adaption of Partner Inc.'s Partnering scheme.

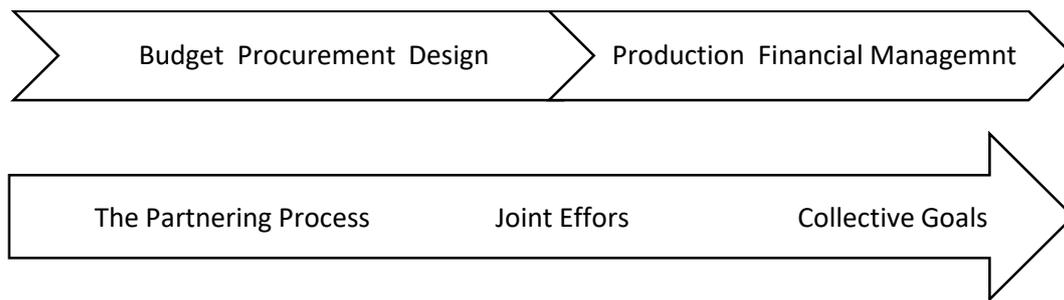


Figure 5.2. The Partnering Project Scheme.

Partner Inc. is a construction main contractor that manage project in several parts of Sweden, spanning from Gothenburg on the western coast, the central parts of the country, to the eastern regions. At the moment, the organisation employs around 150 persons, including both white and blue collar workers. In 2016 the turnover was approximately 900 MSEK. For the past years the organisation has had a steady growth in revenues and the number of employees has increased rapidly.

The organisational structure is highly project based and follows a “classical” project organisation scheme. Top management, administration and organisational support functions are located at the headquarter in the central region, separated from the base. The base of the organisation is founded in individual projects where the main business activities are conducted. At the project site, a temporary project office is established. The project offices are usually the work place for the site manager, project engineers, and foremen from Partner Inc. In vicinity to the site management office, the carpenters, concrete workers etc. have spaces for food-brakes and changing rooms. Also the subcontractors site managers, engineers, foremen and craftsmen work, to varying extent and relative project phase, in the same project office at site. The use of a co-working spaces, at the projects sites, is a conscious management practice from Partner Inc. aimed at improving the collaboration between all project members.

6 Empirical Findings

This section is divided in two main subsections. The first subsection addresses mainly the inter project knowledge sharing at the project A site. The between project knowledge sharing is presented in the second subsection.

6.1 Inter-project Knowledge Sharing

The project team at project A worked closely together at the project office site. The office was basically a barrack, divided by a corridor in the middle, with office rooms along the sides. There were also conference rooms dedicated to meetings. All offices shared a common kitchen area and break room. All offices and a majority of the meeting rooms had glass walls. At the entrance to the barrack, there was a place for outwear and outdoor shoes. As Partners Inc. applied a “no shoes policy” at the site office, slippers were provided. The glass walls and shoe policy were a way to provide the project site with a welcoming, clean and light working environment. There was a second barrack on top of the office barrack where the craftsmen were provided with changing rooms and break rooms. Both barrack shared a common entrance. All members of the Partners Inc. project team share office space with one other team member. The site office was where the team spent the work week and conducted their daily work. Other project members, e.g. Partners Inc. project managers, subcontractors, consultant and client representatives were often present, to some varying degree, at least two days each week. These members, when not in meetings, often shared the larger office spaces with room for up to six persons.

The knowledge sharing within the project and project team was highly intensive. The interviewees stated that their main source of information and knowledge was often found in their vicinity. The closest colleagues were the first persons that project members approached when they found themselves in a situation needing knowledge. To directly contact and ask close colleagues or team members was found to be the main action among the project team for initiating knowledge sharing. Team members were frequently seen standing in each other’s offices or in the corridor, talking and discussing work related issues. This was done in a casual way and did not seem to following any predictable pattern. The informal interactions appeared to occur spontaneously. The same sorts of interactions were common within the whole project, members from different organisations and professional disciplines was observed standing in the corridor and shared offices, discussing the matter at hand. The interviewees highlighted the face to face interaction to be most beneficial as it offers the participating persons to engage in an interactive process, discussing, giving and receiving help. One of the project engineers described that the direct contact provided the social connection and interactive aspects, lost in writing or other forms of medium, to be most helpful when, for example, working with an unfamiliar computer program. The close relationship with team members and other project members was frequently highlighted as a vital aspect of the knowledge sharing at the project site. The partnering method of working was frequently mentioned as an important reason for the high level of cooperation with and between the client representatives, subcontractors, consultants etc.

Not seldom the knowledge and experience shared within the team was gained from previous projects in which the persons had participated in. When team members described how they would go about a problem themselves could not solve due to lacking knowledge, they often referred to taking contact with someone who had a lot of experience in general or experience from the particular task at hand. Primarily, within the own project team but also outside the team and project. At the project A office, the seasoned site manager, subsequently referred to as Roz, was mentioned to be a key person in the knowledge sharing within the project team. Roz has been in the construction industry for many years and had thus gained great amounts of experience from a long career. The rest of the project team was relatively unexperienced and did rely on the support from Roz in several situations, especially regarding production related issues. Project engineer Billy who shared an office with Roz, clearly advocated the importance of Roz experience and willingness to always help with whatever problem he or other team members encountered. Roz experience, willingness to help and importance in the project A was also highlighted by several other team members and project manager Celia.

Furthermore, meetings were a forum where project members interacted with each other and shared knowledge. A number of different meetings were observed by the researchers. In the meetings, the Partners Inc. project team members met with consultants, subcontractors, vendors etc. and discussed issues spanning from technical solutions to project processual working methods. Frequently, larger meetings lead to sub-meetings. The content of the knowledge sharing was often project specific and the meetings were usually of a formal nature, followed and pre-set agenda and meeting protocols were written. There was usually an active moderator during the meetings who directed the discussions, often one of the more experienced individuals. However, spontaneous discussions triggered by a participants input or opinion repeatedly occurred. Also in meetings, generally, the more experienced individuals were the most active and often guided the discussions. The content of the knowledge shared at meetings were often project specific and related to a present issue in the project which the meeting participant worked on at the moment. However, knowledge gained from past projects were shared also in these forums. Previous experiences of suppliers, used solutions and machine rental prices etc. was brought forward during meetings and shared with the persons which the information could concern.

The knowledge sharing within the project was often facilitated by some formal structure, e.g. a meeting, but the informal forums, e.g. the corridor or the time after a meeting, was found to be highly relevant and intense forums for knowledge sharing. The informal forums and interaction was often initiated and facilitated by an individual who had encountered a problem and wanted input right away. At meetings, the formal agenda was predominant and the social dynamics different. While the informal knowledge sharing occurred on the initiative of a searching person, the meetings formal structure put more emphasis on sharing knowledge when in a position of some sort of expertise.

How collective knowledge passed from one project to another was highlighted by the interviewed project team members of project A. The statements indicated that knowledge shared from the previous project to the present project A, it was basically the same project team, was of a more processual nature rather than strictly technical. For example, project engineer Mary stated that after the completion of the previous project the team sat down and reflected on what could be improved in the impending project. The outcome of the discussion was documented to limited extent but the discussion forum in itself provided the team with collective knowledge which they implemented in the A project. An outcome from this forum was the improved and more detailed economical monitoring of minor subcontractors. Further, project engineer Billy highlighted teamwork as the major benefit from working together in a previous project. By working together, the cooperation, knowledge about the group dynamics and improvements on work methods was elements which the group transferred to the next project.

6.2 Knowledge Transfer Between Projects and Project Teams

Knowledge sharing between projects and project teams transcend some sort of boundary. The cross-project boundary can be either time, as in from a previous project, or an organisational boundary, as in geographically and organisational structure based on independent projects. The following section highlights knowledge sharing between projects and project teams which transcends one or the other, or both boundaries.

6.2.1 Individuals Take Direct Contact

The most frequent, between project knowledge sharing action, of the project team members was to get in direct contact with the individuals who was perceived to possess the sought after knowledge. This contact was made either by direct face to face interaction or by calling or emailing. The overall conception, from the interviewees, of how knowledge is managed and shared across project boundaries was that knowledge is highly individually embedded and shared between individuals. Since the organisation is divided into separate projects, the factor of geographical dispersion and the organisations structural boundary for knowledge sharing became visible. The long distance between project sites was mentioned as a factor that inhibits the knowledge sharing across the organisation. If the teams were not co-located, the most common method for taking direct contact with other project teams and participate in cross-project knowledge sharing was found to be via phone or email. All team members expressed how direct contact via phone or email was a large part of their knowledge sharing activities with other project teams. As stated by project engineer John regarding the frequent contact he has with a project in the eastern region, called project E:

... we also have a lot of contact across projects also. I have had a lot of contact with project E regarding Dalux (a software) for example. They often call me if there is an issue and I often call them.

Also, experienced senior employees indicated that direct contact via phone or email was a large part of their knowledge sharing activities. Face to face meeting was preferred but of practical reasons not always used. As expressed by senior project manager Mike:

I take help from others, call them or go to them. Often you would call them and ask how they solved the problem

Site manager Steve emphasised that also the written email form of interaction did provide the necessary information and that it is a good way to share knowledge. Steve described the correspondence and knowledge sharing via email as vital to manage the role of site manager and as an effective medium of communication:

...if I send a list with fifteen points, I would get an answer to every sentence. With a different colour basically. Then the first person would forward it to another colleague who I also have asked via email and that person would also fill in on every row, it is really good.

The contact was often initiated due to a specific need, task or aim from the contact searching person. To utilise others knowledge and reuse their work was a regular course of action. As expressed by project engineer Dave, you don't want to "reinvent the wheel." Often the persons who team members reached out to were persons in similar roles as the calling or emailing person, or who was known to be specifically skilled in a specific area. For example, project engineer Mary who was responsible for purchases in project A stated that she commonly made contact with other purchasers when searching information related to bids, price ranges and supplier selection etc. Generally, terms used to describe the nature of the interaction was "get input", "discuss", "draw upon their knowledge" etc. However, the knowledge about other projects and the teams of other projects was limited among the interviewed team members. When asked if they knew what was going on in other projects, as in knowing who worked with what, what project phase and processes other projects were in at the moment etc. the answer was frequently no. Or they had superficial knowledge about it. The reasons for not knowing was varying, from not ascribing it as part of their work description to insufficient time for it. Some frustration regarding this issue was also expressed. It seemed to be a contraposition between the actions of knowledge sharing via direct contact and a limited awareness of who to actually contact in other project teams. However, a smaller group of individuals were frequently mentioned as key individuals in the across project knowledge sharing, as described in the next section.

Taking direct contact with colleagues was frequently highlighted by the interviewees to be a well-functioning course of action in general as it was perceived effective and that they felt comfortable in doing so. However, time pressure and high workloads was mentioned as, occasional, obstacles or inconveniences for taking direct contact or answer calls/emails. Direct contact to share knowledge was also encouraged by e.g. organisational developer Sullivan and other managers in the organisation. The organisational culture was identified and stated by the interviewees to be an enabler to facilitate this patterns of action. All interviewed team members and managers described the organisational culture in highly positive terms and as a reason to why they felt ease and comfortable calling or emailing other organisational members. The culture was also often mentioned in relation to the working method of partnering. The organisational culture along with the organisational member's attitudes was described as "open", "familiar" or "helpful" etc.

Hence, the knowledge sharing seemed to be heavily embedded in the individuals and facilitated by the of the organisational culture. The knowledge sharing pattern of action was to get in contact with the individuals who was perceived to be the ones to hold the sought after knowledge. Also, high level member's statements regarding knowledge sharing activities was well aligned with the statements by team members. The formal organisational hierarchy was not perceived by the researches as strict or as a significant barrier for knowledge sharing. The knowledge flow and knowledge sharing across project boundaries was highly dependent on the norm of searching for knowledge, willingness to share knowledge and the encouragement to take direct contact.

6.2.2 Knowledge Distributors

Related to individuals and knowledge sharing, knowledge distributors were often facilitating knowledge sharing between project. Through the interviews and observations, a set of individuals was identified as key persons who played an important role in the cross-project knowledge flow. These individuals had a relatively high position within the formal organisational hierarchy as well as extensive experience. More inexperienced members of the organisation heavily relied on the senior member's experience when encountering project specific task to which they perceived to need more knowledge to perform.

Senior project manager Randall was often mentioned by several of the team members to be an individual who they often contacted. Randall has been employed at the company since 2011, starting out as project engineer and now holds the position of senior project manager with a coordinating role. Randall was often mentioned in relation to project calculation and accounting systems and was a person who a majority of the different team members referred to when asked who they turned to when needing help or knowledge. Process manager and organisation developer Sullivan was also frequently mentioned as a distributor and facilitator of knowledge, often in relation to tenders, the internal education modules and process management. Sullivan was one of the founders of the Partners Inc. and, amongst several areas, responsible for the internal education program. Senior project manager Mike was another key individual from a knowledge sharing perspective. Mike also had a long expertise from the construction industry. The work description of Mike differs from the other project managers as his role was explicitly formulated and aimed at sharing knowledge and experience with different project teams. He has a long career in construction and is planning to retire in a few years. The organisation wanted to utilise his expertise as much as possible before he retires. Roz was often mentioned by the project A team members as an important knowledge distributor however, mainly within project A. Even if the project B team members were regularly present at the project A office, the knowledge sharing between them and Roz was limited. The close relation and focus on your own project was mentioned as a reason for this. This line of communication was expressed to be formally facilitated by project manager Celia. However, project A and B interviewees stated that there was probably quite a lot of unconscious sharing of knowledge on a regular basis between the team in general due to their co-location.

The work description of the key individuals, all except project manager Mike, did not explicitly include the responsibility of sharing knowledge between projects. However, all key individual had the perception that knowledge sharing was a natural part of their work. They perceived

their work to be highly related to knowledge sharing. The statement from the key individuals indicated that the knowledge sharing activities they performed were mostly based on how they could share their personal expertise and experience. Often team members were referring to the key individuals long experience and how the key members shared this experience with them. To get help and share knowledge with a key individual, all the members would need to do was ask. This was a regular pattern, team members search for knowledge and the key individuals highlight the necessity for team members to search for knowledge. As expressed by senior project manager Mike when asked about the knowledge sharing between regions and how it could be improved:

...I'm sure there are (improvements to be made), but nothing I can think of right now. I guess it is up to each person to search, if you are looking for something that you search the information. It is hard to know what information they are looking for...

Also site manager Roz expressed the similar thoughts and identified the need for others to actively search for knowledge:

Well I guess that it is up the person who undertake the project to be a bit curious and wanting to find out more. It is hard for us, who are (already) involved in a project, to provide another person. It is that project team who needs to find out what methods we used and to ask questions. And you do that in the beginning, how did that work...When you start a new project I think the responsibility falls on you to try to pull the strings and bring some new ideas. You cannot count on that someone who is finished with a project to say, oh, okay now they start a school project there, think about this and this.

The main mode of knowledge sharing facilitated by the key knowledge distributors derived from post-project experience based on projects which the key distributors themselves had participated in. Knowledge was shared from finished projects to present projects through the individual's experience as they relayed and shared it with the project team. Thus, bridged the boundaries of organisational structure and time. However, a second mode of cross-project sharing, facilitated by key individuals, was when they identified solutions in one ongoing project and shared it to another ongoing project. Thus, transcended the structural boundary. This second mode of knowledge sharing was found less frequently in the collected data but was assessed to be highly effective when it occurred. In the following example, senior project manager Randall exhibited a clear distributive role in the knowledge sharing between two projects that both was ongoing at the time.

The project E team in the eastern region and the project A team plus part of the project B team, took part in a knowledge sharing activity through the intermediated role of the key individual Randall. The project E team had tried a new solution, using prefabricated walls for the basement construction of a school. These walls had shown to be viable construction wise, economically favourable and time saving in the production. Also, the use of short and brief morning meetings and a time curve management method had shown to be a successful procedural implementation in this project. Senior project manager Randall, who had been

involved in both projects, informed the project manager Celia and site managers Roz and Steve in the western region that this solution could be applied also there. The project A and B team made a site visit to the project E and spent one day at the construction site. The day involved observation of the morning meeting, site visit to investigate the prefabricated walls and a review of the time curve method. Additionally, the visit involved rich social interaction with the other project team and several issues were discussed among the different team members. The outcome from the site visit was that project A adopted the prefabricated walls in their construction and the morning meetings was partly adopted.

In this situation, Randall had identified a technical and a processual solution at project E, which had been successful, and arranged a site visit for the project team of A and B to come there and evaluate these solutions. This site visit was mentioned by several of the A and B team members to have been a highly beneficial visit as the solution were applicable in their respective project. The opportunity to meet the other project team, discuss the solutions and be able to make an adaption of the solutions to fit the A and B team was stated to be important. Additionally, site visits, in general, was made occasionally and something the team members found rewarding.

Partners Inc. and the knowledge sharing within the organisation was perceived by the researchers to be initiated by the social norm of taking direct contact when searching for knowledge and that the identified key knowledge distributors play an important role in facilitating this social norm. Thus, the organisation highly utilised the knowledge sharing activities of the key individuals. As described, the actions of knowledge sharing were often of informal nature. Neither the internal document review or interviews revealed there to be a formal structure or procedure guiding this pattern of action. However, the site visit example provided information regarding how a formally structured activity could be highly beneficial in terms of concrete knowledge sharing between projects and facilitate the social interaction between project teams.

6.2.3 Internal Organisational Education – The Academy.

On a regular basis, project members from different project teams and project are participating in internal training workshops. The workshops are called “academy modules”. One of these modules was observed during the period of the study and one module had been observed before the start of the study. The modules followed a predetermined agenda revolving a specific topic. Organisational members, a mix of blue and white collar workers, were participating in these events which took place at Partners Inc. headquarter. It provided a relatively rare opportunity for different project teams (or parts of project teams) to meet in person and socially interact. The academy in general was highlighted by the interviewees as a highly appreciated forum for between project knowledge sharing. The predominant attitude towards these events, among all project teams and manager, was greatly positive and often mentioned in relation to how project teams was given the opportunity to get to know other members of the organisation, from different regions, and discuss cross-project issues. All of the interviewed members had been participating at least 6-7 modules each. Project members was either summoned to these modules or participated on their own request. The procedure of the observed module was divided in two distinguished components:

Firstly, the component of education. Education was often provided by one internal organisational member who specialised in the topic of the module. This part was not un-similar to a typical seminar arrangement. The module leader shared his/her knowledge with the group and the group listened. The module leader frequently asked the group questions regarding the topic and asked for their input. Some individuals (usually the more experienced and eminent individuals of the group) were more keen to answer and engage in the discussions. The module leader clearly focused more in the discussion that was deemed interesting for the module and continued with the education regarding the specific subject. It was clear that the leader steered the discussion and decided what needed to be further discussed or highlighted based on the input given by the group.

The second component was the cross-project discussions where the larger group was divided into smaller groups. Each group consisted of persons from different project teams. The module leader set the agenda and let the group discuss the topics. The module leader also participated actively in these discussion. However, during the group discussion the different team members actively shared experiences from their previous or ongoing projects, engaged in discussions and contemplated on the others input. After the small group discussion, the whole group reassembled to present and discuss the main takeaways from the smaller group discussions. Also at this time, intensive knowledge sharing between project teams and members occurred.

The formal structure of the academy module was primarily aimed towards education of the employees in the present subject but also to facilitate knowledge sharing between project teams in the organisation, as stated by e.g. process manager Sullivan and the consultant. Additionally, the social interaction that occurred at the academy module was also an initiator to the development of connections between project teams outside of the module forum. This connection was highlighted by, for example, site manager Steve:

Sometimes I meet someone at the academy and I realise that they have started to work with this and then I can call that person and share some information and get some (information).

Steve further highlighted the importance of the social context and getting to know other members of other project teams in order to engage in knowledge sharing:

... if I were to visit a project where you don't know (someone) more than casually, it's not a situation where you are intrigued and share knowledge right away

Within the formal settings of the academy there are formal practices. However, it was possible for informal knowledge sharing actions to develop outside the frame of the formal structure as well, as demonstrated by the two quotes above. The social association and network created at the academy seemed to have a positive impact on other sharing actions. Also, informal knowledge sharing actions took place during, for example, lunch and coffee breaks during the academy module. Module participant were able to freely socialise and spontaneous discussion regarding work and experiences took place.

6.2.4 Site Management Meeting

Periodically, site management teams partook in information meetings. The site management teams usually consisted of the site managers, project engineers and foremen. Additionally, the project managers also participated in these meetings. Previous years, these meeting was held at the headquarter. However, on initiative from the top management, theses meeting was now taking place at different project sites. Teams visited the site of the team hosting the meeting. This development was partially due to the growth of the organisation and the division into regions. All site management teams, within the same region, thus met at another regional team's project site. The site visit elements of the meetings were described as a positive development. The aim, as stated by several interviewees, was to convey information and decisions taken at the planning meetings where the project managers and top managers discussed organisational spanning issues. Issues regarding, for example, staffing, future tenders and updates on legislation. The information from the planning was then supposed to arrive at the projects through percolation via the site management meetings.

One of the site management meetings was observed. The meeting was led by project manager Celia and participating was the site management of project A and project B. As mentioned above, the main aim was to transfer information and decision taken at a higher organisational level. Celia had prepared a power-point presentation containing bullet points with information regarding relevant events and on-goings. Celia provided the group with information and spontaneous remarks or small discussion relating to the topic took place during the meeting. Occasionally, the discussion would get more intense and created a forum where project team members would share their experiences and knowledge with the rest of the group to a larger extent than short remarks to the bullet-points. For example, when Celia presented the suppliers which Partners Inc. had a framework agreement with, project engineer Billy highlighted that the supplier offer different prizes on the materials depending on if you purchase it via the internet or by phone/email. This information initiated a discussion amongst the meeting participants and was new information for the project B team who appreciated the enlightenment.

This meeting was a situation designed by the organisation top management, aimed at conveying information across the organisation. However, spontaneous knowledge sharing action, as the one described, were observed several times during the meeting. These discussions provided a forum in which knowledge could be shared between the project teams outside of the formal structure of the meeting. The informal and spontaneous dialogues were situations where more than sheer information was provided by the meeting leader, and personal views on the issues was expressed and discussed in the group.

6.2.5 The Database

Partners Inc. used a database which contained relevant organisational and project documents e.g. project start-up checklists, project handbook and supplier evaluations etc. The formal managerial structure of the database was a quality management tool, aimed at helping the dispersed project teams to reuse knowledge through templates and post-project evaluations. Through the database, each project team and team member gained access to organisational spanning information, other projects working documents as well as their own project team documents. The content in terms of templates and checklist was repeatedly used as a tool to guide the work but not for direct application. Some modification was needed to fit the specific project context. The database as a work tool was used regularly and recurrently by all interviewed team members at Partners Inc. The database was often described as a backup storage unit to not lose personal documents if the computer would malfunction. The backup function of the database was highlighted by some of the interviewees also when specifically asked about the database and whether it was platform for knowledge sharing. However, the database was also recurrently used by team members to search for knowledge that could be useful in their current situations. Searching for tools, templates, previous bids and other relevant documents from previous projects, and also documents provided by the organisation management, was noticeably a part of team members work. As expressed by project engineer Mary and site manager Steve when asked how they used the database:

...I usually go in and look at inquiries, purchases, tenders and tender evaluations...which providers or subcontractors have they inquired, and who and which they choose. (Mary)

I always check for tools, if there are any, it may have come new ones. It really sucks to reinvent something. There are a lot of helpful tools there. (Steve)

The majority described their use of the database in similar terms. The interviewee statements indicated that there was a habit of searching for knowledge using the database. As a team member uploaded a document on the database it would become “searchable” for other teams, and reviewing other teams’ documents was a common action. The information was rarely applicable directly, the information needed to be transformed in order to be applied in the project specific task context. However, the statements also offered an ambiguous picture of how the project team members perceived their role in sharing documents. Frequently, when asked if the database was perceived as a platform for knowledge sharing, the answers were vague. Even though there was compelling evidence that the database was used as a source for knowledge, the project members rarely actively acknowledged their own participation in sharing and transferring knowledge through the database. Also, it was not uncommon that project members store their files locally on their personal computer. For example, when site manager Steve was asked if he perceived the database to be a platform for knowledge sharing the response was:

Eh..., no I don't think so...I do not access the database and upload anything there that I think anyone else will look at.

However, some interviewees emphasised and recognised the importance of using the database as a tool for knowledge sharing. They acknowledged the individual project members' contributions as important in terms of organisational development and improvement. As stated by senior project manager Randall when asked about the content of the database:

The most important thing is that if you do something good in your project, that you see it as an improvement for the whole company.

Also, project engineer Mary highlighted the importance of sharing via the database and not storing files locally.

...it is important that everyone upload documents and not store them locally. That you share it, that you think about that. Even if it is a document that you have most use of yourself in the project, someone else might use it in other projects.

There seemed to be differing levels of awareness and shifting attitudes towards knowledge sharing via the database. The reasons for not uploading documents, with the intention for other project teams to take part of, was quite fragmented. A reoccurring theme was that project members didn't recognise their documents to be of interest for other project teams. Also, there was a perception among a majority of the project team members, including craftsmen and subcontractors, that no one reads documents and that documents were hard to find. The prevailing behaviour among the majority of project members was that they did not up-load files on the databased with an explicit purpose of sharing it with other project teams. However, documents and other written material was not generally perceived to be the most effective medium to share knowledge. The personal connection was preferred.

When a project was completed, an evaluation report was supposed to be written. The purpose of these reports was to capture "lessons learned" and accumulate knowledge to support the organisational learning and development. The reports were to be saved in the database and provide guidance for future projects. However, these reports were not written to the extent that was desired by top management. The internal document review showed that many of these reports was missing. Interviewees statements indicated that the task of performing these reports was not prioritised and that there was insufficient time dedicated for this task. Also, the reports were rarely read by project teams before commencing a new project. Not everyone knew what the reports were or their purpose and neither did project members know where the reports were found. End-of-project evaluation workshops was also a part of Partner Inc. working method as a way to capture lessons learned and finalise the projects. These workshops were also aimed to gather all project participants and stakeholders and provide a forum for input and evaluation. However, the project team of project A had not participated in an end-of-project workshop after the completion of the previous project.

No collective and explicit reason for not performing the reports and workshop was found but the overall conception of the researches was that there was no allocated time or high prioritisation for the workshop task or the evaluation report task. This notion was supported by statements from e.g. senior project manager Randall and organisational developer Sullivan. The interviewees often emphasised the importance of learning from previous projects and informal internal evaluations was made but the result of these evaluations was usually not documented in a formalised way.

7 Analysis and Discussion

The empirical data suggest that all organisational members perform a wide range of different activities relating to knowledge sharing. Similar to the findings of Mueller (2015), there are formal and informal practices of knowledge sharing. Furthermore, there are mainly two normative and informal practices that permeates and effects the subsequent actions. These practices are labelled *searching* and *involvement*. By using the practice-based perspective, I argue that these two social norms are what underpins the surface layer of actions that is found in the empirical data. Meaning that the empirical data shows the actions and performances by individuals but it is through deeper analysis that the underlying social practices is identified. Individuals actions become a practice when it is reproduced and recurrent within a social system (Corradi et al., 2010). As mentioned in the theoretical framework, section 3, to not diminish the practice theory and practice-based perspective to a mere description of what people do, I identify the underlying social matters supporting the actions. The identified practices are put in an managerial point of view, using the different approaches of the KM model by Alvesson and Kärreman (2001), in order to exemplify the managerial efforts related to the identified practices and social effects.

7.1 The Norm of Searching and Involvement – Encouraged Informal Practices

The most predominant way of performing knowledge sharing between project teams is that members make direct or indirect contact with other team members to discover the needed knowledge. To conceptualise this behaviour, it is a practice of *searching*. This pattern of action is normative and it is a practice as it is a recurrent and repetitive action which the team members, in particular, perform. This practice would thus align with the third dimension of practice when using the conceptualisation by Corradi et al. (2010). That is, actions are only considered a practice if they are reproduced. Also, these actions are not a mechanical duplicate of previous actions. The actions identified is highly dynamic and formed by the specific context in which the action(s) are performed. As the empirical findings suggest that, the team members, project managers and key knowledge distributors. All share the same behavioural pattern of searching, in various forums and ways, for knowledge and information relevant to their, at the time, specific task. The statements from members from different team highlight their need to constantly search for knowledge. The identified key distributors also state that they follow the searching norm but further underlines the need for members in the organisation to actively search for knowledge and be “curious” etc. Building on the argument of the first of the three dimensions of practice, the searching norm appears to be socially recognised across the organisation. Thus, part of collective action that provide orientation within Partners Inc.

Practices are interconnected with a social system of activities (Corradi et al., 2010; Gherardi & Nicolini, 2000), and the practice of searching is closely co-dependent with another normative social practice, *involvement*. The practice of involvement is embodied when individuals share their knowledge, help and assist their colleagues and team members in a social exchange. Hence, getting involved and entangled with the practice of searching. The results show that the ease and high level of comfort in making contact with team members across organisational structural boundaries indicate a high level of trust in fellow employees. Also, a strong positive

attitude towards cooperation. The involvement practice has clear cultural characteristics, such as trust, willingness to help, supportive attitude etc., of a positive knowledge culture (Hanisch et al., 2009; Mueller, 2012, 2015). The culture seems to be collective across Partners Inc.'s organisation, both within project teams and between teams and management. Ren et al. (2017) argue that knowledge sharing require a transfer intention to be initiated. At Partners Inc., the searching practice is fuelled by the intention of receiving knowledge to manage the work and the involvement practice is triggered by the searching. Thus, both practices are co-dependent and highly related to each other. Interdependent as one or the other practice by itself would lose its rational.

Knowledge shared across boundaries often needs to be translated or transformed (Carlile, 2004). Carlile (2004) argue for the existence of different boundaries along three knowledge aspects, novelty (uncertainty), difference and dependence. In order to preform translation and transformation of knowledge over these boundaries, a process of developing shared meanings and negotiating knowledge is needed. At Partners Inc., knowledge is shared, gets dis-embedded from one context and re-embedded in another through the social and interactive processes. The interaction with colleagues in the same team or in another project team is often described in terms of "get input" or "discuss". The social and interactive dimension of the knowledge sharing practices at Partners Inc. is highlighted by the interviewees to be a basic requirement in the knowledge sharing practices. Therefore, highly relevant in shaping these practices. The reciprocal relationship of the social interaction is found to be the glue holding the actions of knowledge sharing together. Hence, human actions are tangled in a social system (Nicolini, 2017). The social interaction and the actual output in terms of knowledge sharing between projects, i.e. over boundaries, would be the KM effect recovered from the social practice system.

I argue that both the searching and involvement practice is mainly of an informal nature at Partners Inc. The normative practices and routine of taking direct contact are receiving encouragement from team members as well as top management to be performed. However, there are no formal or explicit guidelines that set the path of action. The formal structures of e.g. academy modules and meetings facilitate another type of interaction and social dynamics. Similar to the findings of Mueller (2015), knowledge sharing is not an official demand from top management but all team members and the knowledge distributors, highlight that knowledge sharing is a natural part of their work. The dynamics of the searching and involvement norm appears thus to be informal and heavily reliant on the organisations knowledge sharing culture. The culture at Partners Inc. is ever present, in statements from interviewees to the culture symbols of e.g. glass walls. It demonstrates traces of being affected by managerial intervention. It points to a conscious general strategy of the organisational management in creating a culture regarding the knowledge sharing in the company. As argued by Mueller (2015), culture affects the practices and vice versa. This is highlighted in the practice theory and the practice-based perspective on knowledge and aligned with the general literature on KM and culture relations (see e.g. Ajmal et al., 2010; Gherardi & Nicolini, 2000; Mueller, 2014). Relating to the model on KM by Alvesson and Kärreman (2001), culture creation would be an attempt at the normative domain, characterised by a normative approach

and combination of weak and strong managerial control to knowledge management. Further, the culture fostered in Partners Inc. is co-aligned with the partnering concept. The partnering working method and the organisational culture is perceived by the researcher to be highly interdependent, thus having an effect on the knowledge sharing practices (Mueller, 2014, 2015).

However, the involvement practice for between project knowledge sharing seems to be highly dependent on the active participation by the identified key knowledge distributors who enable a large volume of the boundary bridging knowledge sharing. The knowledge distributors role is found to be a mixture of formal and informal structures and forums that facilitate the searching and involving practices in different ways.

7.2 The Brokers and Knowledge Sharing

The key knowledge distributors of the organisation highlight their willingness to take part in the practice of involvement and share their knowledge and experience. The identified key individuals perform the knowledge sharing practices similar to what Gherardi and Nicolini (2002) call “brokering” and are what, among others, Koch and Thuesen (2013) label “brokers”. Brokers are individuals able to influence practices and coordinate knowledge in different communities by participation. A broker is normally not one of the core members of a community but rather work in the boundaries of the community. In this case, the boundary consists of the project and the communities would consist of the project teams. It would be a fair assumption to view the Partners Inc. project teams as communities and extend them similar characteristics as a CoP. The identified brokers of Partners Inc. are mainly Randall, Mike, and Sullivan. These brokers work in the outskirts of the community and perform the activity of brokering as they all possess the ability to move between communities, or projects, acting like a living intermediary between several projects (Koch & Thuesen, 2013). Facilitating the transcendence of these boundaries (Carlile, 2004). All three brokers actively performed sharing practices but were distinguished in how they engaged with the involvement practice and the arenas they use.

Roz is identified as an important knowledge distributor, however, mainly confined to the arena of project A. He qualifies as a broker based on the transfer of practices and experience from previous projects, thus performing brokering in project A. However, from an organisational, more holistic, perspective he is unexploited as a broker. Roz is one of the core members of the A project team and work closely within the project. As there are several communities within a construction project (Koch & Thuesen, 2013), the label of broker is appropriate. But, between the project teams within Partners Inc. organisation, Roz serves one specific project and is from the perspective of knowledge sharing between teams, highly isolated.

Mike is actively moving between different project sites, interacting with the team members, relaying experience from previous projects. Thus, brokering knowledge over time and geographical project boundaries by participation (Koch & Thuesen, 2013). The main mode of knowledge sharing practices, which the team members and brokers are performing, derive from experience gained in previous projects. This mode is especially embodied by the actions and role Mike and Roz. However, all brokers exhibit the characteristics of willingness to help and

provide input to the team members. Also, allocating time to answer questions, engage in discussion and be available for direct contact. Thus, actively participating in the practice of involvement. The role of both these brokers is part of the formal organisational structure, given official roles and work descriptions. But the arenas they use and the nature of interaction are mainly informal substantiated by the normative practices of searching and involvement. Even if Mike possesses a quite explicit and pronounced role of a broker, the informal practices and arenas are found to be the dominant ones.

Randall has a key coordinating role within Partners Inc. and by participating in project meetings on site and sharing knowledge from past experience and ongoing projects. The second mode of knowledge sharing action by brokers, in particular the example of Randall introducing practices and solutions to project A and B team from the project in E, exhibit clear actions of brokering (Koch & Thuesen, 2013). The data is however not sufficient to conclude if the specific action, in this case, of Randall is a reoccurring and reproduced action, thus not a practice (Corradi et al., 2010). Nevertheless, the arena and structure of the formal forum of the site visit serves as a place for teams to meet, exchange ideas and shape meaning (Koch & Thuesen, 2013). The format of the site visit is influenced by the searching and involvement of the actors who participated. However, the strong dependency to search for knowledge is facilitated by the formal arena. That is, the area and situation in itself made it easier for the “searching” team and “involving” team to perform knowledge sharing between the projects. The actual knowledge sharing and the effects is very clear in the project E site visit example, indicating that the concrete output from these situations can be highly advantageous. Also, the knowledge underwent the process of translation and transformation when transcending the project boundaries. The wall solution and meeting procedure was adjusted to the team who adopted it (Carlile, 2004). Based on the positive attitude towards the site visit, the beneficial elements of social interaction and managerial support, an attempt of making site visits a recurrent exercise amongst project teams might be a valuable addition to the repertoire of practices for knowledge sharing.

The results showed that Sullivan plays a large part in the internal education events, the arena of the academy modules. These modules are a formal structure containing formal knowledge sharing practice at Partners Inc. which also can nurture the development of informal practices (Mueller, 2015). The formal educational element of the modules offers information which project teams and members can utilise in their project. The discussion forums at the academy module change the dynamics of the searching and involvement practice as they become redundant, to some extent, as the forum is guiding the interaction of the participants. I.e. that the forum favoured knowledge sharing and removed the need for individual searching. However, the academy modules also facilitate the development of personal connections and practices outside the academy forum. The encouragement of the normative practices presents also at the academy modules. Further, as shown in the empirical findings, site manager Steve developed a channel of communication to another project team member after an academy module. It highlights the already identified normative practices but also supports the findings of Mueller (2015), that formal practices help developing informal ones.

I argue that the brokers act on the normative practices and channel the organisational need of knowledge sharing between projects by participation and active encouragement of the same norms. The knowledge sharing actions of the brokers differ, their use of arenas varies and the managerial intervention differs in strength. However, all brokers facilitate that practices of searching and involving in the organisation, especially knowledge sharing between projects. Sullivan and Randall in particular use formal arenas and make use of formal structures while Mike and Roz rely, to further extent, on experience and informal arenas. Thus, combine and complements the normative approaches to KM (Alvesson & Kärreman, 2001). The brokers actions are present also on the database as the majority of the brokers are part of the top management, hence providing, information, templates and guidelines, drawing on the behavioural domain approach (Alvesson & Kärreman, 2001). Based on the finding, a substantial volume of the knowledge sharing between projects and project teams is directly or indirectly related to the brokers. Hence, the brokers are critical in the organisations knowledge sharing practices.

The meeting arena in general and the site management meeting in particular exhibit data suggesting that the social dynamics of the searching and involvement practices changes in these forums. The formal agenda and the meeting leader would guide the discussions and thus remove some of the need for participants to actively search and extract knowledge. The involvement practice is the dominant social norm in these situations, in contrary to the informal arenas. In meetings, the involvement becomes a formal practice. The site management meeting, which now is held at different project sites and the teams get to meet face to face, consist of a formal meeting agenda and the element of a site visit. As previously discussed, the site visit element has certain benefits and the formal setting can help facilitating the social norms. The site management meeting which was observed by the researches involved the project A and B team who frequently work in the same office and thus meet in a regular basis. The relationship between these team might be stronger then between teams in general but nevertheless, the meeting proved to be an arena where knowledge was shared beyond the formal agenda. The new format of the site management meetings, containing two positive elements, seems aligned with the social and cultural context at Partners Inc. and can provide the organisation with a more effective knowledge sharing between projects.

7.3 Searching and Involvement via the Database

The practice of searching is also highly visible when the interviewees talk about how they use the internal database and their relation to it. The most basic use of the database is as storage for digital data and work document. Nevertheless, the findings show that the database is frequently used as a source in the team members practice of searching, although in a more indirect fashion. The objectivist would argue for the tacit vs. explicit sides of knowledge and describe the database as a storage unit for explicit knowledge (Hislop, 2013). However, it would on the contrary be an inaccurate description when taking the practice-based perspective on knowledge. Certainly, the information on the database is explicit to some extent but in light of the fact that information found on the database is not very useful for direct implementation, a highly tacit dimension is needed. Information provided by individuals, via the database, is not separated from the individuals since the information in itself is redundant when not applied in

a specific context (Hislop, 2013). The translation and transformation of information is needed to utilise the knowledge (Carlile, 2004). Meaning, the searching individual finds information, but not knowledge. However, the subsequent actions of the searching individual, when acting on the information found on the database, is knowledge sharing in practice.

In relation to the model of knowledge management approaches by Alvesson and Kärreman (2001), the database would be a combination of “extended library” and “enacted blueprint”. The managerial intervention varies depending on the document but the overall domain remains behavioural. In the study by Mueller (2015), she presents the database as a formal managerial structure mostly aimed at information storage, to offer guidance through templates and project evaluation forms and reports. I argue that this is the primary function of the database also at Partners Inc. The formal practices in direct relation to the database is identified, for example when project member use checklists and other templates. Also, in line with the findings of Mueller (2015), informal practices have developed within the frame of the formal structure. The informal searching practice, in relation to the database, is identified as a central practice at Partners Inc. It is not categorised as a formal practice because it is a pattern of action and interaction that goes beyond the formal structure and the behavioural domain. The project team members main use of the database is of normative nature and closely tied to the knowledge searching practice.

What prevents the database from being a particularly effective platform for knowledge sharing is the un-balance between the informal searching practice and the informal practice of involvement on the database. As a majority of the interviewees state, they rarely upload document with the intent of sharing them with other teams. Thus, the involvement practice seems lacking in the database arena. The evaluation reports, which is not written due to low prioritising and no allocated time, is an effort to capture lessons learnt. Previous scholars highlight these procedures to be an important part of PKM as they serves as a boundary objects in knowledge sharing (see e.g. Boh, 2007; Koch & Thuesen, 2013; Ren et al., 2017). However, Partners Inc. do not complete these reports to the extent desired by related brokers and top management. The limited intention and awareness of the value in sharing documents for other teams to use, via the database, inhibit knowledge sharing to other teams. Also, in relation to organisational development, it is not fully utilised. Thus, servers as a barrier for effective KM (Kamara et al., 2002).

8 KM Initiative Proposals

Drawing on the KM approach model of Alvesson and Kärreman (2001), supported by KM literature and aligned with the organisational culture characteristics and its couplings with practice; two KM initiatives to further facilitate knowledge sharing practices between project teams are presented.

8.1 Highlight the Searching and Involvement Practices

As previously discussed in section 7.1 , the social norm of searching for knowledge lay the foundation for the predominant practices of searching and involvement. The practice of searching for knowledge is mainly informal and thus not explicitly directed by managerial intervention or formal structure. The informal practice is encouraged by the key individuals who are in a position of making strategic manoeuvres in the organisation but there is a lacking awareness of how the practices affect the organisation. The uncertain link between KM strategy and knowledge sharing practices pose a as barrier (Riege, 2005).

Kamara et al. (2002) argue that two of the key steps for effective KM is making an assessment of the organisations readiness for KM and emphasise the linkage between the KM strategy and business strategy. The readiness relates to the actual practices and its affinity to the culture as restrictors or enablers of KM. I argue that Partners Inc. has the beneficial and fundamental cultural enablers necessary to perform effective KM. The mutual trust and openness between the key individuals, management and project teams demonstrate the most important factors of a knowledge sharing culture (Mueller, 2015). Also, the partnering working method reinforced the advantageous aspects of a knowledge sharing culture. However, the statements in line with not having to “reinvent the wheel” mostly regards how to make the day to day work easier. The practice of searching is necessary for the employees in order to acquire knowledge, or even manage the work. Knowledge is rarely spontaneously offered or shared. This indicate that the linkage between business problems and knowledge sharing are not clear. For example, the dimension of sharing knowledge via the database to aid members of other project teams and support the organisational development and learning is missing. In making KM and knowledge sharing practices part of the formal agenda, as a talking point at meetings for example, the level of consciousness could rise and thus close the gap between KM strategy, business strategy and the knowledge sharing practices. Also, time dedicated for knowledge sharing, both within projects and across project boundaries, is limited. As argued by Mueller (2014), time dedicated to knowledge sharing activities has positive effects on the knowledge sharing practices between project teams. As shown in the empirical section, the urgency to move on to the next project and the lack of time to write the project evaluation reports, inhibit the project members to perform knowledge sharing. However, the important take away from Mueller’s study is that time in general does not assure the desirable outcome, the time needs to be dedicated to the process of knowledge sharing.

From an implementation perspective, emphasising the link between KM strategy, business motivation and knowledge sharing by making KM a part of the formal agenda, would mainly touch upon the “normative control” (Alvesson & Kärreman, 2001). Partners Inc. should keep the social focus and not downplay the importance of informal connections, in the KM initiative,

as the knowledge sharing practices of the organisation are socially constructed and highly culturally embedded. Thus, keeping the initiative aligned with the organisational conditions as it will increase the chance of successful implementation (Liebowitz & Megbolugbe, 2003). However, the stronger managerial intervention would provide the brokers and team members a formal mandate to put KM and knowledge sharing practices in the spot light. Hence, increase the awareness of their own action and facilitate the searching and involvement practices. It highlights the positive aspects of sharing intention, team and output orientation and strengthen the link between KM strategy and business strategy (Kamara et al., 2002; Mueller, 2014, 2015; Ren et al., 2017). To summarise, increase the awareness of the knowledge sharing practices and their link to organisational KM. Integrate with formal agenda, e.g. by making it a talking point in meetings, a part of project check-list and provide dedicated time for knowledge sharing activities between projects.

8.2 Develop Knowledge Brokers and Utilise Site Visits

Knowledge brokers is found to facilitate knowledge sharing and site visit, the academy and other formal structures enables and support the informal practices. However, as discussed in section 7.2, the brokers are directly or indirectly responsible for a substantial amount of the knowledge sharing between project teams. This dependency on the brokers is not limiting in itself but it poses as a risk for the organisation. For example, Mike is soon retiring and the organisation will have limited access to his experience and expertise. Hence, if the brokers would become inaccessible, the knowledge sharing between project teams could be reduced. A complimentary initiative, also a risk management initiative, is to develop more brokers in the organisation and utilise the positive social aspects of interactions from site visits and academy modules.

The outline of the initiative is to send team members to other projects and conduct a variant of a site visit and academy event. Firstly, the visiting team member(s) would perform the task with an aim, e.g. searching for a construction solution or meetings procedure, and then return to their own project team and report back. Thus, the visit has a purpose and the team member(s) who do the visit acts as a knowledge broker. The new brokers would perform the second mode of knowledge brokering, knowledge sharing between ongoing projects. The first mode of brokering, based on past experience, is not the current focus but could be enabled in due time when the role of broker is established. Secondly, the action of site visits could become a formal practice which could develop further informal practices among the project teams (Mueller, 2015). The aim is to facilitate the social interaction and knowledge sharing practices between the teams by removing the boundaries of geographical dispersion, unfamiliarity with other teams and decrease the dependency of the normative searching practice. It is important not to remove the opportunities of informal practices to develop by formalising excessively. However, the structure should encourage and facilitate the involvement practice. The initiative is still aligned with the social practices but serves as a tool to favour and make the actual output more effective. Thirdly, the aim of the visit should be highlighted, as discussed in the previous section 8.1. Time dedicated for knowledge sharing and acknowledgement of organisational benefits, has a positive influence on knowledge sharing. From a practical point of view, sending a whole project team might be inconvenient as a site visits takes time and resources. Sending

one or two team members at the time according to, e.g. a rotation schedule, would to make the initiative more practically manageable.

This initiative is based on the positive results indicated in the findings regarding the academy, site visits in general and the highlighted importance of the social context and interaction. All of which enable qualitative knowledge sharing between projects. In terms of managerial intervention, the level of interventions is relative strong and takes a normative control approach to KM (Alvesson & Kärreman, 2001). However, as the aim is to create more brokers and also facilitate informal practices, the creation of CoPs would be a plausible result as well. Through organisational control, informal creation of organisational opportunity and social network, mechanisms to initiate knowledge sharing connections could be created (Wanberg et al., 2017). Thus, integrating the community sharing of ideas approach.

Both initiatives stay within the normative domain as I argue that the cultural and social elements of knowledge sharing practices are prerequisites for effective KM at Partners Inc. Also, top management commitment is an enabler for KM implementation (Ajmal et al., 2010). As top management encourage informal practices and follow the normative practices, it raises the possibility of management support and in extension, successful implementation. There are several positive aspects and advocates for the techno-structural approach to KM which focus on IT and ICT solutions (see e.g. Ajmal et al., 2010; Dave & Koskela, 2009). However as pointed out by Hanisch et al. (2009), technical aspects are mainly considered as supporting factors and not a solution in itself. The fundamental aspect to adhere for successful KM is the organisational culture (Lindner & Wald, 2011). I argue that the practice perspective exposes the underlying social dynamics and cultural aspects, demonstrated by the practices and actions of the organisational members, critical for successful KM at Partners Inc. That is why the proposals of KM initiatives largely draws upon these findings. IT systems and ICT could be helpful and improve the knowledge sharing between project teams as the technology enables communication and remove some of the knowledge sharing barriers. However, technological solutions to KM and knowledge sharing was not the main focus of this study but poses as an interesting extension and possible further development of the initiatives. Nevertheless, the core of the initiatives should be based on the actual knowledge sharing practices and focus on improving these practices.

9 Conclusion

This thesis depicts the findings of an exploratory construction case study on KM in practice. The industry and research community are giving KM increased attention and its relevance in the contemporary business arena is recognised. KM in project-based industries, as the construction industry, face the challenge of adapting to constantly changing environments, fragmentation due to discontinued project teams and unique projects. Knowledge sharing between projects and project teams is found to be highly relevant in PBOs. This qualitative case study takes a practice perspective on knowledge sharing between projects. Identifying practices concerning knowledge sharing and underlying social dynamics affecting these practices.

At Partners Inc. the preferred way of performing knowledge sharing, both within a project and across project boundaries, was found to be through direct contact. Knowledge sharing was supported by two normative practices, *searching* and *involvement*. These two practices were found to be highly co-dependent and facilitated by social interactions and the organisational culture. Four key knowledge brokers, who were directly or indirectly involved in a substantial part of the knowledge sharing at Partners Inc., were identified and their use of different arenas was analysed and discussed. Several of the formal structures were found to facilitate the two normative practices and enable the development of informal sharing practices.

Based on the findings of this study, two proposals of KM initiatives for Partners Inc. are presented:

- I. Increase the awareness of how and why the knowledge sharing practices affect the organisation by making it a formal part of the agenda. Hence, facilitating the searching and involvement practices.
- II. Develop more knowledge brokers by arranging cross-project site visits to other project teams. By doing so, it is possible to utilise the social interactions during the visits and possible development of brokers.

The findings of this study are highly related to the specific situation and context of Partners Inc. and might thus be difficult to conceptualise and apply in other organisations and industries. It is possible that more knowledge brokers were present in the organisation but not identified in this study, possibly due to limited time for data collection. However, this study contributes to present research by taking a practice perspective on KM in general and knowledge sharing between projects in particular; areas of research which has attracted limited attention by previous researchers. Although only one organisation was studied, the findings provide future researchers with the basis for conducting similar studies at other organisations and in other industries. For example, it would be interesting to see if a construction company of a larger size exhibit the same knowledge sharing practices and reliance on knowledge brokers.

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Appendix

A general schedule of interview questions. Should be adapted to the interviewee.

The first questions are regarding you, who you are etc. Followed by questions regarding your work and your experience from Partners Inc.

General information questions:

What is your position at Partners Inc.?

Which department or project are you currently working at?

How long have you been employed at Partners Inc.?

What is your (professional and educational) background?

Which persons do you work with?

Individually or in a team?

What are your task/assignment/function at the company?

Could you describe a “normal” working day?

Questions regarding the KM at Partners Inc. The questions are more aimed toward your role in the company and the KM related work.

How do you perceive and what does “knowledge” mean to you?

What do your association with the term “knowledge management”?

What is your course of action when facing a problem/issue to which you do not possess the necessary knowledge to solve?

Who do you turn to?

How do you find out who to turn to?

Do you get help from both internal (at Partners Ink.) and external (consultant etc.) actors?

Is there something that could be helpful in this situation?

Do you use any IT or technical support/tools?

In which setting do you perceive it easiest to absorb and comprehend information?

(if needed, give example: meetings, personal conversation, reading documents)

How do you share information to others? Knowledge you think could benefit others?

Can you give us an example?

Do you consider there to be sufficient support/tools available to find information? (E.g. the handbook, check-lists and templates)

Do you use these tools?

How do you use them?

Is there any support/tools you feel is lacking?

Do you use the database?

How do you use it?

Do you consider the database to be a platform for knowledge sharing?

Good/Bad how?

Are there any difficulties finding what you are looking for on the database?

How do you perceive the environment at Partners Inc.?

Are you encouraged to share your knowledge and experience?

How are you encouraged to share/transfer knowledge?

Are there any situations where you (or someone else) feel you need to hold back and don't express your thoughts?

If yes, can you provide an example?

Why is that, do you think?

Have you participated in any of the academy modules? Describe

Have you gained useful information/insights/relations at the modules?

Examples?

Is there anything you want to change regarding the modules?

Should something be done differently?

How do you perceive that Partners Inc. work with knowledge sharing? In general

Do you share knowledge between projects? If yes, describe how.

Do you perceive it difficult to know what is going on in other projects?

What are your thoughts on how to improve the knowledge sharing at Partners Inc.?

In particular knowledge sharing between projects?

Is there anything else you want to share with us or feel that we have overlooked in this interview?