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Unravelling the Complexities of Knowledge

A qualitative study on how knowledge is managed and shared in
knowledge-intensive organizations

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Abstract

This paper aims to investigate the knowledge sharing and management practices of knowledge-intensive organizations. The research was done through the form of a qualitative case study, examining two Swedish research institutes and conducting 18 interviews with employees and managers at both organizations. Additional data was collected through observations at one of the organizations and internal documentation from both organizations. The findings indicate that knowledge sharing within the organizations takes place through informal means and that the value of knowledge within both organizations is derived from the successful sharing of knowledge. The existence of a strong community of practice (CoP) was also identified at one of the organizations where it was passively nurtured by management, but not in the other organization which displayed more formalized attempts at CoP-creation. Finally, identity was identified as a factor playing an important role within both organizations, as well as an important factor for the success of the CoP at one organization. This paper argues that CoPs play an important role in successful knowledge sharing within knowledge-intensive organizations, and that CoPs can be strengthened by proper managerial nurturing and a strong shared organization and professional identity. This study contributes new insights into the field of knowledge management within the unique and seldom studied context of research institutes.

Keywords

Knowledge-Intensive Organizations, Research Institutes, Knowledge Management, Knowledge Sharing, Communities of Practice, Identity, Knowledge-In-Practice

Introduction

Throughout the last few decades, societal, industrial and technological advancements have fundamentally changed many different aspects of our society. These changes mean that many industrialized countries have developed into “knowledge societies”, where knowledge is viewed as the primary source of economic power. (Campbell et al., 2012, Drucker, 1999A). As a result of this, it is widely accepted that many organizations operating in these societies are highly dependent on knowledge as a means to secure their long-term success (Grant, 1996). These organizations are often referred to as knowledge-intensive firms or knowledge-intensive organizations, which can

be defined as organizations that offer the market sophisticated knowledge or knowledge-based products, and generally employ individuals with academic education (Alvesson, 2004). Knowledge-intensive organizations which make use of sophisticated knowledge are often considered to be highly reliant on human capital and highly skilled individuals, so called knowledge workers, which are commonly considered to be the true source of knowledge (Kaufmann & Runco, 2009; Drucker 1999B). As such, knowledge management and the management of knowledge workers are often presented as essential practices for knowledge-intensive organizations in order to succeed (Rechberg & Syed, 2014). It is important to recognize that the use of knowledge as a concept introduces several difficulties. While some scholars approach the topic from a more resource based perspective, viewing knowledge as a tacit thing possessed by individuals (Nonaka & Takeuchi, 1995) and as a resource to be exploited (Boxall & Purcell, 2011), others have noted that this approach to knowledge is an oversimplification, ignoring the role aspects such as context and social practices of interaction play in all knowledge. (Fahey & Prusak, 1998; Nicolini, 2011; Orlikowski, 2002). Recognizing the complexities of knowledge also raises the question about the validity of the concept of knowledge management. As discussed by Alvesson & Kärreman (2001), if knowledge is truly an ambiguous and dynamic phenomenon, how can it then be meaningfully managed? One line of thinking within the field of knowledge management focuses particularly on the social and interactive aspects of knowledge. By this interpretation of the value of knowledge, especially in knowledge-intensive organizations, value does not come from the exploitation of knowledge as a resource, but rather from the successful sharing of knowledge within the organization (Styhre, 2002). Based on this view on knowledge, the role of management in managing knowledge might be viewed as less direct, serving to facilitate the knowledge sharing between individuals and reducing knowledge “stickiness” (Sanchez et al., 2013; Szulanski, 1996). Another specific area within knowledge management often highlighted by current research is the communities of practice-perspective, where knowledge sharing and learning is viewed as taking place informally and socially within communities of practitioners (Bolisani & Scarso, 2014). As will be discussed later in this paper, this concept is somewhat fragmented and there is a clear lack of consensus within the literature as to what role management can play in creating or facilitating these communities.

The aim of this study is to examine the way knowledge is understood, shared and managed within knowledge-intensive organizations. In order to achieve this and to provide a theoretical contribution to the field, the context of a research institute has been selected. Research institutes are an interesting form of organization to study due to their unique nature as being situated somewhere in between the commercial industry and academia, often collaborating with both. This paper studies and compares the similarities and differences between two different research institutes, anonymized as “SciTech” and “BIGSCI” in this study. SciTech is a comparatively small and highly successful organization specialized in applied industrial mathematics and software development. Meanwhile BIGSCI is a much larger organization, active in many different and diverse scientific fields and areas. However, for this study, a specific department at BIGSCI has been chosen as the unit of study, which comparable in size compared to SciTech. Both case

organizations chosen for this study are active in highly technical fields, are reliant on skilled individuals and are engaged in cutting edge research projects.

While there exists some research within the context of research institutes and research centers, these articles often focus on university-industry collaboration (eg. Lind, Styhre & Aaboen, 2013; Philbin, 2008). Others have studied the knowledge sharing of high performing research groups (Degn et al., 2018) but primarily in a university setting. As such, research institutes remain relatively unexplored as a setting of study within the knowledge management literature. Answering the call for more studies on how knowledge management and sharing takes places in practice within different contexts (Bolisani & Scarso, 2014), the purpose of this study is to answer these questions through the qualitative case study of two Swedish research institutes. In order to achieve this, the following research question has been formulated:

RQ: How is knowledge managed and shared within knowledge-intensive organizations?

This paper begins by providing an overview of theoretical concepts and approaches that are present in academia and which are relevant for answering the research question. This includes an overview of previous research including different understandings of what knowledge is and how it is understood. Next, the theoretical framework introduces the concept of communities of practice and the role they play in managing knowledge, as well as the concept of identity and its importance for communities of practice and knowledge-intensive organizations. Afterwards, the methodology of the study is presented and discussed. Next, the case organizations are presented in greater detail, and the findings of this study are presented based on the relevant observed themes. The findings are then analyzed and discussed in terms of the observed knowledge management practices within the case organizations. Finally, conclusions are drawn based on the aforementioned analysis and the implications of the findings are discussed as well as recommendations for future research.

Previous research

Knowledge-intensive organizations

Throughout society, there exists many different kinds of organizations and companies which operate based on different structures, strategies and goals. One type of organization discussed in Starbuck's (1992) seminal article and that have become increasingly important concerns what is called Knowledge-Intensive Firms (KIF), henceforth referred to as knowledge-intensive organizations. These are organizations which are characterized by their use of esoteric and rare knowledge as a central resource which in turn enable them to gain competitive advantages and favorably compete in the marketplace (ibid.). Another way to explain knowledge-intensive organizations is that they are organizations that offer to the market the use of sophisticated knowledge or knowledge-based products, for example professional service firms or R&D companies (Alvesson, 2004). There is a tendency for knowledge-intensive organizations to value formal education and to employ individuals with an academic background and relevant experience. This is also commonly reflected in the salaries of knowledge-intensive organizations, and the

expression of “gold collar workers” is sometimes used in relation to the type of organization (ibid.). It is often argued that this form of organization has become more influential and viable as our world has become increasingly interconnected and the degree of servitization and the prevalence of service-based organizations has increased (Alvesson, 2004).

As previously mentioned, knowledge-intensive organizations are generally classified as being highly reliant on people and their unique competencies as well as knowledge as a source for success. More than this, for an organization operating within the business to business space, people can also contribute with more than just their own competence, namely things such as a professional peer network, their reputation and existing relationships with new and existing business clients (Løwendahl, 1997). Several academic scholars point out that many knowledge-intensive organizations face significant challenges as a result of their dependence on their key employees and their unique and attractive competences, and that many often struggle to retain their personnel (Alvesson, 2004; Davenport & Prusak, 1998). Some of these challenges stem from the fact that competent knowledge workers (a term popularized by Peter Drucker) are generally in a strong bargaining position and are in possession of the primary means of production for the organization (Drucker, 1999B). This in turn results in unique HR-related challenges for the successful management of knowledge workers, where some argue that fostering a sense of loyalty and commitment between the employee and the firm is essential for successful retention (Løwendahl, 1997). As discussed by Alvesson (2000), this means that knowledge-intensive companies and organizations are more highly reliant on the loyalty of its employees for their continued success compared to other types of organizations. One proposed way in which this loyalty can be developed and ensured relates to the concept of social and professional identity and working proactively to ensure the creation of the self-identified interests and individual identities that align with those of co-workers and that of the organization itself (ibid.). Additionally, knowledge workers often present different managerial challenges compared to other types of workers, stemming from the fact that they are often considered as being more motivated and driven by a genuine intrinsic interest for their work. (Deetz, 1995). As a result, while knowledge workers may be easy to manage in the sense that they are self-sufficient and independent in their work, it also presents different challenges, such as issues relating to potential boredom or attitudes that must be considered and counteracted by management (Massaro, 2012).

What is meant by knowledge and can it be managed?

In order to meaningfully discuss the concepts of knowledge and knowledge management, we must first spend some time on presenting and discussing some of the different theoretical approaches as to what the word knowledge actually means, as well as how it can be understood in relation to organizations. One of the most prevalent approaches within academia as originally introduced by Polanyi (1958) and later elaborated on by Collins (1993) among many others divides knowledge into “tacit” knowledge and “explicit” knowledge. Explicit knowledge is generally defined as that which is easily expressed, while tacit knowledge is that which escapes measurement and easy representation, while still playing an important role in the expression of knowledge. Explicit

knowledge often takes the form of pure data or information and is more easily shared, while tacit knowledge is embedded within the individual, and while often of greater value is more difficult to share (Rechberg & Syed, 2014; Collins, 1993). Utilizing this approach, the failure of organizations to recognize the different types of knowledge and more specifically the importance and unique challenges of handling tacit knowledge is often regarded as one of the major difficulties organizations face in managing knowledge (Fahey & Prusak, 1998).

However, before continuing, it is necessary to critically examine the concepts and clear division often presented of tacit and explicit knowledge in the literature. Drawing on the process-philosophy of Henri Bergson, which deals with the fluid and continuously changing process of becoming, Styhre (2004) critiques the concept of tacit knowledge as it is often represented and expressed in academia. The tacit component of knowledge is often viewed as a residual category, an umbrella term for representing that which cannot be expressed or captured. This way of thinking fails to capture the complexities of knowledge and the role the individual and their unique interpretative and expressive abilities play in all knowledge, as well as the fact that tacit and explicit knowledge are not separate categories, but rather must be viewed as interrelated (*ibid.*). All knowledge expressions share elements of both explicit and tacit dimensions (Tsoukas, 1996), and must be viewed through the lens of the expression, language and processes of the individual. As such, the common literary use of tacit knowledge often serves to mystify rather than to clarify the nature of knowledge, and as such must be viewed critically in order to better understand the value knowledge brings and how it can be managed (Styhre, 2004).

Traditionally, the knowledge utilized in organizations has often been understood through an objectivistic lens as something with an inherent tangible quality, something that is able to be quantized and made explicit to then be stored, transferred and used within the organization as a resource, commonly referred to as the resource-based view (Nonaka, 1994). Building on this perspective, knowledge is often viewed as a central constitutive element of many modern organizations, not least regarding knowledge-intensive organizations. However, this somewhat narrow-minded view on knowledge and its properties has been criticized and discussed by a large number of researchers and academics (Grant, 1996; Nonaka & Takeushi, 1995). Instead, it is beneficial to recognize the fact that knowledge does not exist in a vacuum, but rather it is situated in a complex network between interdependent individuals and processes (Lave & Wenger, 1991). As such, knowledge as we understand it is highly dependent on the understanding of the individual, and new knowledge is created in much the same way (*ibid.*). These studies paved the way for a new approach to knowledge, sometimes referred to as the situated view or knowledge-in-practice, emphasizing the importance social practices and processes plays in all knowledge (Nicolini, 2011; Orlikowski, 2002). One study specifically on a knowledge-intensive organization highlights this fact, and concludes that the value knowledge offers within these types of organizations is not derived from the exploitation of knowledge as a resource, but rather from the value that can be gained by the successful sharing of the information across project teams, communities of practice and individuals (Styhre, 2002). In addition, research has also highlighted the fact that knowledge processes are driven by individuals, and thus their roles are inescapably intertwined (Jennex,

2008). Certain scholars, drawing on the concepts of knowledge-in-practice, consider tacit knowledge as inseparable from the practice of the individual since it is constituted through doing, thereby viewing all knowledge to be part of a “social accomplishment” (Orlikowski, 2002).

Given the fact that knowledge is such a complex concept, it is interesting to consider how it could be managed. Drawing on the traditional classification of tacit and explicit knowledge, Rechberg and Syed (2014) presents four different knowledge management processes and practices which are commonly discussed in the literature. These being IT-systems, organizational structures and culture, communities of practice and HR-functions. These different processes are generally considered to be suited to different types of knowledge, however, as discussed by the authors, this approach to knowledge management approaches the topic from a simplified perspective on knowledge, and while many organizations engage in these different KM practices, they also often fail to adequately acknowledge the role the individual plays in these different practices, limiting their effectiveness (*ibid.*). Furthermore, studies have shown that organizations often place too much emphasis on formalized KM systems (such as IT-systems), the success of which are often limited, in no small part due to the organization’s failure in taking the individual employee’s views and opinions into consideration (Diedrich, 2004). Finally, several studies have shown that organizations often fail to recognize the importance of context and the type of knowledge being used, which is vital in order to ensure the correct use and effectiveness of KM efforts (McIver et al., 2013; Zack, 1999). For example, in a context where knowledge is complex, difficult to learn and personal, overly formalized attempts at managing or codifying knowledge is often ineffective (McIver et al. 2013). While much of the earlier research on knowledge management emphasized formal and technological solutions for knowledge sharing, more recent research has highlighted the role communities of practice, where it has been established as a key element for organizational knowledge management (Murillo, 2011).

Theoretical framework

Communities of Practice

One of the primary concepts which has been highly influential within both the academic and organizational spheres of knowledge management is the concept of Communities of Practice, from here on out referred to as CoP (Bolisani & Scarso, 2014). It is often highlighted by knowledge management scholars as one of the more effective means of knowledge sharing, especially within knowledge-intensive organizations (*ibid.*). While some later studies have also popularized the concept of online and virtual communities of practice (Murillo, 2011), this was not observed at the organizations and is thus not a focus of this paper. The concept of CoPs was initially introduced by Lave and Wenger (1991) as a broader part of a framework on the social dimensions of learning, but has since seen significant evolution and redefinition, often by Wenger himself. The original definition defines a CoP as a collection of individuals connected through their shared practices, and was primarily interested in how learning takes place between individuals based on the shared understandings of the meaning of their practices and the process by which newcomers are able to join a new professional setting and community by legitimate peripheral participation. (Lave &

Wenger, 1991). The concept of a community of professionals connected by a shared practice was also discussed by Orr (1996) in his seminal study on Xerox repair technicians who were observed as being part of a larger community transcending organizations, connected by shared goals, identities and stories. This study, along with numerous others highlight the importance of social interaction, collective knowledge and stories for solving problems that arise (Orr, 1996; Brown & Duguid, 1991). In a later book, Wenger (1998) further developed the concept by expanding on the ideas of the individual's socialization, learning and identity development, and described CoP as an entity consisting of the social dimensions of *mutual engagement*, *joint enterprise* and *shared repertoire* (Li et al., 2009). Up until this point, CoPs were widely regarded as something organic that arose naturally through bottom-up processes provided the existence of the previously discussed prerequisites. However, a 2002 book on the cultivation of CoPs once again advanced the concept, now viewing and advocating CoPs as something that could be knowingly cultivated by organizations (especially those managing knowledge workers) in order to enhance their competitiveness (Wenger, Mcdermott & Snyder, 2002). The definition of what constitutes a CoP was once again reformulated into “*groups of people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis*” (Wenger, Mcdermott & Snyder, 2002 p.5). The previously defined three characteristics were also revised to become more usable as management tools, namely the *domain* (the area of knowledge that brings the community together), *community* (the group and relationships among the people for whom the domain is relevant) and *practice* (the knowledge, methods, stories and tools that members share and develop) (Li et al., 2009; Bolisani & Scarso, 2014). Finally, the 2002 book also emphasizes the roles of leaders and facilitators in the CoP, and the roles these (often senior) individuals play in the formation and continued existence of these CoPs. (Li et al., 2009). Studies have shown that organizations which exhibit strong communities of practice were found to also exhibit improved performance as opposed to those who did not (Schenkel & Teigland, 2008). There have also been studies directed at examining more exactly how CoPs create organizational value. Lesser and Storck (2001) identifies different areas of organizational performance which can be improved by the existence of CoPs, such as decreased learning curve of new employees, quicker and higher adaptability to customer needs, less risk of unnecessary rework and increased innovation and creation of new ideas. The ways in which the authors propose how management can help the creation of CoPs is mainly through facilitating the creation of social capital among the employees. More specifically, they argue that this can be done through connecting employees that share a practice, facilitating and fostering relationships between employees in order to build a sense of trust and mutual obligation as well as developing a common language, context and identity which is shared among the community members (ibid.).

Brown and Duguid (2001) approaches the concept of knowledge “stickiness” (referring to knowledge not properly disseminating) in organizations by utilizing CoP as a way for understanding knowledge in the firm. In this article, they posit that too much focus is often placed on community and not enough on practice. They argue that differences between the internal communities of the organization invariably creates epistemic differences, and that it is the

successful coordination of this differing knowledge that enables firms to gain an advantage. These internal communal divisions are often viewed as a primary source of stickiness, however, coordinating a firm around knowledge and practice can help uncover its innovative potential (ibid.) Drawing on this increased focus on the practice-aspects rather than on the community-aspects of CoPs (echoing a more nuanced and social view of knowledge and learning), Gherardi (2006) elaborates on the phenomenon of knowing-in-practice and situated learning. Rather than viewing the community as something concrete, it is viewed as something that is being “performed” into being by the practice that unites it. Viewed in this way, CoPs are not a social object but rather a fluid social process, the existence of which is constructed within the gaze of the observer. By this line of reasoning, attempts of management to clearly define and reify CoPs within the organization are problematic, due to the continuous and fluid nature of communities. It is not the community that dictates practice, but rather the process of doing and its interconnected complexities which dictates social interaction. Furthermore, the study also highlights the interactions between several different CoPs within an organization, separating it from a lot of studies on CoPs which often focus on a single CoP and broadening the understanding of how different CoPs interact (ibid.).

There exists no clear consensus within the academic literature about what role management can play in the successful creation of a community of practice within the organization. Certain scholars, like Ward (2000) highlight the voluntary nature of communities, meaning that managerial efforts to directly control or command them are ineffective and that they rather must be passively nurtured. DeLong and Fahey (2000) instead offers a broader approach, highlighting the importance of creating a strong organizational culture that encourages knowledge sharing. Others meanwhile advocate a more active role on the part of management, offering clear principles to help guide the formation of said communities, for example through the facilitation of the creation of social capital within the organization (Lesser & Storck, 2001; Wenger, McDermott & Snyder, 2002). Certain scholars also argue for the formal definition of CoPs within organizations (Schenkel & Teigland, 2008) and others advocate the straight-out structured creation of “strategic CoPs” to help organizations (McDermott & Archibald, 2010). Despite this lack of consensus, the most prevailing view within the field of CoP is that while communities cannot be forcibly created or controlled, management has an important role in facilitating their existence and continued growth and prosperity (Bolisani & Scarso, 2014). Some scholars argue that the continuously changing definitions of CoP makes it a difficult concept to apply, and that one of the primary reasons for this is that there exists a significant tension between satisfying individual’s needs and at the same time acting in accordance with the organization’s bottom line (Li et al., 2009). Despite this and the aforementioned lack of consensus on the definitions of CoPs, the prevailing view among KM scholars is that CoPs serves an important role as a vital KM tool (Bolisani & Scarso, 2014).

The role of identity in Communities of Practices

Ever since the concept of CoPs were initially introduced in the early 1990s, identity and identity creation has played an important role within many different aspects of the scientific CoP-literature (Murillo, 2011). Many subsequent studies regarding the role of identity have drawn on the original

framework by Lave and Wenger (1991) which, as previously discussed, dealt with how professional identities are learned and created through the individual's introduction into a new CoP, as well as the concept of legitimate peripheral participation which details how new employees go from being peripheral apprentices to a full members (or masters) of a community. This early research argues that learning and identity are both social processes and are inescapably intertwined (ibid.). In his 1998 book, Wenger elaborates and expands on the concept of identity and its relevance for CoPs, as well as the concept of master-apprenticeship. Wenger (1998) argues that within CoPs, its members continuously communicate and negotiate meanings and understandings, which in turn serves as the basis for all learning as well as identity construction. As such, achieving mastery does not simply entail an individual becoming proficient within a subject, but also becoming confident in their professional role and their membership within the community (ibid.). As a result, all learning within CoPs is not just an accumulation of knowledge or skills, but rather a process of becoming that is grounded in an identity of belonging (which itself is continuously evolving). In order to better understand and formulate how identity is constructed within the context of a CoP, Wenger (1998) introduces three different modes of belonging, these being *engagement*, *imagination* and *alignment*. Engagement refers to the ongoing negotiation and discussion of meaning between participants of the community, and the ways in which new members transition into full membership. Imagination refers to the ability of individuals to see themselves as members of the community, both in the current as well as in the future. Finally, alignment refers to the way in which the identity of the individual is aligned with that of their professional role, as well as the larger context of their workplace. Here, it is essential that individuals are able to develop a confidence in their own roles and see themselves as valuable members of the community, as well as feeling that their own roles and identities align with those of the other members of the community and their professional peers (ibid.). While these initial studies on identity construction and its importance for CoPs primarily focuses on the individual's perspective, later studies have also taken a somewhat broader approach and examined how this relates to management. One example of this is Handley et al. (2007) who highlights the role organizations can play in the identity-construction of new employees. In their ethnographic study they were able to demonstrate how the regulatory activities of senior managers at a consultancy firm played an important role in the self-perceived identities of new employees. While the new employees were initially given unrewarding and menial tasks, it was not until they were given more freedom to play a more active role that their professional identities began to flourish and their understanding of what it meant to think and act like a consultant grew. As such, their study indicates that management has the potential to facilitate the creation of a strong identity through the orchestration of possibilities for legitimate participation (ibid.).

Identity also plays an important role in the definition of boundaries of different CoPs. Since many professional individuals view themselves as members of a specific community as a result of their particular profession and individual identities, this professional identity often serves as a natural boundary for that particular CoP (Bolisani & Scarso, 2014). Put another way, individuals are naturally attracted to communities that consist of individuals that share similar identities, goals

and values (Wenger, 1998). While not specifically related to CoPs, Czarniawska (2008) expands on the academic research on identity and image construction by introducing the concept of *alterity* and its interplay with identity. While identity can be defined as the characteristics determining how a person views themselves, alterity can be defined as the state of being different, the otherness of others. (ibid.). As identity is formed and constructed through discourse, alterity also grows in tandem as the individual gains a firmer understanding of both “who they are” and “who they are not” and the final understanding of the identity should be seen as an interplay between these two factors. (ibid.). Identity and alterity are not only specific to the individual, but are also analogously transferred and extended by Czarniawska (2008) to entail legal persons and entities (organizations). An example of this is how organizations attempt to communicate an image to convince employees and other actors how much they have in common, while at the same time attempting to convince the same individuals how they differ from competitors (ibid.). The article goes on to examine several different case studies of organizations and concludes that the organizations differ significantly in how they promote themselves in terms of identity and alterity. While a balance of the two appears to be the most successful combination, allowing the possibilities within the identity/alterity-circle to be fully exploited, it is essential that the communicated image of the organization is closely linked to the organizational strategy (ibid.). While studies on identity are prevalent, studies on alterity are rare in academia, despite representing an equally important aspect of the same phenomenon.

Methodology

Research design

Based on the research question and the type of data that needed to be collected and studied in order to best answer it, the choice was made to adopt a qualitative approach for this study. In his book, Silverman (2013) discusses at length the different advantages and limitations of qualitative studies. One of the primary strengths of qualitative research is that it is well suited to studying social interactions as well as understanding processes (ibid.). For these reasons, the qualitative approach is very well suited since it enables us to study these processes as well as allowing us to gain a more in-depth understanding of how people think and make sense of different situations. As Silverman (2013) puts it, qualitative research is best at answering “what” and “how” questions that require a deeper underlying understanding of the context being studied. It is also worth noting that qualitative research can involve many different approaches to data collection. In order to capture both the process perspective and the perspective of the individual, this study has used both interviews as well as observations, thereby capturing both how people think, feel and experience things as well as how they act in practice. As qualitative studies often are, this study has been inductive in its nature, meaning that the findings have guided the research and the choice of the theoretical framework used as an analytical lens.

This qualitative case study examines the relevance and implications of knowledge management with regards to two Swedish research institutes. Case studies as a research form come with their own set of possibilities and challenges, which have been extensively discussed

by Flyvbjerg (2006). While case studies are maligned by some, they are an important method of research that can provide a degree of depth, nuance and context which cannot be matched by other forms of research (ibid). Flyvbjerg (2006) argues that since context is an inescapable and important factor of all research, performing a study in a specific context (and acknowledging and understanding that context) enables us to gain a highly sophisticated understanding of the situation and thus enabling the creation of knowledge and understanding which can then be applied even beyond the specific context. This connection between context and knowledge is essential for human learning (ibid.). While case studies have traditionally been accused of lacking in generalizability and therefore value, Flyvbjerg (2006) argues against this for two reasons. First, a hypothesis such as “all swans are white” can easily be disproven (and generalized) by the observation of a black swan, even if this observation takes place within the context of a case study. Second, by doing research that provides a rich and detailed description of the context the case is situated in (a case narrative), this context can then be considered by readers. This can give the reader a sensitivity for the issues being explored that is not possible by other means (ibid.). What this means for the case study done at the case organizations is that the importance of context and creating a clear case narrative for the reader must not be disregarded and it is something that has been present and kept in mind throughout the data collection and writing process.

A limitation of this study is the ratio of interviews to observations. Ideally, the study would include more observations and ethnographic elements, however this was not possible due to the coronavirus. A more in-depth ethnographic approach to better understand the processes involved would be a suitable approach for future research.

Data collection

In order to answer the research question, both first- and second-hand data has been collected in order to create a rich dataset to work from. First-hand data has served as the primary data source and has been collected through the use of interviews at both as well as observations at one of the organizations. Additionally, second-hand data has been collected from both organizations and includes (but is not limited to) internal documentation, online material, internal policies and recruitment ads. In total, 18 interviews were performed for this study, nine from each organization interviewing both researchers and managers. Each of the interviews varied between approximately 50 to 120 minutes in duration. Due to the outbreak of the coronavirus and its subsequent effect on the organizations serving as the case study subjects, most of the interviews have been conducted at a distance through phone or other online communication tools out of necessity. Many of these interviews were conducted with video enabled, in order to simulate a face-to-face conversation and to more accurately gauge the reactions of the interviewee. It is important to recognize that power dynamics (and asymmetries), plays an important role in all human interactions, not least when doing interviews (Kvale, 2006). Kvale (2006) argues that it is misleading to refer to an interview as a dialogue, this due to the fact that the interviewer has a hierarchical upper hand in terms of power, both ruling the interview and possessing a monopoly on the interpretation of what is said. For these reasons, efforts have been taken to minimize the power asymmetries present

throughout the process. For example, since many of the interviews have been held at a distance, the interviewees were able to participate from the comfort of their own home, greatly reducing the risk of a perceived power asymmetry due to the location the interview was held. Additionally, whenever uncertainty arose as to what the interviewee meant, the interviewee was asked to clarify any uncertainty, which is another way this power asymmetry can be decreased (ibid.). It is important to recognize that this power asymmetry exists and to act accordingly, not least with regards to the ethical considerations one must take when doing research. Some more elaboration on the ethical considerations taken will be covered shortly. The interviews that have been held have been semi-structured in nature, which means that while some initial questions might be standardized, the researcher is free to explore, improvise and ask new questions based on the direction of the interview (Bryman, 2008). This approach was chosen because it enables the researcher to gain valuable in-depth insights and connections between different topics that might otherwise have been very difficult to reach through superficial questions (ibid.). If a person is not comfortable talking in a non-native tongue, this might present a hindrance to the collection of relevant data (Bryman & Bell, 2015). For this reason, the interviews have been conducted in Swedish and have been later translated by the researcher. Special care has been taken in the translation of quotes to ensure that the perceived spirit of the original statement was retained. In order to reliably collect the large amount of data gathered during interviews, they have been recorded by the researcher with the active consent of the person being interviewed (Silverman, 2013). Additionally, notes have been taken to help the researcher remember interesting wordings, concepts or points made by the interviewee which were then used when referring back to the audio recording to transcribe relevant data after the interview process is finished.

Finally, as mentioned, observations were also performed at one of the case organizations, SciTech. Since the study in part deals with the practices, processes and social interactions of individuals, it is important to actually observe the processes and interactions taking place, due to the fact that there sometimes is a clear disconnect between what people think they do as opposed to what they actually do (Silverman, 2013). While the possibility of doing more in-depth ethnographically inspired observations was greatly limited by the outbreak of the coronavirus, the ones that were able to be performed gave valuable insights into the knowledge sharing processes and social nature of work at the organization.

Data analysis

Once the data from the interviews and observation was collected, transcribed and organized, it was then analyzed. There are several different ways to analyze data, but for this study the choice was made to use a grounded theory approach to data analysis. Grounded theory is an inductive approach which is particularly well suited to qualitative studies and enables the researchers to build and create conceptual theories which are fully based on the available data (Martin & Turner, 1986). One of the primary reasons for this is that the approach does not ignore or simplify the complexities of the organizational context, but rather incorporates them into the analysis. It instead encourages and enables the researcher to approach the research subject with an open mind

and without preconceived notions and to follow a concrete outline of data collection, coding and theory building (ibid.) This means that grounded theory is well suited to analyze the data that will be collected in this study, since it captures the complexities of the organizational context when studying the processes and social aspects of knowledge management and sharing practices. Additionally, another positive attribute of the approach is that it does not matter if the data is collected through interviews or observations, the data can still be analyzed using grounded theory (Corbin & Strauss, 1990). The authors also highlight the fact that data collection and analysis are interrelated processes, meaning that the data collection procedures (such as the interviews) are continuously adapted based on the previously collected data, thereby improving the methods used throughout the data collection (ibid.). This stands true for this study, where the collected data has continuously guided and shifted the scope of the study. Utilizing this approach, the data collection has become increasingly efficient throughout the process, resulting in a richer and higher quality final dataset for analysis. The transcribed data has then been analyzed and grouped into different concepts, an approach which is called coding. These concepts and ideas represent the basic building blocks, or the basic conceptualizations of the raw data (Corbin & Strauss, 1990). Based on these concepts and the frequency with which they appear throughout the data set (among other factors), different categories have been formed and developed. These categories are not just a collection of interrelated concepts but have instead been developed further by the researcher, in order to properly signify the phenomenon they represent (ibid.). It is also important to note that this process of comparison between categories and concepts is an intentionally nonlinear and iterative process (Martin & Turner, 1986). Using the properly coded data and concepts that have been transformed into saturated and relevant categories, this has then guided the choice of theoretical approach and themes of analysis within this study.

Ethical considerations and data reliability

When conducting research that involves other people, it is essential to keep ethical considerations in mind in order to insure a high ethical standard for the study. Silverman (2013) introduces several key things to keep in mind when doing research as well as why it is important that the research reaches a high ethical standard. I will quickly cover some of these points here and which steps have been taken during the study to ensure this high ethical standard. When doing interviews or observations, all participating individuals have been informed of the purpose of the research study and have been asked to actively consent to participate (Silverman, 2013). It has also been made clear that consent can be retracted at any time, whereupon the data will not be included in the final report. Participants have also been allowed to review the data they supplied prior to publication and have had an opportunity to clarify said information. Next, the confidentiality of information supplied by research subjects has been insured. Quotes and the data presented in the empirical section has been anonymized so that it is not possible to connect it to a specific individual. Additionally, the organizations have also been anonymized. Due to the limited size of the organizations, the majority of quotes will be attributed to “employee” in order to guarantee anonymity. The fact that all information will be treated in a confidential manner has been relayed

to the participants (ibid.) Consideration has also been taken to ensure that no harm comes to the research participants, which is not limited to physical harm, but also entails mental well-being and stress. This is especially important to keep in mind when performing in-depth qualitative interviews where it is not uncommon to touch on sensitive subjects (ibid.) In these cases it is the task of the researcher to walk a difficult line on how sensitive subjects can be discussed, but it is important to always err on the side of caution. Finally, any potential conflict of interests that has arisen during the process must be made explicit and dealt with accordingly, since the impartiality of the researcher is essential to ensure the validity of the research and study (ibid.).

Empirical Section

This study has taken the form of a qualitative case study of two different research institutes in Sweden and the findings will be presented in this chapter. Since a more ethnographic study on one organization was made impossible due to the coronavirus outbreak the choice was made to broaden the data set, incorporating data from two different organizations, thus creating a comparative study to widen the understanding of the unique context of Swedish research institutes.

Case introduction - SciTech

One of the organizations chosen for this case study is a small Swedish research institute with roughly 80 employees, from here on referred to as “SciTech”. SciTech is an institute and a subsidiary (with a large amount of autonomy and independence) of one of the largest research organizations in Europe. The organization primarily engages in high level research projects, as well as in consultancy projects with clients within the industrial sector. The organization has grown steadily since its start in the early 2000s, providing highly specialized advanced consultancy services and software solutions centered around applied industrial mathematics and has proved itself as a highly successful and innovative organization. The research institute is also partnered with a major university focused on the engineering sciences. Apart from some employees in HR and administrative functions, essentially all employees (including those in managerial positions) have some sort of scientific engineering background, having achieved at least a master’s degree in mathematics, physics or related subjects. Additionally, many employees also possess higher education, such as doctoral degrees within differing specialized technical fields.

The organization is divided into three different departments with slightly differing specialization, all within the field of applied mathematics. The organization is relatively flat and most of the employees have very similar work tasks, which can be exemplified by the active participation by employees in several different parallel projects, often having various roles and degrees of responsibilities in each. As such almost all of the employees (especially within the departments) interact with one another through various projects on a frequent basis, and authority is often linked to the role of individuals in specific projects. SciTech also employs students in student positions, mainly from the partnered technical university. These students work in different projects and the organization regularly partners with these students as a place where they write

their master's thesis. These students serve as one of the primary recruitment pools for the organization.

Case introduction - BIGSCI

The second organization examined in this study is a department at a large Swedish research institute, from here on referred to as "BIGSCI". The organization is active in a larger number of different scientific fields and routinely collaborates with both universities, industry and the public sector in different research projects. While the organization employs several thousand employees, this study has focused on one specific department of the organization, with a little over 100 employees. This department is active in a specific scientific field, working on technical sustainable solutions, and much like SciTech primarily employs individuals with academic backgrounds, often having achieved at least a master's degree in one of several technical engineering fields. However, there are also many employees who have achieved higher degrees of education. While there are many similarities between the two organizations there are also some differences. Since the department studied is more closely linked to the larger organization of BIGSCI, this means that the department has less autonomy as compared to SciTech. Additionally, there is a significantly larger variation of roles within the department. While many individuals hold multiple roles, there is also a significant dispersion in the work tasks of individuals at the department, such as researchers, lab technicians, engineers, event planning and more. Finally, the organization also regularly partners with students as a place where they can write their master's thesis.

Employees' views on knowledge

Before delving deeper into more complex issues relating to the case organizations and how knowledge is managed and shared within them, it is interesting to first establish what kind of knowledge is used and how it is viewed by employees, as well as by the organizations as whole.

In the case organizations, knowledge appears to be most commonly regarded in terms of individual skill and competence. Given the highly advanced skill set of many employees and the complex nature of the work being done within the context of the research projects, knowledge in the organizations is generally regarded as being highly complex and unique to the individual that possesses it. Oftentimes throughout the interviews at both organizations, knowledge and competence is spoken of as something that is continuously evolving, in large part due to the cutting edge and innovative work engaged in at the organizations.

*"Learning new things is such an integrated part of the work, I don't think there is a single day without me having to learn something new. It's a continuous part of my further training." -
SciTech Employee*

Throughout the interview process, the interviewees of both organizations often relate the concept of knowledge to the competence of key individuals. One example of this is in SciTech when discussing how new knowledge is formed within the organization through the development of new internal projects with the sole purpose of improving key competencies.

“It’s very rare that we say that now we need to attend some form of course or education. It is more a question of us needing to become better at a specific area and then those individuals can put a certain amount of time and work towards certain goals, and to do that they must improve their own competencies so it becomes a natural part of the project.” - SciTech manager

Interestingly, as demonstrated by this quote, even when discussing the importance of strengthening their combined organizational capabilities, it is instantly related to improvement of the competencies of the individual. Newly developed or existing knowledge is rarely if ever made explicit or codified and stored in formalized structures or systems, with the distinct exception that is publication of scientific articles, which will be discussed later in this paper.

One sentiment expressed by top management at SciTech is that it is simply not possible (with reasonable organizational effort) to organize or enact effective knowledge storage or transfer through formalized means due to the technical complexity of the knowledge and competencies being developed and that relying on the expertise of key individuals is simply a necessity that comes with the territory of having a business model revolving around high level research.

“You can always worry about losing people, but I realized quite quickly after I had started that we are performing at such a high level of work that there are very few in the world who can do what we can, and then you become very dependent on people. [...] Of course, from a manager’s perspective this is pretty scary, but I learned early on that it’s our reality, it’s part of what we do.” - SciTech senior manager

While knowledge is often talked about in terms of individual competence and expertise, there are also many examples from the interviews highlighting the importance of these competencies in relation to one another. For example, one interviewee at BIGSCI expressed that being a good research institute also means being innovative, which in turn relies on building on each other’s knowledge and knowledge from different parts of the organization.

“If you want to be really cutting edge as a research institute you have to find ways to connect knowledge from different areas, that’s what I feel like innovation is.” - BIGSCI Employee

Both organizations also work almost exclusively in project form, and as such much of the new research and knowledge created in the organization is a product of the work of several different individuals.

“You are always dependent on other people within the projects, you are dependent on each other’s knowledge.” - BIGSCI Employee

As has been discussed so far, knowledge in both organizations is generally viewed by employees and managers alike as something complex, intangible and something which exists within the individual. Despite this, codified and explicit knowledge also plays a role in research institutes in the form of scientific articles. The publication of these articles plays a large role in both BIGSCI and SciTech’s external communications, being prominently displayed on the organizations’ respective websites. The natural question then arises, how is this seemingly explicit expression of

knowledge understood in the organization and how is it consistent with previously presented view of knowledge as something intangible and individual-specific? Based on the collected data, the interviewees expressed three different roles of academic articles within the case organizations. The first application served by academic articles and their publication relates to their use as a tool in keeping track of progress in long-term research projects, something that often presents significant difficulties, especially when the project entails several different organizational actors. As such, goals are often formulated to stipulate the publishing of an article concerning the topic of the project at specific points in time (such as half-way and on the project's completion). The second role of academic articles expressed in the interviews is as an important organizational resource. However, this resource is not spoken of in terms of aiding the transfer or sharing of knowledge within the organization, but rather as an important marketing and promotional resource directed at attracting attention to the organization or as a prerequisite for securing certain research projects.

“In some instances we have decided to publish everything, only to make a name for ourselves and to become known within that specific field, because that’s actually something that is very important since it creates new business opportunities and contacts.” - SciTech Manager

Finally, academic articles were also discussed by the respondents in terms of individual motivation, goals or symbols of status. More specifically, for those interested in making a name for themselves in academia, the importance of continuous publication of academic articles was emphasized. However, at both organizations many of the interviewed individuals expressed that they had no particular aspirations of making an academic career, and rather viewed it as a natural part of their work.

“I personally don’t find it that important to publish a lot of articles, I don’t have that academic interest. But for a lot of people that’s probably a main selling point with working at an institute, being allowed to work with the academic bits.” - BIGSCI Employee

Management initiatives and interactions between employees

Employees at both organizations of study are typically engaged in a number of different work projects at once. While these projects differ in size, complexity (ranging from pure new research to the application of existing knowledge) and time frame, most employees are actively engaged in a mix of different projects, often taking on different roles in each. While this is true for both organizations to some extent, the connection of a certain role to a specific project is more pronounced at SciTech, where most employees simply are “researchers”, than at BIGSCI, where employees are more specialized in their stated roles (such as researcher, project manager, engineer, lab technician etc.). The data collected through observation and interviews indicates that working in these parallel projects with different individuals means that almost all employees at both organizations routinely engage with many of their co-workers to discuss said projects on a daily basis. When asked about how this communication takes place, the prevailing view among the interviewees is that it is done in a personal, social and informal way, most often face-to-face if possible. Since employees at both organizations work in their same respective office and are in

close geographical proximity (excluding some employees at BIGSCI), this communication often entails simply walking over to the desk or office of the person you wish to talk to and starting a discussion. This practice of social face-to-face communication is something that several interviewees expressed was of great importance for them in order to discuss and brainstorm around complex and difficult problems in their work. Communications through other means, such as email or phone (or other digital communications platforms), is considered by some of the employees to be an inferior mode of communication when discussing complex issues.

“If I get stuck or need to discuss something I usually just walk over to my colleague's desk. I have short 5-minute meetings and I use my colleagues as a sound board all the time.” - BIGSCI Employee

“People often spend time in each other's offices, throwing around ideas and discussing problems and having mathematical discussions on a whiteboard.” - SciTech Employee

While individuals most often engage in projects with others in the same department, there are also many examples of larger projects which span across several departments at both organizations. At SciTech, knowledge sharing in these larger projects is done in much the same way as smaller projects due to the smaller size of the organization and the fact that the different departments work at the same offices (also sharing a break room et cetera). At BIGSCI, due to the larger more dispersed nature of the organization, collaboration and communication in these larger cross-departmental projects is less often done face-to-face and more commonly through other means. More complex knowledge is rarely shared, created or stored through direct formal means or structures, but rather is achieved through the informal and interpersonal actions and practices of individuals. While the organizations are very similar in the way knowledge is shared informally between individuals, there are distinct differences in how the organizations approach the topic of facilitating knowledge sharing. At SciTech, the collected data indicates that the majority of initiatives undertaken by management aim to facilitate knowledge sharing within the organization through a more indirect approach. Contrastingly at BIGSCI, there are many examples of more direct, formalized top-down approaches to the sharing of knowledge within the organization.

SciTech exhibits several efforts by management to facilitate the exchange of knowledge between employees. What becomes clear however is that these efforts are not commonly aimed at the exchange of knowledge itself, but rather are ways for employees to gain a better understanding of their colleagues' competencies and what they are currently working on, a sort of “meta-knowledge” regarding the existence of the knowledge and expertise within the organization. These efforts are often especially directed at cross-departmental knowledge sharing, since this knowledge of their co-workers' unique knowledge and competencies is often already well developed within a department due to the frequency of the interaction of its members.

“We have an initiative where someone who has been working on something interesting invited people from the different departments to a seminar to talk about it. The point of those

presentations is to keep each other informed about what they were working on.” - SciTech HR representative

Additionally, managers at SciTech repeatedly emphasized the importance of reducing the friction of sharing knowledge and not being worried about admitting ignorance about a topic and asking co-workers for help. According to the interviews, the most important and successful way the organization has been able to achieve this is to actively work with strengthening the professional identity of each individual employee by making sure that they are the most competent in the organization within a specific niche within the broader scientific field of applied mathematics.

“We try to keep it the way that everyone who works at SciTech has a special area of knowledge and a specialized competence where they are essentially the best. Because of this, people feel more confidence and dare to ask “stupid” questions in other areas because they know that everyone else knows that they are good at this and so on...” - SciTech Manager

“A lot of our employees are quite introverted, but at SciTech almost everyone has their own specialty or niche where they can shine and grow and be the person a lot of people go to for their knowledge. That's one area where we try to lift up the employees in a knowing way and to give them responsibility to achieve things.” - SciTech HR representative

As previously mentioned, the management at BIGSCI has attempted to implement several different initiatives specifically aiming to increase knowledge sharing and connecting people throughout the organization. The interviewees give several examples of these types of initiatives as well as what they perceive to be significant limitations in how they are implemented in practice. One of these initiatives is the so-called “knowledge platforms”, which have the purpose of strengthening the organizational knowledge within a specific field. While the purpose of these initiatives is to bring people with the same competencies and interests together from different (or the same) parts of the organization, they also contain very clear requirements in the form of financial goals and KPIs which are closely linked to the project. Many of the interviewees express that the financial aspects which are tied to these initiatives greatly limit their own interests in participating. Another example is presented by one of the interviewees at BIGSCI when discussing a new potential cross-departmental collaboration they identified and attempted to pursue.

“Me and my co-worker realized we had a lot in common with people at a different department, so I took the initiative and arranged a meeting with them, and we realized we had a ton in common and could work great together. Then we presented this to our boss and said “we have identified these great synergies, can we work on this?”. Their response was that they thought it sounded great, but that we had to apply for internal funds earmarked specifically for internal collaboration. But there is way too much bureaucracy and effort with applying for that, and it also needed to have a clear financial motivation. This completely killed the idea, since it was way too much effort.” - BIGSCI Employee

There are also other examples of more casual organizational initiatives aimed at the sharing of knowledge, such as themed days including workshops, group discussion and mingling about topics

such as innovation within the scientific field. While many BIGSCI employees were informed and encouraged to participate, many also felt that they were not able to justify their attendance, since they were not able to free the time or justify the attendance from a financial perspective to their superiors. This theme of what the interviewees thought to be excessive formalization and focus on financial viability of different collaborative efforts is something that is very prevalent in the data collected at BIGSCI, and it was something that many employees expressed limited their interest and their ability to participate.

Employees' views of themselves and their place of work

Throughout the data collection process, it became increasingly clear that the concept of identity appears to play an important role for employees at both organizations. The interviewees continuously expressed thoughts about the importance of their individual professional identities and there were also many examples of employees (not just management) expressing that they thought there existed a strong collective identity shared throughout the organization. While the identities expressed were similar within each organization, there were both similarities and clear differences in how they were expressed between the two organizations. At BIGSCI, the department which has been the focus of this study works with developing new sustainable technologies. As such, many employees repeatedly expressed that it was very important for them to work with things that help society and the environment, and that they felt it was very important to work at an organization that shared these same goals.

“The thing that is really important to me is that the work we do is so close to reality, that what we do actually has a strong effect on society.” - BIGSCI Employee

“I think we have a really strong shared identity in the way that we all stand for the same thing and really want to help. I think a lot of people really feel like we are “the bright people with the answers” and that we together are part of a really cutting edge organization.” - BIGSCI Employee

Another commonly expressed theme was the importance and rewarding nature of working with like-minded and highly competent and skilled individuals, and that this was something that served as a primary source of inspiration and work fulfillment.

“You are always part of projects with other competent people and it is always so inspiring. It is really cool to be in a room with colleagues and to get the feeling that the people you are sitting with are the best at their thing in Sweden.” - BIGSCI Employee

The collected picture that arises based on the data is that BIGSCI is an organization with a strong organizational identity, and that many of its employees are connected not strictly through their professional identities but more so in their shared desire to develop sustainable solutions and to help society and the environment.

At SciTech, the identity of the individuals and the organization is expressed slightly differently although arguable in an even stronger and more defined way. Throughout the

interviews, most of the individuals repeatedly expressed the importance of doing cutting edge research, as well as continuously developing their own skills and expertise and playing an active role in development of new technologies and fields of science. Many of the interviewees emphasized their role as researchers, and the high level of individual importance that professional identity meant for them, as well as being part of a world-class research institute within their field.

“I really enjoy the intellectual challenge. To really be able to push the boundaries and the mathematical level of the things I’m doing, to be able to continue developing within the area I studied and really enjoyed studying.” - SciTech Employee

This organizational image of the organization as a world class research institute excelling in their field was often repeated by management at SciTech.

“So we tried to figure out what we were really good at and define an offer that can stand up on the international scene. That way we can say “we are among the best in the world at this”. This is something I think is very important in attracting really skilled individuals, the fact that they see this and agree with it.” - SciTech Manager

Another theme that emerged continuously throughout the data collection process is how the employees felt that SciTech differed from other places of work which serve as the organization’s primary competition. Several of the interviewed employees had previous jobs working at consultancy firms or at large industrial companies and expressed that they felt there were many differences between working in an industrial setting as opposed to working in a more research-oriented institute setting. Since SciTech is unable to compete with wages offered by large industrial companies, there has been a history of some employees leaving for these organizations. However, several of these employees have since returned to SciTech (accepting a lower compensation), including some of the interviewees in this study. Many of the interviewees were very vocal about their thoughts on their previous employment in the industry, and one underlying theme is that they seldom felt appreciated in their roles and competencies.

“When you interview for larger companies it’s almost always like they have a specific spot to fill, they need someone who knows one specific thing. It is never a question of “do you have the ability to learn?” or “what do you want to work with?” but rather “Do you know this?”. That’s what matters to them and it leaves you with a really bad feeling. You don’t feel seen as a person or a greater resource and there’s never any thought that you should continue to develop.” - SciTech Employee

“I felt like I got a great reception [at SciTech] and I feel like they look at your competencies from a greater picture perspective. And that’s really different when I’ve worked in the industry.” - SciTech Employee

Additionally, many employees at SciTech expressed feelings that other jobs (in the industry) did not offer them enough opportunities to continue evolving and specializing within their area of expertise, the possibility of which was deemed highly important for them. The overarching theme

present through the interviews is that the employees wished to be respected not only based on their current competencies, but even more importantly on their abilities to learn and to be given the possibility to develop and excel within their respective fields of expertise. This is something that many felt were not present at more conventional consultancy jobs. While the primary competitors to the firm can be considered more “traditional” consultancy firms and several of the interviewees have worked at such organizations, the current image of themselves they present is more that of researchers more so than consultants. This expressed opinion of a clear differentiation between “us” and “them” and the shared identity of employees and the organization is something that was also repeated by management at SciTech.

Both organizations share many similarities in that they both work extensively with students that are almost ready to begin their professional career. For both organizations, this means serving as case organizations and tutors for last year students working on their master’s thesis. Several of the interviewees at both organizations had started as students and subsequently been offered employment after their completed education and expressed that they felt this offered them a very natural way to become a part of the organization.

“For me it has a lot to do with me starting as a student. When I later started working at the same department that I wrote my thesis at I already knew everyone and felt like “one of the gang”. It felt like I had a natural place.” - BIGSCI Employee

Additionally, SciTech also employs a number of students each year for part time student positions. At these positions, the students get the possibility to work in one of the existing projects active in the organization, in a limited but relevant capacity. The exact work task of each student varies and is uniquely tailored for each individual and their abilities, however the common theme expressed by interviewees at SciTech is that they try to involve the student as much as possible, without expecting them to engage in tasks that are vital to the project. Many students go on to write their master’s thesis at the organization and are also sometimes offered continued employment after its completion. Several of the interviewees entered the organization in this way, and it is the primary pool of recruitment for the organization (excluding the recruitment of people with higher academic degrees). Recruitment for these positions is done at the partnered technical university and is done through a lunch seminar and presentation of the organization, following which students are encouraged to apply. The pressure on the existing positions is very high with only a few applicants being accepted, often based on their grades and academic excellence. The seminar highlights the technical complexity of the work being done at the organization, and several of the interviewees expressed that they felt that depending on what kind of person is attending, this either serves to attract or dissuade them from applying.

“It’s a split feeling you get at the student seminar, a very common feeling is probably “Wow, this is really advanced stuff, I think I want to do something more simple”, I know that’s how a lot of people feel. But I on the other hand felt like the results were really cool and felt “I want to do that too”. I think you really feel the challenge, then you either think that this isn’t anything for me or you think that you’ll show them what you know in your CV.” - SciTech Employee

Analysis and Discussion

Knowledge and research institutes as knowledge-intensive organizations

Before continuing with more in-depth analysis of the specific practices observed at the case organizations, it is interesting to first establish how knowledge is viewed and understood within them. Along the definition presented by Starbuck (1992), both organizations use rare and esoteric knowledge as a central resource in order to differentiate themselves from their competitors and to successfully compete in the marketplace, in many ways encompassing both the role of a professional service firm and that of an R&D company as discussed by Alvesson (2004).

One of the clearest takeaways from the interviews is the way in which people at both organizations almost always talk about knowledge in relation to the competence of individuals. This is exemplified in the quote from a SciTech manager, expressing that new competence is developed within the organization by having employees work in new projects in order to enhance their individual expertise. Additionally, quotes from both organizations indicate that the reliance on individuals with key competencies is often high, reflected in the statements that if certain key employees were to leave, this would have disastrous consequences for the organization. This reliance on individuals aligns well with the view of knowledge-intensive organizations presented in the scientific literature (Davenport & Prusak, 1998; Alvesson, 2000). Building on the view of knowledge as something that is difficult to define, the knowledge in both organizations is thought of as being too complex and individual to be stored through formal systems or structures, a sentiment echoed by both employees and management. Connecting this to the literature, we can see that knowledge within the organizations is often spoken of and understood in terms of something “tacit” (Collins, 1993), offering great value but being difficult to share through formal means. The fact that this view on knowledge is so prevalent within both organizations indicates that they appear to have recognized the complexity of managing the tacit dimensions of knowledge through formalized means, something many organizations often fail at doing (Fahey & Prusak, 1998; Zack, 1999). It is also important to point out while the knowledge used in the organizations contain many aspects which might traditionally be considered tacit, the knowledge is in reality more complex, building on both tacit and explicit elements (Tsoukas, 1996). This is exemplified in the work at SciTech, where the knowledge used is often based on pure mathematical concepts that are easily made explicit, but are made complex through their novel applications or developments based on the intuitive know-how and experience of the individual. Similar complexity was shown at BIGSCI, where the employees described how their knowledge cannot be applied in the same way consistently, since the application always varies based on the tailored and customized solutions within the projects. While the methods involved could be codified to some extent, the advanced problem solving involved is highly tacit and individually bounded, showing that knowledge is indeed neither wholly tacit nor explicit. As such, simply denoting the knowledge used at the organizations as tacit is an oversimplification, and the complexity of knowledge should not be forgotten (Styhre, 2004).

Knowledge within the organizations is generally understood in terms of individual competence and skill. However, as has been detailed in the empirical section, work done within

both organizations is project-based and highly collaborative in nature. Employees are continuously working on several different projects at once and often have extensive daily interactions with many of their co-workers in the context of the different projects. As expressed by the interviewees, these interactions are often informal and ad-hoc in nature and play an important role in brainstorming around new ideas and ways to advance the different projects, as well as working together to solve problems that have arisen. These observations from the case organizations support the understanding of knowledge from a more situated perspective of knowledge-in-practice, and recognizing the role these frequent social interactions play in the creation and sharing of knowledge (Nicolini, 2011; Orlikoski, 2002). While some individuals may hold specific knowledge or competence that is essential to the organization, the application of that knowledge does not take place in a vacuum. Rather it takes place within the context of a project, where frequent interactions between the project members means that knowledge flows freely and is exchanged, developed and applied. These observations support the theoretical approach to knowledge processes as being something that is driven by individuals (Jennex, 2008). Thus, knowledge in the context of these knowledge-intensive organizations benefits from being viewed not as a resource to be exploited, but rather as a resource the value of which comes from being shared (Styhre, 2002).

Another interesting aspect that is worth a closer look and is likely somewhat unique for research institutes is the role that academic articles play within both organizations. In a way, the existence and prevalence of this highly explicit and codified form of knowledge appears somewhat paradoxical, since these articles could be viewed as an example of tacit knowledge being made explicit and then shared. While the study of the role of academic articles was not part of the initial scope of this study, some general analysis on the topic can be made based on the collected data. As presented in the empirical section, while academic articles appear to play several roles, they were not observed as a common tool or practice used for knowledge sharing within the organizations. While this does not mean that they do not play a role in knowledge sharing or creation (for example in the creative discourse of scholars within a field), this was not something that was able to be explicitly observed in the collected data. Rather, their role was observed as being either an organizational resource for promoting the organization, a tool for managing project progress or an important thing for the individual, serving as a source for individual motivation and identity. While a more in-depth analysis is outside the scope of this study, it is important to acknowledge their existence and the fact that their role is not wholly understood, which could prove an interesting topic for further study.

Formalized knowledge management tools such as IT-systems are not used for knowledge sharing per se since the knowledge utilized within the organizations is too complex. Formalized knowledge management tools are rather relegated to the sharing of raw data and administrative tasks. For more complex knowledge, management instead relies on the informal knowledge sharing between employees, which aligns well with the thoughts present in the knowledge management literature, which indicates that formalized systems are ineffectual at managing knowledge work (Diedrich, 2004; McIver et al. 2013; Rechberg & Syed, 2014). However, both

organizations exhibit attempts from management to facilitate the sharing of knowledge between individuals in more indirect ways. One example of this is the seminars organized by managers at SciTech to increase the knowledge of what competencies exist within the organization. At BIGSCI, there are many examples of initiatives to connect individuals with similar or complementary competencies in different projects, which can be viewed as a formalized attempt to create CoPs. (Rechberg & Syed, 2014). The perceived effectiveness of these efforts will be covered later in the analysis.

Communities of Practice and the role of management

In knowledge management literature, one of the most effective ways thought to help knowledge sharing throughout an organization is through the existence of a strong Community of Practice (Bolisani & Scarso, 2014). Throughout the data collection process, it became increasingly clear that in one of the organizations, SciTech, the existence of a strong CoP could be observed. Interestingly and somewhat paradoxically, despite the strong attempts by BIGSCI management to create avenues and communities for knowledge sharing, no similar CoP could be observed at BIGSCI. This chapter will begin by introducing the observed CoP at SciTech, analyze and discuss why it matters for knowledge sharing within the organization and examine what role management plays in its formation and continued existence. The latter part of the chapter will discuss the lack of a CoP observed at BIGSCI and some of the possible reasons as for why this might be the case.

Drawing on Wenger, Mcdermott & Snyder's (2002) definition we can see that at its basic level, a CoP is an entity consisting of the social dimensions and characteristics of *domain*, *community* and *practice*. The domain is the shared domain of interest and knowledge that unites the group. In the case of SciTech, there is a strong shared identity that unites the group, namely the identity of researchers within the scientific field of applied mathematics. The importance of a strong shared identity will be discussed at greater length a bit later in this study. The community refers to the existence of a social interaction and sharing of information within the group. A relevant distinction made by Wenger (1998) is that relationships are formed not through top-down organizational decisions, but rather are allowed to form naturally around a shared practice. This important aspect can be observed at SciTech, where employees express that they often discuss and communicate with other individuals to share knowledge and solve problems all throughout the organization, not only within their specific project groups. Finally, practice refers to the shared work practices of the individuals within the group, more than just shared interests. This includes the development of a shared understanding of problems and stories related to the practice. While the individual expertise at its most advanced level might differ somewhat between individuals at SciTech, they are active within the same general field of applied mathematics and all work together in the same type of projects, working towards common goals.

As previously discussed, many individuals also take on different roles in different projects and as such the authority and power relations of individuals is often not fixed but rather should be viewed in relation to that specific project or practice. Lave and Wenger (1991) details this phenomenon as legitimacy and informal authority being afforded by the consensus of the group,

based on the specific context. As such, authority can be observed as emerging through interactions and is context and practice-specific, which is a clear indicator of a CoP (Lesser & Storck, 2001).

As has been covered in the literature review, there are many different views on what role management plays in the success of a CoP, and whether or not CoPs can be knowingly created or set up. (Bolisani & Scarso, 2014). For this reason, it is interesting to study how the CoP appears to have formed at SciTech, and what management has done to facilitate its existence. Based on the data collected from interviews with managers at SciTech, there are no indications that there was ever the expressed intent to create a community to facilitate knowledge sharing. However, the organization has grown organically and there are many examples of management emphasizing the importance of finding the right individuals that are a good fit for the organizations. Here, individual professional identity as well as a strong organizational identity appears to play a major role, and it is also something that many believe to be of great importance for CoP (Murillo, 2011). Despite the lack of expressed intent on the creation of a CoP on the part of management, there are also several examples of organizational initiatives that can be understood as efforts to facilitate the CoP. One example of this is the active decision made by management at SciTech to ensure that employees at the organization have similar roles and (for the most part) engage in very similar practices. By having a flat organizational structure with employees continuously engaged in several parallel projects with their co-workers, this creates an environment where social interaction and communal problem-solving of shared problems is a natural part of daily work, creating the perfect environment for CoPs to prosper (Brown & Duguid, 1991; Wenger, McDermott & Snyder, 2002). The actions of SciTech are interesting to compare with the writings of Gherardi (2006) who emphasizes the importance of the practice-aspect of CoPs over the community-aspect. The way in which management has not actively reified or classified the existence of any communities but rather has sought to align the practices of the employees at the organization seems to support the findings of Gherardi (2006), highlighting the fact that communities are an inherently fluid and social process. In other words, while the existence of communities might be observed, their perceived shape and constitution is greatly influenced by the gaze of the observer and are ultimately not that important. Rather, the important thing is the practice that “performs” the community into being, and by focusing on the continued existence of a strong shared practice, communities will naturally arise and form and continuously change around that practice.

Additionally, SciTech also routinely engages in cross-departmental projects and knowledge sharing, for example the previously presented seminars which have the explicit purpose of aiding the sharing of knowledge within the organization. Viewed through a theoretical perspective, this can be viewed as an attempt at decreasing knowledge “stickiness” (Brown & Duguid, 2001) throughout the organization and to align different parts of the organizations around the same goals and practices. Linking this back to Gherardi (2006) and how communities are in reality constructed by the gaze of the observer, we can see that while it is possible to understand the different departments at SciTech as different CoPs, this division is not necessary, since spontaneous collaborations and knowledge sharing continuously emerges both within and between departments based on the practices being performed. For the sake of clarity and based on the fluid

nature of communities, this paper will continue to refer to the existence of a singular strong CoP at the organization, but it is interesting to note that it could also be understood as multiple interlinked communities, all emerging around a common practice.

One of the ways in which the observed results of this study differs from some previous studies on CoPs is in the way in which all participants in the community are essentially experts within their field. Early studies on CoPs, for example that of Lave & Wenger (1991) primarily revolved around legitimate peripheral learning, with one of the primary factors of this being the master-apprenticeship relationship. This clear distinction between apprentices and masters was not observed at SciTech. While new employees are initially given some limited mentorship and guidance by more experienced employees, there is an expressed goal of quickly having each employee specialize in their own unique niche and competence. In this way, the observed community at SciTech is less hierarchical and the status of individual more closely tied to the individual member and their competencies within specific contexts, which correlates more closely to a more egalitarian understanding of CoPs as presented by Brown and Duguid (1991) and Orr (1996). This in turn means that the master-apprentice relationship is not fixed, but rather varies greatly depending on the specific context and the different tasks being performed. Since all employees are essentially masters of their specific domain, it is essential to encourage interactions and learning possibilities between different employees, something that is expressed by managers at SciTech. Furthermore, this fluid and context-dependent relationship of mastery can also be closely linked to the importance of professional identity and a sense of confidence in their roles, the importance of which for CoPs cannot be overstated (Wenger, 1998). The complexities of how identity has been found to correlate to the existence of CoPs at the organizations will soon be discussed in greater detail. What unites all the different initiatives and practices observed at SciTech is that all represent more indirect and nurturing ways to support the CoP, supporting the line of thought promoted by some scholars that the role of management is mostly that of nurture and support, rather than the clear formulation or classification of specific communities. (Ward, 2000; Delong & Fahey, 2000; Bolisani & Scarso, 2014).

Another interesting finding of this study is the apparent lack of a clear CoP at BIGSCI, at least at the department that served as the subject of this study. On a surface level, this might appear somewhat paradoxical, due to the fact that BIGSCI engages in many different managerial initiatives aimed at increasing knowledge sharing throughout the organization. Many of these initiatives, such as the knowledge platforms presented in the empirical section, have the explicit stated goal to connect groups of individuals with similar and complementary expertise in order to further the competence of the organization. However, these initiatives are also invariably tied to clearly stated financial targets and are very formalized in nature. As such, while these initiatives arguably represent formalized attempts by BIGSCI to create CoPs, employees at the organization express that they feel that these initiatives are hindered by excessive ties to financial KPIs and goals, greatly increasing the formal nature of all interactions and creating barriers of entry for employees that are interested in less formal and more organic knowledge exchange. A perfect example of this is found in the described situation of one interviewee where they attempted to

organize knowledge exchange with another department where it naturally arose. However, this attempt fell flat due to the bureaucratic inflexibility and need to financially justify this collaboration. Connecting these actions to the scientific literature, the example represents a clear case where the organization is failing to properly nurture and support new potential communities (Lesser & Storck, 2001; Wenger, McDermott & Snyder, 2002). We can see that the managerial actions of BIGSCI indicates that the organization is attempting to create new communities through highly formalized and structured means, meanwhile neglecting their role in supporting opportunities for new knowledge sharing that arises naturally. The skepticism expressed by the interviewees support the views expressed by Ward (2000), indicating that CoPs are voluntary in their nature and that they cannot be forcibly created. By attempting to formalize knowledge exchange and sharing and adopting a top down perspective on reifying communities (Gherardi, 2006), the organization instead introduces potential barriers between different employees which might actually serve to increase the “stickiness” of knowledge (Brown & Duguid, 2001) rather than decrease it. This is especially true for cross-departmental collaborations, which stands in stark contrast to the example of SciTech where informal knowledge sharing between departments is both encouraged and facilitated. Drawing on the framework formulated by Lesser and Storck (2001), another way to understand the role of management in facilitating CoPs is by aiding the creation of social capital among the organization's employees. While BIGSCI does provide opportunities for individuals to make new connections through different initiatives and also appears to have a strong shared culture and identity facilitating relationships, it is let down by the fact that relationships are not given the time or space to naturally build and develop between individuals. As such, the natural growth of CoPs is severely hindered, and several of the potential benefits of CoPs are unrealized (Lesser & Storck, 2001).

Apart from this overly bureaucratic and formal approach to the creation of CoPs and lack of nurture, there are also some other possible explanations as for why none were detected at BIGSCI. While it is always difficult to identify why something was not observed, one potential explanation lies in the fact that there is a significantly larger variation in the professional roles of the employees at BIGSCI compared to SciTech, and thus likely a bigger variation in work practices. As has been previously discussed, several scholars highlight the importance of practice rather than community in CoPs, and the fact that a community is a fluid process of social interactions, centered around a unifying practice which serves as the driving force “performing” the community into being. (Brown & Duguid, 1991; Gherardi, 2006). As such, if there is not enough of a common practice between individuals, there is also less reason for a community to form around it (Wenger, McDermott & Snyder, 2002).

The role of identity in knowledge-intensive organizations and CoPs

Throughout the data collection process, it became increasingly clear that identity appears to play an important role within both of the case organizations for several different reasons. As such, this chapter will first approach the topic from a more general perspective, examining identity at both organizations on a more general level and in relation to their nature as knowledge-intensive firms,

followed by a more detailed discussion on the importance of identity for CoPs. While identity was not a topic that was initially considered at the start of the writing and is not as commonly discussed in more recent CoP research, throughout the process it emerged as an important factor, not least with regards to the observed CoP at SciTech and the managerial actions that facilitates it.

During the interview process, the interviewees expressed many different thoughts about different kinds of identity. This entails both the perceived existence of a strong shared organizational identity at both organizations, as well the fact that many of the interviewees repeatedly emphasized the importance of their own individual professional identities. At BIGSCI, the shared identity is exemplified by the expressed importance of working at an organization that plays an active role in helping the environment and developing sustainable solutions for society. The interviewees repeatedly expressed the importance of working at an organization that is “part of the solution” and that does good for society. At SciTech, the shared identity was more closely related to the professional identity of a researcher, working, developing and excelling within the fields of applied mathematics. Many interviewees expressed that they felt that it was very important to work at an organization where the pursuit of knowledge and doing cutting edge research was a key priority, and felt that this thought was shared by management and other members of the organization. Connecting these examples of a strong shared identity at both organizations with the academic literature on knowledge-intensive organizations, we can make some general observations. These examples of a strong shared identity and the successful alignment of the identity of the individual with that of the organization found in this study seem to support Alvesson’s (2000) claims that identity is an essential concept for knowledge-intensive organizations to consider and recognize. As discussed by Alvesson (2000), these types of organizations often struggle with employee loyalty and retention, however these issues can be mitigated by a strong shared and aligned identity. This is exemplified in the apparent loyalty of employees at SciTech. As previously discussed, the two studied organizations are not able to offer the same level of wages as some of their competitors in the industry. As such, some employees at SciTech have left for other jobs in the industry with higher pay, but the interesting thing to note is that several of these employees have chosen to later return to SciTech, accepting a lower wage. When asked why they chose to return, one of these individuals interviewed in this study expressed strong feelings that they could not identify with the larger organizational identity and values of the other organization, and that this was a primary reason for their return to SciTech where they felt more at home. Additionally, a common theme throughout the interviews was that many employees at SciTech expressed both their own and the organizational identity in terms of what they were not, which can be linked to the concept of alterity presented by Czarniawska (2008). This indicates that in the case of SciTech, a clear organizational identity incorporating elements of its “otherness” from its competitors has been very successful in aligning the identities of its employees and the organization. By separating itself from its competitors as an organization focused around scientific excellence and the pursuit of knowledge, it has been able to attract and retain individuals who share those same values. The findings of this study indicate that knowledge workers often place great importance on identity in relation to their work, and that while no organization is immune to

losing employees, this is an important aspect for management to work with proactively to ensure the loyalty and retention of employees (Alvesson, 2000; Løwendahl, 1997). As discussed in the theoretical framework, the concepts of CoPs and identity are also closely interlinked, with identity (especially individual professional identity) being one of the primary constitutive elements with regards to knowledge sharing and learning within CoPs (Wenger, 1998). As such, the remainder of this chapter will now discuss the ways in which identity matters for CoPs, how it relates to the unique context of research institutes and what it means for management.

One way in which identity plays an important role is as a source of intrinsic motivation for individuals to join a certain community based on what they self-identify with (Lave & Wenger, 1991; Murillo, 2011). Relating this to the collected data, a commonly expressed thought among the interviewees from both organizations was that they greatly valued the possibility of working with other skilled individuals sharing the same goals and motivations, and that this was one of the primary reasons why they were attracted to their current place of work. In the case of SciTech, the image of the organization as a high performing place of work doing world-class research is reinforced repeatedly in order to attract skilled individuals who share the same motivations. This is exemplified by the yearly student-seminar held in order to attract students to the student-positions the organization offers. The way the organization and its work is presented does not shy away from the complex and challenging nature of the work, and the seminar serves the purpose of separating out and identifying the potential applicants whose own identity and motivations corresponds to that of the organization. As such, the organization (and by extension the CoP) is more likely to attract employees that are a good fit for the organization and that might more easily integrate into the existing CoP. Utilizing the different modes of belonging within CoPs presented by Wenger (1998), we can see that examples of both *engagement*, *imagination* and *alignment* can be observed in the collected data from SciTech. By the nature of the work, members of the CoP routinely engage in negotiations of meaning with other members, facilitated by daily face-to-face contact and discussion relating to the shared practice. Through this, the meaning and direction of the community is continuously reinforced as a community of the shared practice of mathematical research and the pursuit of knowledge. Employees are able to imagine themselves as members of the community and align their own roles with that of the workplace, something that is exemplified by the importance the interviewees place on working at an organization where they feel respected, comfortable and appreciated in their professional roles. Based on the results of this study, it appears that management can play an important role in facilitating the engagement and alignment of individual identities and identity construction within CoPs, which will be elaborated on shortly.

Drawing on the seminal article by Lave and Wenger (1991) on legitimate peripheral learning, several interesting observations can be made in relation to the case organizations. While legitimate peripheral learning does indeed appear to take place at both organizations of study, for example through the different student positions, there are also several ways in which the findings differ from those presented in the article. Beginning with the similarities, as new students enter the organization and are given relevant work tasks within real projects, they are able to engage in legitimate peripheral participation (Lave & Wenger, 1991) and to situate themselves within the

community as well as begin to understand the underlying rules of communication. At BIGSCI for example, one of the interviewees described how they began their career at the organization as a student, and that this was a natural way of becoming a part of the group. This legitimate peripheral learning serves an important role in forming the professional identity of the student, creating an identity which corresponds to that of the organization as well as that of the CoP. While no CoP was observed at BIGSCI despite their student positions, this relation to CoPs holds true for SciTech where it was observed. Those individuals who most strongly identify with the organizational identity and the shared identity of the CoP are consequently the most likely individuals to pursue a continued position at the organization after the completion of their student positions. As expressed by the respondents, the purpose of the student positions is not to extract labor or competence, but rather to have the opportunity to create a relationship with a new potential employee and to ensure that the motivations of the individual corresponds to that of the organization. As such, students that continue their employment after their graduation are well prepared to join the existing CoP. However, there are also several ways in which the findings of this study differ from previous views on legitimate peripheral learning, specifically centering around the master-apprentice division and hierarchy that Lave and Wenger (1991) outline in their study. As previously discussed, all employees are essentially masters of their own unique domain, something that has been knowingly engineered by management, especially at SciTech. This means that there is no clear division between masters or novices, but rather that this relationship needs to be viewed as fluid and context dependent, where all individuals within the CoP occasionally play the role of both master and apprentice depending on the specific context. Based on the data, it appears that this reinforces importance of individuals being comfortable in their identities and roles and being able to admit ignorance within areas that lay outside their own expertise.

As outlined in the empirical chapter, management at SciTech appears to be well aware of the challenges that arise from doing work in a context where all employees are essentially “masters” and as such have taken several steps to support and empower its employees in their roles and professional identities. This is in line with the findings of Handley et al. (2007), who argue that organizations can also play a more active role in the individual and personal identity-construction of new employees, thus helping facilitate a strong CoP. A clear example of this is the individual development plan enacted by the organization with the explicit aim of making sure that each employee is the most specialized and the best at a certain topic. This appears to serve two very important functions. First, it serves to facilitate collaboration and lowering barriers to asking a co-worker for help through the mutual understanding that each employee has their own area of expertise, thus lowering prestige and making it easier for people to admit ignorance. Second, and perhaps even more importantly, it also aids in the identity-construction of the individual in their role as a highly competent researcher. As expressed by the manager at SciTech, when people feel like they have a specific area in which they are the most competent and where people come to them asking for help, they become more secure in their own professional identities. The end result is a CoP where there is no clear hierarchy or division between masters of apprentices among its members. Rather, this relationship is wholly fluid and context dependent, being facilitated and

made possible by a strong shared negotiated understanding and the strong professional identities of individuals within the CoP. As discussed by Handley et al. (2007), by orchestrating opportunities for personal development and legitimate participation for the individual, the organization can empower the individual and provide opportunity for further strengthening of the identity-construction in their professional roles and by extension the CoPs.

Summing up this analysis of identity at the case organizations, we can make some general conclusions. First, identity appears to play a very important role for knowledge-intensive organizations, including for recruiting and retaining employees. Second, identity appears to be of great importance for CoPs, especially with regards to introducing new employees to the community. Third, managers can and should actively work to strengthen the organizational identity, making sure that it is aligned with that of employees and work to actively strengthen the professional identities of individuals in a way that aligns with the organizations.

Conclusion and Implications

This study has researched and examined how knowledge is shared and managed in knowledge-intensive organizations. The research has been conducted through a qualitative case study within the unique context of research institutes characterized by the mix of industry and academia, contrasting and comparing two different organizations. Drawing on the situated view of knowledge (Nicolini, 2011; Orlikowski, 2002), this research indicates that knowledge is neither purely explicit nor tacit, but rather exists in a socially situated context between individuals and is primarily shared informally within the organizations. This in turn has several implications for management. Recognizing the complexity of knowledge as well as the fact that its value derives from sharing rather than exploitation (Styhre, 2002), management must act to provide avenues for and to facilitate informal knowledge sharing within the organization. It is also vital for organizations and management to recognize the limitations of formalized knowledge management systems in relation to these facts and to act accordingly.

Answering the research question, the findings indicate that knowledge within knowledge-intensive organizations is primarily shared informally, and that one of the most efficient ways of facilitating knowledge sharing is through CoPs (Wenger, 1998), which was observed in one of the case organizations but not in the other. This study indicates that CoPs appear to play an important role in reducing knowledge “stickiness” (Brown & Duguid, 2001), supporting the findings of Schenkel and Teigland (2008) that organizations can greatly benefit from the existence of a strong CoP. The observation that a CoP was present at one organization but not the other is interesting for many reasons, for example due to the very different managerial approaches and practices. Several managerial implications can be drawn from the results gathered from the two case organizations. While one of the organizations exhibit several attempts at the formalized top-down creation of CoPs, the effectiveness of these efforts appears limited at best, owing to an excessive focus on financial goals and measurements. Meanwhile, at the organization where the CoP was identified, the community appears to have grown organically, passively facilitated by management. Relating this back to the research question, these findings support the view that while

management plays an important role in creating the right environment for the community to exist and prosper (such as aligning identity and practices), CoPs are at their core voluntary constellations of individuals and cannot be forcibly created (Ward, 2000; Wenger, McDermott & Snyder, 2002). While management should always be on the lookout for existing communities and work to support and nurture these, overly formalized attempts at creating or controlling CoPs were found to be ineffective and not advised based on the findings of this study.

Finally, this study has also highlighted the central role identity plays for knowledge-intensive organizations as it was expressed by interviewees at both case organizations. One of these roles is the importance of creating a strong shared identity to foster loyalty among employees, supporting the findings of Alvesson (2000). Again, relating back to the initial research question, identity also appears to play a more direct role in the facilitation of knowledge sharing, as well as facilitating the existence of a strong CoP where it was observed, supporting the claims of Wenger (1998). The findings also indicate that managers can and should play an important role in fostering the professional identity of the individual by orchestrating possibilities for legitimate participation for both new and existing employees (Handley et al., 2007). Finally, this study shows that a strong organizational identity can be successfully created by incorporating elements of not only what the organization is, but also what it is not, drawing on the concepts of alterity by Czarniawska (2008).

This paper has made contributions to the field of knowledge management, providing insights into how knowledge is shared, understood and managed within the unique and seldom explored context of research institutes. Further, it has also contributed to the field of study of CoPs, offering insights on the role that management plays in the existence and facilitation of CoPs at knowledge-intensive organizations and more specifically research institutes. Finally, this study has also highlighted the importance of identity in relation to knowledge-intensive organizations as well as the relevance of the concept to the theoretical perspective of CoPs.

Throughout this study, several interesting aspects arose that were deemed to be outside the scope of the study but that could likewise benefit from further study and exploration. One of these aspects is the role that academic articles play at research institutes or other knowledge-intensive firms. As indicated in this paper, these articles appear to have several different applications reaching far beyond knowledge sharing and are often used as both a tool and a resource for both individuals and the organization, depending on the context. A future more in-depth study aimed at better understanding their role within this organizational context could provide valuable insights for both the academic community as well as organizations. Additionally, it would also be of interest to further study the way in which knowledge is informally shared within these organizations on a more thorough level, for example by the use of a more ethnographically oriented study. In doing so, it would be interesting to examine the shared use of stories and understanding, perhaps applying a theoretical sensemaking approach to better understand these interactions.

References

- Alvesson, M. (2000). Social Identity and the problem of loyalty in knowledge-intensive companies. *Journal of Management Studies*. 37(8), 1101-1123
- Alvesson, M. & Kärreman, D. (2001). Odd Couple: Making Sense of the Curious Concept of Knowledge Management. *Journal of Management Studies*. 38(7), 995 - 1018
- Alvesson, M. (2004). *Knowledge Work and Knowledge-intensive Firms*. Oxford: Oxford University Press.
- Bolisani, E. & Scarso, E. (2014). The place of communities of practice in knowledge management studies: A critical review. *Journal of Knowledge Management*. 18(2), 366-381
- Boxall, P., & Purcell, J. (2011). *Strategy and human resource management (3rd ed.)* New York: Palgrave Macmillan.
- Brown, J. & Duguid, P. (1991). Organizational Learning and Communities-of-Practice: Toward a Unified View of Working, Learning, and Innovation. *Organization Science*, 2(1), 40-57
- Brown, J., & Duguid, P. (2001). Knowledge and Organization: A Social-Practice Perspective. *Organization Science*, 12(2), 198-213
- Bryman, A. (2008). *Social Research Methods, Third Edition*, Oxford: Oxford University Press.
- Bryman, A. & Bell, E. (2015). *Business research methods (4.th ed.)*. Oxford: Oxford University Press.
- Campbell, B. A., Coff, R., & Kryscynski, D. (2012). Rethinking sustained competitive advantage from human capital. *Academy of Management Review*, 37(3), 376–395
- Collins, H. M. (1993). The Structure of Knowledge. *Social Research*, 60(1), 95–116
- Corbin, J. & Strauss, A. (1990). Grounded Theory Research - Procedures, Canons and Evaluative Criteria. *Zeitschrift Fur Soziologie*, 19(6), 418-427.
- Czarniawska, B. (2008). Alterity/identity interplay in image constriction. In: Barry, Daved & Hansen, Hans (eds.) *The SAGE handbook of new approaches in management and organization*, 49-62. London: SAGE
- Davenport, T., & Prusak, L. (1998). *Working Knowledge*. Cambridge, MA.: Harvard Business School Press.
- Degn, L., Franssen, T., Sørensen, M. & de Rijcke, S. (2018). Research groups as communities of practice—a case study of four high-performing research groups. *Higher Education*. 76(2), 231-246

- DeLong, D. W., & Fahey, L. (2000). Diagnosing cultural barriers to knowledge management. *Academy of Management Executive*, 14(4), 113– 127.
- Deetz, S. (1995). *Transforming Communication, Transforming Business: Building Responsive and Responsible Workplaces*. Cresskill, NJ: Hampton Press.
- Diedrich, A. (2004). *Engineering Knowledge: How Engineers and Managers Practice Knowledge*. Doctoral Thesis. Gothenburg: University of Gothenburg
- Drucker, P.F. (1999A). *Management Challenges for the 21st Century*. New York: Harper Collins.
- Drucker, P.F. (1999B). Knowledge-worker productivity: the biggest challenge, *California Management Review*, 41(2), 79-94.
- Fahey, L., & Prusak, L. (1998). The eleven deadliest sins of knowledge management. *California Management Review*, 40(3), 265-276
- Flyvbjerg, B. (2006). Five misunderstandings about case-study research. *Qualitative Inquiry*, 12(2), 219-245.
- Gherardi, S. (2006). *Organizational knowledge: the texture of workplace learning*. Oxford: Blackwell.
- Grant, R. (1996). Toward a Knowledge-Based Theory of the Firm. *Strategic Management Journal (1986-1998)*, 17(Winter Special Issue), 109-122
- Handley, K., Clark, T., Fincham, R. & Sturdy, A. (2007). Researching situated learning: participation, identity and practices in client-consultant relationships. *Management Learning* 38(2), 173-191
- Jennex, M. E. (2008). *Current issues in knowledge management*. New York: Information Science Reference
- Kaufmann, G., & Runco, M. A. (2009). Knowledge management and the management of creativity. In T. Rickards, S. Moger, & M. Ronco (Eds.), *The Routledge companion to creativity* pp. 149–159
- Kvale, S. (2006). Dominance Through Interviews and Dialogues, *Qualitative Inquiry*, 12(3): 480-500.
- Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge, UK: Cambridge University Press
- Lesser, E. & Storck, J. (2001). Communities of Practice and Organizational Performance. *IBM~Systems Journal*. 40. 831-841.

- Li, L.C., Grimshaw, J.M., Nielsen, C., Judd, M., Coyte, P.C. & Graham I.D. (2009). Evolution of Wenger's concept of community of practice. *Implementation Sci* 4(11), 1-8
- Lind, F., Styhre, A. & Aaboen, L. (2013). Exploring university-industry collaboration in research centres, *European Journal of Innovation Management*, 16(1), 70-91
- Løwendahl, B. (1997). *Strategic Management in Professional Service Firms*. Copenhagen: Copenhagen Business School Press
- Martin, P. Y. & Turner, B. A. (1986). Grounded theory and organizational research. *The Journal of Applied Behavioural Science*, 2, 141-157
- McDermott, R. & Archibald, D. (2010). Harnessing Your Staff's Informal Networks, *Harvard Business Review*, 88(3), 82-89
- McIver, D., Lengnick-Hall, C., Lengnick-Hall, M., & Ramachandran, I. (2013). Understanding work and knowledge management from a knowledge-in-practice perspective. *The Academy of Management Review*, 38(4), 597-620
- Murillo, E. (2011). Communities of practice in the business and organization studies literature. *Information Research*, 16(1)
- Nicolini, D (2011). Practice as the site of knowing: Insights from the field of telemedicine. *Organization Science* 22(3), 602–620
- Nonaka, I. (1994). A Dynamic Theory of Organizational Knowledge Creation. *Organization Science*. 5(1), 14-37
- Nonaka, I. & Takeuchi, H. (1995). *The Knowledge-Creating Company*. New York: Oxford University Press
- Orlikowski, W. J. (2002). Knowing in practice: Enacting a collective capability in distributed organizing. *Organization Science*. 13, 249-273
- Orr, J. (1996). *Talking about machines: an ethnography of a modern job*. Ithaca, New York: ILR Press
- Philbin, S. (2008). Process model for university-industry research collaboration, *European Journal of Innovation Management*, Vol. 11 No. 4, 488-521
- Polanyi, M. (1958). *Personal Knowledge: Toward a Post-Critical Philosophy*. Chicago University Press, Chicago
- Rechberg, I., & Syed, J. (2014). Knowledge Management Practices and the Focus on the Individual. *International Journal of Knowledge Management (IJKM)*, 10(1), 26-42
- Massaro, S. (2012). Managing Knowledge-intensive Workers. *Nature Biotechnology* 30(7) 721-723

- Sanchez, J.H., Sanchez, Y.H., Collado-Tuiz, D. & Cebrian-Tarrason, D. (2013). Knowledge creating and sharing corporate culture framework. *Procedia: Social and Behavioral Sciences*, vol. 74, 388-397
- Schenkel, A. & Teigland, R. (2008). Improved organizational performance through communities of practice, *Journal of Knowledge Management*, 12(1), 106-118
- Silverman, D. (2013). *Doing Qualitative Research, 4th edition*. London: SAGE.
- Styhre, A. (2002). The knowledge-intensive company and the economy of sharing: rethinking utility and knowledge management. *Knowledge and Process Management*. Vol. 9, 228-236
- Styhre, A. (2004). Rethinking Knowledge: A Bergsonian Critique of the Notion of Tacit Knowledge. *British Journal of Management*, 15(2), 177–188
- Szulanski, G. (1996). Exploring Internal Stickiness: Impediments to the Transfer of Best Practice Within the Firm. *Strategic Management Journal*, 17, 27-43
- Tsoukas, H. (1996) The firm as a distributed knowledge system: A constructionist approach. *Strategic Management Journal*, 17, 11-25
- Ward, A. (2000). Getting strategic value from constellations of communities, *Strategy & Leadership*, 28(2), 4-9
- Wenger, E. (1998). *Communities of practice: Learning, meaning, and identity*. Cambridge University Press.
- Wenger, E., McDermott, R. & Snyder, W.M. (2002). *Cultivating Communities of Practice: A Guide to Managing Knowledge*. Boston, MA: Harvard Business School Press.
- Zack, M. H. (1999). Developing a knowledge strategy. *California Management Review*, 41(3): 125-145