UNIVERSITY OF GOTHENBURG

SCHOOL OF BUSINESS, ECONOMICS AND LAW

Master Degree Project in Management

To share or not to share
A case study of inter-project knowledge sharing in a project-based organization

Finn Andersson

Supervisor: Niklas Egels-Zandén
Graduate School

To share or not to share

A case study of inter-project knowledge sharing in a project-based organization

Finn Andersson

Master of Science in Management, Graduate School
School of Business, Economics and Law, University of Gothenburg

Abstract

This paper investigates how knowledge is shared between projects in a project-based organization (PBO). This is relevant as PBOs usually have problems with sharing knowledge emerging in separate projects. By adopting a practice-based view of knowledge, this paper outlines how inter-project knowledge sharing occurred and what influenced this in a Swedish construction firm. The case study shows that knowledge sharing occurred in five different arenas and was facilitated by a handful of key knowledge brokers. It furthermore shows that knowledge sharing was influenced by three organizational norms and that the knowledge brokers were given power over the knowledge sharing practices. These findings contribute to Knowledge Management (KM) research and research concerning knowledge sharing in PBOs by suggesting that arenas, norms, knowledge brokers, and power are central to inter-project knowledge sharing. This paper argues that, when given power over knowledge sharing practices, the actions of a few knowledge brokers become the foundation upon which norms and practices are reproduced. Therefore, to fully understand why knowledge is, or is not, shared between projects researchers must understand the underlying power relationships in an organization. The managerial implications of this study are that managers should focus on the four above mentioned factors when constructing KM initiatives.

Keywords
Knowledge Management, Knowledge Sharing, Project-based Organizations, Knowing in Practice, Power.

Introduction

The knowledge which an organization possess and can effectively manage is a key aspect of their competitiveness and crucial for their success and survival (Hanisch, Lindner, Mueller & Wald, 2009; Kivrak, Arslan, Dikmen & Birgonul, 2008; Dave & Koskela, 2009; Ren, Deng & Liang, 2018). Towards this end Knowledge Management (KM) activities has in recent years been applied and implemented by firms in a multitude of business sectors and has become a worldwide area of interest for organizations and researchers (Dave & Koskela, 2009; Matayong & Mahmood, 2013). Another growing trend is project-based organizations (PBOs),

in which a majority of organizational activities are conducted in the form of projects (Ren et al., 2018). As projects are limited in time and discontinued upon completion often knowledge assembled during projects is lost, representing a major problem for PBOs (Kivrak et al., 2008; Ajmal et al., 2010, Ren et al., 2018). Focusing on inter-project knowledge sharing can help PBOs solve this problem and increase productivity, organizational learning, and competitiveness (Mueller, 2015). Research within this field outlines that PBOs tend to focus on sharing knowledge internally in projects but not between project teams (Hanisch et al., 2009; Mueller, 2014), and suggest information technology (IT) and/or organizational culture to be important factors (Wiewiora, Trigunarsyah, Murphy & Coffey, 2013; Mueller, 2014 & 2015; Ren et al., 2018).

Studies performed in project environments and PBOs report problems for PBOs to share knowledge between separate projects (e.g. Kivrak et al., 2008; Ajmal et al., 2010; Ren et al., 2018) and a need for more effective KM in PBOs (Hanisch et al., 2009). What influences inter-project knowledge sharing in PBOs has been researched to some extent but received considerably less attention than KM in permanent organizations. Overall, this depicts a practical and theoretical gap in understanding how inter-project knowledge sharing occurs and what influences this phenomenon (Hanisch et al., 2009; Mueller, 2014). In addition, PBOs tend to operate in knowledge intensive and highly competitive environments where successful inter-project knowledge sharing can help satisfy organizational knowledge needs (Wievora et al., 2013).

With the purpose to shed further light on how inter-project knowledge sharing occurs and what influences this phenomenon, this paper outlines a case study of a PBO, referred to as GotCon, acting in the Swedish construction industry. With a focus on how inter-project knowledge sharing was performed in practice on-site observations, interviews, and a document survey were used to study how organizational members at GotCon interacted and shared knowledge between projects. Differentiating from traditional KM research, this study used a practice-based view on knowledge highlighting the importance of informal practices and contextual implications (Mueller, 2015). Representing an alternative approach to study knowledge in organizations, practice-based theories provides a framework emphasizing social and processual aspects and considers knowledge to be situated in practices and socially constructed (Nicolini, Gherardi & Yanow, 2003).

Practice-based studies focusing on intra-project knowledge sharing (i.e. between project members) have outlined elements such as brokering, arenas and the social aspects of knowledge to be relevant for knowledge sharing (Gherardi & Nicolini, 2002; Koch & Theussen, 2013). Using these conceptual tools along with the overall view of knowledge as socially constructed, this paper sheds light on the importance of where knowledge sharing occurs, who facilitates this, and what contextual and relational elements affect this phenomenon. This paper contributes to the existing literature on KM and knowledge sharing in PBOs by recognizing that arenas, norms, knowledge brokers, and power are four factors central to knowledge sharing which have not been taken up in previous inter-project knowledge sharing studies. By showing that a few key knowledge brokers are given power over knowledge sharing practices, this paper argues that the actions of a few individuals can be central to how an entire organization acts in regards to knowledge sharing. In line with this reasoning, this paper suggests that organizational researchers should take the concept of

power into account when studying KM. This concept is usually left out of the academic debate (Gherardi & Nicolini, 2000), and when introduced it can help researchers understand why some KM initiatives fail while others succeed. Furthermore, this paper argues that managers should take the four above mentioned factors into account when considering KM and knowledge sharing in their organization. The findings of this study suggests that to enable knowledge sharing between projects a KM initiative must be aligned with the norms in an organization *and* with the interests of the individuals given power over knowledge sharing practices.

The paper starts with a description of the theoretical framework used in the study. This outlines KM research, with a special consideration for knowledge sharing in PBOs, and concludes with a description of practice-based studies and a brief discussion of why this framework was chosen. The following section describes the methods used for conducting the case study, the implications of these methods, and finishes with a description of the company studied. Then, the results of case study, with regards to how knowledge sharing occurred at GotCon, is presented. In the empirical analysis the sections presenting the case study material are accompanied by analyses relating to the theoretical framework and the concepts of norms, knowledge brokers, and arenas for knowledge sharing. This is followed by a discussion of inter-project knowledge sharing and how this is affected by norms, knowledge brokers, and power. The paper ends with a conclusion including academic and managerial implications.

Theoretical framework

Knowledge Management research

Throughout the last decades, knowledge and its organizational aspects have been areas of interests for organizational researchers. The questions of what knowledge is and how it is used in organizations has been discussed and the importance of knowledge as a resource has been recognized (Dave & Koskela, 2009; Matayong & Mahmood, 2013). KM activities has in recent years been applied and implemented by firms in a multitude of business sectors and has become a worldwide area of interest for organizations (Matayong & Mahmood, 2013). The concept of KM encompasses organizational activities that deal with knowledge such as acquiring, creating, storing, organizing, communicating, sharing, and (re)using knowledge (Alavi & Leidner, 2001; Ajmal, Helo & Kekäle, 2010). An underlying ambition of KM is to prevent the need for organizational members to 'reinvent the wheel'. By gaining access to and (re)using knowledge that others have previously acquired, employees may be able to solve problems more efficiently as they do not have to rediscover the knowledge needed (Diedrich, 2004). Central to achieve this, and other aspects of KM, is the process of sharing knowledge which also has been found to positively influence organizational learning, productivity, and competitiveness (Mueller, 2014 & 2015).

To a large extent KM research focus on identifying factors, often labeled barriers or enablers, to knowledge sharing in organizations (e. g. Hanisch et al. 2009; Ajmal et al., 2010; Israilidis, Siachou, Cooke & Lock, 2015). A large focus both from an academic and a managerial point of view is also put on IT-based KM systems as tools for enabling knowledge sharing in particular or KM in general (e. g. Kivrak et al., 2008; Dave & Koskela, 2009;

Matayong & Mahmood, 2013; Diedrich & Guzmann, 2015). In reviewing existing KM literature Israilidis et al. (2015) found that collaborative technologies (IT), organizational culture and structure, and management actions are important factors for knowledge sharing. Emphasizing the individual's role the authors also argue that employee attitudes and ignorance of KM influence knowledge sharing.

Inter-project knowledge sharing in PBOs

Most of the research cited above concerns itself with KM in permanent organizations. A growing trend in many sectors are PBOs where work is organized primarily in projects (Ren et al., 2018). When considering KM in the context of PBOs some inherent aspects of projects influence the KM process. A project is a temporary form of organizing work designed to achieve a goal, it is limited in time, and often assigned specific resources (Hanisch et al., 2009; Wastian, Rosentiel, West & Braumandl, 2015). Due to the transient nature of projects, knowledge acquired in a project is often lost when the project ends and the project team dissolves (Kivrak et al., 2008; Ajmal et al., 2010; Wiewora et al., 2013). Managing knowledge in PBOs is therefore faced with the inherent challenges that comes with this temporary form of organizing. As project are, more or less, unique and temporary endeavors that involve a workforce often consisting of internal and external experts, organizational learning and knowledge sharing becomes hard to achieve (Hanisch et al., 2009). For example, in the construction industry, where firms are often project-based, each separate construction project require specific and complex knowledge. Generally, organizations in this industry have problems with efficiently sharing knowledge between projects (Dave & Koskela, 2009). Furthermore, empirical studies suggest that PBOs generally focus on sharing knowledge internally in a project but often fail to share knowledge between projects. What influences knowledge sharing between project teams has also received less attention in academic circles, than studies of permanent organizations, which all in all has resulted in a practical and theoretical gap (Hanisch et al., 2009; Mueller, 2014).

Specific studies on knowledge sharing between projects in PBOs are quite uncommon but are generally in line with the general research on KM. Focus is put on factors that influence knowledge sharing and commonly IT and organizational culture are emphasized as the most important factors (Wiewora et al., 2013; Mueller, 2014; Ren et al., 2018). From their quantitative study of Chinese construction companies Ren et al. (2018) concluded that IT was the most important factor for between project knowledge transfer in PBOs. IT was found to be a critical element for communication and knowledge transfer and to completely rectify the issue of geographical dispersion of projects. In a multiple case study comparing the different cultures of four PBOs Wiewora et al. (2013) concluded that different organizational cultures lead to different inter-project knowledge sharing behaviors and outcomes. A culture emphasizing collaboration, non-competitiveness and friendliness was found to positively influence inter-project knowledge sharing. Mueller's (2014) quantitative study on cultural antecedents for knowledge sharing between projects found that organizational structure, output orientation, openness, and time dedication positively influenced knowledge sharing.

Practice-based approaches to studying knowledge in organizations

In contrast to traditional ways of studying knowledge the practice-based view provides a framework for studying knowledge as being performed and socially constructed. In this view organizational knowledge is viewed as a primarily social and cultural phenomenon, not as a mental processes taking place in the minds of individuals. Knowledge is considered to be situated in the practices in which individuals partake, in what they do together – their actions and interactions (Nicolini et al., 2003). The term *knowledge* is in practice-based research sometimes substituted with *knowing*, implying that knowledge is an activity (Cox, 2012). By being situated in practices knowledge is inherently related to actions and therefore studying what organizational members do is a key aspect of studying knowledge in practice. Furthermore, organizational knowledge is continuously produced and reproduced through participation making it dynamic and temporary (Nicolini et al., 2003). According to Nicolini et al. (2003) prevailing misconceptions about knowledge have rendered this field of study superficial and overly simplistic as knowledge has been considered an object, not a process. An object can be sent from individual to individual, received, used and then sent to the next. A process on the other hand is bound up in the circumstances which it entails and the context in which it occurs. These specific conditions influence the process, changing how it plays out and altering the nature and effects of it. The transfer, circulation, or sharing of knowledge therefore entails that knowledge is disembedded from its origin and natural context and then transformed when transferred (Gherardi & Nicolini, 2000).

Gherardi and Nicolini (2000) apply this view of knowledge in an empirical case study focusing on the circulation of safety knowledge. The authors conclude that safety knowledge circulates in an action net. As knowledge circulates between actors it is continuously translated (and transformed) and what safety entails is interpreted in different ways by different actors. Gherardi and Nicolini (2000) also raise the question of power and argues that power is a "[…] recursive, ubiquitous and contingent relational effect." (p. 345). Knowledge and power are interrelated, difficult to separate and aspects of the same phenomenon. Furthermore, power is a concept often forgotten and not addressed in knowledge related studies (Gherardi & Nicolini, 2000) implying a theoretical gap.

Adopting a view more centered on Communities of Practices (CoPs) Gherardi and Nicolini (2002) focus on how these facilitate knowledge circulation and transfer. In this article the authors use the term 'brokering' to explain how learning takes place in a constellation of practices. Brokering is described as an activity where a person – a broker – acts as a bridge between CoPs and facilitates knowledge transfer. By his day-to-day actions the broker becomes a living intermediary between actors in different CoPs as he is able to understand their specific fields of knowledge and get them to communicate. Brokering also includes copying practices from one community and exporting it to another for example by the broker being moved into a new setting and introducing, by persuasion and negotiation, elements of his earlier setting(s). This brokering practice creates a social structure which includes shared learning and is based on the brokers ability to translate knowledge from one practice to another.

Building on this research Koch and Theussen (2013) show how brokers and arenas, together with other factors, play important roles in how knowledge is shared between intra-project groups. Koch and Theussen (2013) use a similar definition of brokers, as Gherardi and

Nicolini (2002), where a broker is defined as an individual that actively participate in several CoPs. As described above elements from one CoP can be introduced into another through the broker resulting in knowledge coordination. Arenas are the context where CoPs meet, where knowledge is exchanged, and where brokers act. Building on Wenger's (1998) notion of 'boundary encounters' and Orr's (1996) study of Xerox repairmen, Koch and Theussen's (2013) arenas include formal settings, such as meetings and visits, and informal settings, like coffee breaks or lunches. While using the terms brokers and arenas to describe the nature of intra-project knowledge sharing the authors mainly focus on how other factors such as redundancy and governance structure influence knowledge sharing. By borrowing these concepts and applying them to the field of inter-project knowledge sharing this study emphasizes the important roles and interrelatedness of brokers and arenas.

Studying five knowledge intensive PBOs Mueller (2015) investigated how formal and informal practices at these companies were related to inter-project knowledge sharing. She found that organizational members developed informal knowledge sharing practices and used formal mechanisms for inter-project knowledge sharing. Mueller (2015) also concluded that cultural characteristics were enacted and expressed in knowledge sharing practices. To a larger extent than the previously described practice-based approaches, Mueller (2015) focus on organizational culture and how this is related to knowledge sharing practices. She describes that elements of a culture, such as a team orientation or a customer orientation, has effects on knowledge sharing practices.

Why use a practice-based approach?
Nicolini et al. (2003) argue that the inadequacy of contemporary KM activities and the disappointing results of KM systems, tools and techniques stem from the flawed assumptions about knowledge upon which these are based. Traditional approaches tend to ignore the social and processual aspects of knowledge and instead focus on technological or managerial aspects. Instead of recognizing knowledge as an effect of social practices traditional approaches propose IT solutions or management interventions as keys to solving organizational knowledge problems. In the words of the authors:

> […] what is required is recognition that both knowing and knowledge are first and foremost effects of social practices, and that it is toward practices and a practice-based approach that we need to turn to advance our understanding of these processes. (p. 25)

Although being fifteen years in the past these words still seem to ring true in the field of KM as studies continue to suggest that IT and/or managerial efforts are what is needed to help organizations improve their knowledge sharing (e. g. Ren et al., 2018). Furthermore, in the construction industry, constituted by a majority of PBOs, Lundberg et al. (2017) found that intranets were the most common solution used to facilitate knowledge sharing. Several other studies report a need for effective KM in PBOs and that efforts often fall short of their expected targets (e. g. Kivrak et al. 2008; Hanisch et al., 2009; Ajmal et al., 2010). Therefore, to use a different approach including a different view and definition of knowledge can arguably be beneficial both to organizations attempting to improve their KM and to nuance the academic debate. In line with the practice-based view on the social aspects of knowledge Styhre (2008) in his study of a rock construction company noted:

> One of the implications of the study is that conceiving of knowledge not as an individual property but as a social accomplishment may enable more detailed understanding of how intellectual resources are used in the construction industry. (p. 941)

With the aspiration to reach this detailed understanding the practice-based framework was chosen to study a PBO in the construction industry.

Summary

General research in the KM field commonly focus on barriers to KM and knowledge sharing within an organization. Studies suggest that in order to improve the KM overall and knowledge sharing in particular these barriers can be overcome either by cultural measures or by IT initiatives. These studies generally prescribe to an objectified view of knowledge where knowledge is seen as an entity which can be transported from individual to individual through a medium (such as an IT system or a document). Studies of PBOs are rare but generally prescribe to the aforementioned view of knowledge as an object and identifies the same types of barriers and suggests similar ways to overcome these.

The practice-based view of knowledge in organizations provides a different framework where knowledge is considered a social process, not an individual one. Practice-based studies generally focus on how knowledge circulates and is shared between different groups. Several of these have a CoP approach where emphasis is put on how knowledge is shared between intra-project groups (e. g. Suchmann 2000; Gherardi & Nicolini, 2002; Koch & Theussen, 2013). Some studies have also focused on how knowledge circulates between actors in a specific discipline or internally within a CoP (e. g. Cook & Yanow, 1993; Orr, 1996; Nicolini & Gherardi, 2000). Few studies with a practice-based view of knowledge, with Mueller (2015) being an important exception, have examined inter-organizational knowledge sharing and especially the field of PBOs remain largely unexplored by practice-based researchers. Using the framework of knowing in practice, and adapted concepts from different stems of practice-based research, this study differentiates from traditional KM literature and provides insights into the workings of PBOs with a focus on knowledge sharing between projects. The ambition has been to use previously developed concepts from practice-based research to understand how inter-project knowledge sharing occurred and what influenced this. These concepts have earlier been used to describe knowledge circulation and sharing between CoPs but have in this study been used to describe and conceptualize in what ways and why knowledge have or have not been shared between projects.

Methodology

Following in the footsteps of practice-based researchers this study was conducted as a qualitative study of the actions, behaviors, and attitudes of GotCon's employees in an ethnographic fashion (e. g. Gherardi & Nicolini, 2000 & 2002; Suchmann, 2000; Koch & Theussen, 2013; Mueller, 2015). It was conducted as a single case study providing the opportunity to come as close to the people working at GotCon as possible (Flyvbjerg, 2006). The ambition was to gain a deep understanding of the social, processual, and collective elements of knowledge sharing at GotCon which an ethnographic approach enabled (Watson, 2011). The study was conducted in collaboration with Anton Nilsson from Chalmers

University of Technology who simultaneously wrote his master thesis paper and worked part-time at the company. Data collection and preliminary analysis of the data was conducted collaboratively but final analysis was conducted separately. With the ambition to understand inter-project knowledge sharing this study, to a large extent, ignores intra-project knowledge sharing. To meet the criteria of being considered inter-project knowledge sharing the knowledge, information, or experience being shared was to stem from a different project (in time or space) than the recipient of this.

Research Design

The study was conducted as a case study of the company GotCon. The source material was collected by conducting interviews, observations, and a document survey which is a common case study methodology (Eisenhardt, 1989). In support of using a case study approach, in contrast to quantitative approaches, Flyvbjerg (2006) argues that case studies generate context-dependent knowledge whereas quantitative approaches generate context-independent knowledge. This context-dependent knowledge is the key to deeper understanding of a field, craft, or skill and arguably to understand a phenomenon as abstract as knowledge deeper understanding is of utmost importance. Furthermore, case studies are able to provide researcher with detailed situated knowledge in limited settings, like a single firm (Styhre, 2008). As knowledge is situated in the practices of an organization (Gherardi & Nicolini, 2000) to gain detailed situated knowledge of the setting, and what occurred in it, was imperative to understand the how and why of inter-project knowledge sharing at GotCon.

In line with the ambition to get close to organizational members an ethnographic approach was also chosen. Being present in the organization enables the researchers to understand the viewpoints and behaviors of those they study (Flyvbjerg, 2006; Watson, 2011). An ethnographic approach entails close observation of people in a social setting with regards to language used and actions performed in a cultural framework (Watson, 2011). This approach brings the benefit of the researchers being able to view and analyze humans as cultural beings affected by norms, values, and patterns of behavior. A key element in this approach is to not only observe but to also participate by asking questions and partake in conversations (Watson, 2011). The goal of an ethnographic study is to figure out 'how things work' in a specific domain (Van Maanen, 2011) which in this case was to figure out how inter-project knowledge sharing occurred at GotCon. Furthermore, being present in the organization enabled us to continuously observe what the organizational members did and, directly or at a later point in time, ask them about it. This in combination with interviews provided valuable insights into conscious and unconscious actions, and patterns of behavior, performed by the employees at GotCon.

In line with practice-based methods of studying knowledge in organizations this study focused on what people did and said. We studied the everyday work of the employees at GotCon and how they went about and organized their work. We tried to understand how they made sense of their world and identified practices around inter-project knowledge sharing which occurred from everyday events (Nicolini et al., 2003). As suggested by Gherardi and Nicolini (2000) we gave attention to how knowledge traveled and circulated in space and time and who the agents circulating this knowledge were. Furthermore, inspired by Koch and

Theussen (2013) we focused on where knowledge was shared. We studied these forums, or arenas, for knowledge sharing and gave attention to what occurred there and why.

Data Collection

As noted above, data was collected in three ways: interviews, observations, and a document survey. The data collection was undertaken by both of the researchers collaboratively. The first collection of data was a document survey of 29 documents gathered from the company's intranet. The documents were either steering documents or internal project documents and included an employee handbook, project checklist, meeting records, recorded learnings, start of project reports, and end-of-project reports. Steering documents were distributed by the central organization as help or guidelines for the employees and internal project documents were documents that were created during the course of a project. The document survey was conducted prior to the start of interviews and observations and provided a basic understanding of the organization.

The second part of the data collection process was the simultaneous start of making observations at a local project office, located in Gothenburg, and interviewing GotCon's employees. From the start of February, 2018, until the end of April we observed the daily activities and routines of the employees working at the local project office. We also participated in lunches, coffee breaks, hallway chats, the occasional construction site barbeque, and other informal interactions that took place. Observations made were recorded as journal entries on the day that they were observed, as close in time as possible, and used as source material for the study. We furthermore participated in meetings and an internal employee education seminar. Meetings were a more or less daily occurrence at GotCon and in total ten of these meetings were observed. Meetings were recorded by the observer taking notes during the meetings but were not taped and could therefore not be transcribed. However, in taking notes while participating in the meeting the researcher could record intangible elements of the interactions that took place such as the mood and the general atmosphere in the room. A few examples of the meetings observed are: internal project meetings, construction meetings with subcontractors, morning meetings, and cross-project white-collar worker meetings. The education seminar was a full day event conducted at the company's headquarter and was observed by one of the researchers. At this occasion notes were taken in the same fashion as during meetings. To broaden the scope of the investigation observations was also made during three days at GotCon's headquarters and at a local construction site and recorded as journal entries.

In addition to the observations, 15 individuals working at GotCon or involved in their projects were interviewed. Interviewees had varying organizational roles and responsibilities and worked in four different projects or in the management team. The interviewees were: a senior project manager, a senior production manager, a site manager, a production manager, a communications director, a project manager, a consultant, a subcontractor, a site foreman, and six project engineers. The interviews were conducted by both of the researchers together, taped, and then transcribed collaboratively. Prior to the interviews an interview guide was constructed. This interview guide was influenced by findings made in the document survey and by observations made at the local project office. The interviews were furthermore conducted in a semi-structured fashion where the ambition was to follow an agenda but at the

same time to allow us to follow up on relevant topics and insights that emerged in the interviews. The questions were open-ended and used as guidelines with the aim to nudge interviewees in the right direction while at the same time encouraging them to talk freely and set the pace of the interview (Silverman, 2013). During the time which the interviews took place the content of the interview guide changed as relevant information from the interviews and the simultaneously ongoing observations emerged. We aspired to conduct the interviews in an ethically sound way by being aware of the often uneven distribution of power that can occur in interview situations (Kvale, 2006). All interviewees were made aware of that their contributions were anonymous and that no names would be reported or appear in text. The interviewees were selected based on convenience and snowball sampling. First the individuals working in Gothenburg were interviewed, then individuals that were observed or often mentioned during the interviews as being of note in relation to inter-project knowledge sharing were interviewed.

Data Analysis

The data from the document survey, the observations, and the interviews was coded and analyzed using a grounded theory inspired approach. Grounded theory has been argued to be a well suited approach for researchers dealing with qualitative data from semi-structured interviews, case-study material, and observations (Martin & Turner, 1986). As the ambition was to accurately depict the knowledge sharing practices at GotCon this approach was deemed appropriate. The area of study was approached with an open mind and in analyzing the data the aspiration was to continuously stay as close to the source material as possible, to build theory grounded in the data. Preliminary open coding was conducted collaboratively by both of the researchers in a line-by-line fashion, with codes stemming directly from the data (Goulding, 2002). Adhering to the three principles of note writing, concept discovery, and concept definition (Martin & Turner, 1986) we moved on to axial coding and then selective coding, as suggested by Colin & Hussey (2009). Final analysis was conducted by the author alone and at this stage concepts from the practice-based research framework were found useful in explaining themes in the data. In analyzing the findings, the central themes of *key individuals* and *arenas* for inter-project knowledge sharing became evident. Abstracting the data even further the three themes of *norms*, *knowledge brokers* and *power* were identified. These themes helped explain both how, in what ways, and why inter-project knowledge sharing occurred at GotCon. Using the practice-based view of knowledge and concepts derived from this framework also shedded light on why inter-project knowledge sharing did not occur and how the interrelatedness of said themes was an important aspect.

Limitations of this study in terms of generalizability mainly arises from the limited amount of data collected and analyzed. The data stems from one organization and from individuals working quite closely together in this organization. The risk exists that the sample used is flawed and represents only a minority of the people working at or with GotCon. However, with the aspiration to broaden the scope and generalizability of the study individuals working in different projects and at different organizational levels were interviewed and observed. Furthermore, this is a single case study of one medium sized PBO in the construction industry limiting the ability to generalize for other, larger or smaller, PBOs in this industry or in other industries. However, nothing that has come to the attention of the

researchers indicates that the findings made at this organization does not apply to other organizations as well. Especially when considering PBOs in the construction industry. Being present in the organization and participating in organizational activities is a factor that both has brought strength and limitations to the study. The risk exists that when being present in an organization one becomes biased or gets tunnel vision, only seeing either what one expects to see or 'not seeing the forest for the trees'. Using a combination of methods (interviews, observations, and document analysis) were a measure to counteract this risk and is beneficial for the strength of the study (Watson, 2011). This combination and being present in the organization has also led to the ability to nuance the data and ascertain both what organizational members did, why they did it, and how they made sense of it.

The Company

GotCon is a project-based construction company operating in western, central and eastern Sweden. As the company wished to remain anonymous they were given the alias GotCon. The company's headquarters is located in central Sweden and at the time of the study GotCon had approximately 150 employees. Established in 2006, GotCon had during the last couple of years experienced a growth period, both financially and in terms of the number of employees, and in 2016 reported a turnover of approximately 900M SEK. GotCon's operations were divided into projects scattered across different parts of Sweden but the company was centrally governed from its headquarters. Regional project offices, housing GotCon's staff, were often located in proximity to local construction sites. GotCon used a strategy called 'partnering' which, according to GotCon's website, entails a close collaboration with all actors in a project from start to finish. Partnering comprised a number of interactive processes such as common goals, technical cooperation, procurement, and teambuilding. GotCon cooperated with the client, subcontractors, and consultants to create a shared way of working. In practice this entailed that all parties continuously participated in meetings, workshops, and evaluations and together made decisions concerning financials, planning and production. This study mostly took place at GotCon's Gothenburg office which was located right next to the construction site of project A. The local office building contained offices for approximately 10 of GotCon's white collar workers, 10 offices for blue collar workers, and a few offices for subcontractors and representatives from other companies involved in the project.

Empirical Analysis

Inter-project knowledge sharing at GotCon was not random and without order, it took place in certain forums – or arenas – and was facilitated by certain key individuals. These individuals connected different projects, past and ongoing, to each other and facilitated knowledge sharing. Furthermore, certain norms were evident in the arenas and these norms seemed to be aligned with the general attitudes of the organizational members and the opinions and actions of the key individuals. These individuals had vast amounts of experience, which they shared in different ways, and had positions that enabled them to influence how, where, and in what ways knowledge sharing unfolded. Following sections will outline the identified key individuals and the arenas for inter-project knowledge sharing at GotCon. They will describe

how organizational members acted in these arenas and what norms, attitudes, and interests that were encountered.

Key Individuals

During the empirical study of GotCon's activities and the actions of organizational members, four key individuals that in different ways initiated and facilitated inter-project knowledge sharing were identified. These individuals were all senior members of the organization and all had extensive experience (20+ years) from the construction industry. The four identified key individuals at GotCon were a site manager, an organizational developer, a senior project manager, and a senior production manager. Who they were and how they facilitated knowledge sharing will be described below but a more extensive description, including examples, is provided in a later section.

The site manager (Mike) was a man tasked with the overall responsibility for the construction of Project A. His duties ranged from the economic responsibility of the project to overall workplace environment responsibilities. Mike had worked at GotCon since the start of the company and had 35 years of experience from the construction sector. Day-to-day he was observed working closely with different work groups both in the office and on the construction site. He participated in numerous meetings and was a contact point for both the white- and blue collar workers. Mike was the person in project A which you came to with questions, especially concerning the production process. He shared an office with a project engineer who continuously sought his help with practical issues and was often seen answering questions and discussing issues with engineers, subcontractors, craftsmen, consultants, and other actors involved in the project. Most often Mike shared knowledge internally in project A and, during some meetings, he was observed sharing knowledge stemming from other projects in time or in space.

The organizational developer (Eliza) was a woman tasked with developing the overall business of GotCon specifically with concern to their processes and partnering activities. Eliza was one of the founders of the company and had approximately 25 years of experience from the construction industry. Eliza's work tasks made her travel extensively between the different regions where GotCon's projects were located and the head office. Furthermore, in her position as organizational developer she received feedback and results from evaluations and internal control programs. When on site in Gothenburg she participated in some meetings and mingled with the office workers who sometimes had questions for her concerning specific activities such as bid for contracts. Eliza was in charge of the internal education seminars and employee training function called GotCon academy. She both personally conducted some of these seminars, referred to as modules, and oversaw their content. At these modules she relayed personal experiences and results from evaluations and controls.

The senior project manager (Charles) was a man tasked with the coordination, planning, and production of several projects. He also had the overall responsibility for other project managers within the field of special projects. Charles had been working at GotCon for seven years and had more than 20 years of experience from the construction industry. His office was located at GotCon's headquarters but he spent quite a lot of time visiting different projects. Charles sometimes participated in internal project meetings in project A and on occasion relayed his experiences at these meetings. Charles was a person which several of the

engineers actively sought help from. Through face to face conversations, telephone calls, or emails he shared with them his experiences and knowledge. Charles also participated in executive planning meetings and coordinated site visits.

The senior production manager (Steve) was a very experienced man who had been at GotCon since the company was founded and had over 40 years of experience from the construction industry. Formerly working as a site manager he had recently stepped in to a new role as production support. Steve was tasked with participating in the early stages of projects and helping with planning and budget as well as during the later production stages. His responsibilities included supporting site managers with specific issues such as which materials to choose and to overall teach and relay how the company worked and their values. Steve's assignment was not to coordinate and enable knowledge sharing between different ongoing projects but to relay the knowledge he had assembled during his many years in the industry. When present in Gothenburg Steve was a person which employees turned to in their everyday work searching for help.

Analysis: Mike, Steve, Eliza, and Charles were inter-project knowledge brokers that brokered knowledge sharing between GotCon's separate projects. They all held formal top positions but it was not by a function of their hierarchical positions that they brokered knowledge sharing, it was by their actions. In different ways these four individuals' actions connected projects separated by time or space (Gherardi & Nicolini, 2002; Koch & Theussen, 2013).

Mike brokered inter-project knowledge sharing by referring to past situations and projects, relating his experiences to the present project. Mike continuously shared his experiences with project members, but seldom with members outside of project A. In this sense Mike was a project restricted broker, acting inside the boundaries of project A. By interacting with individuals involved in this project and telling them about his experiences from past projects he acted as a bridge between different projects separated by time, in line with Gherardi and Nicolini's (2002) definition of brokering.

Eliza's knowledge brokering took place mainly at the GotCon academy in an educational fashion. By establishing and running the academy Eliza provided organizational members with a forum, an *arena*, for inter-project knowledge sharing. At the modules organizational members were encouraged to share experiences with each other and interact. Furthermore, Eliza herself shared her personal experiences assembled from participating in numerous projects, and educated the employees based on these experiences. In her position she also received information generated by different projects and sometimes relayed this to organizational members in more informal ways. Eliza's educational brokering created a social structure including a shared learning platform where dispersed organizational members could communicate and learn from each other and from Eliza (Gherardi & Nicolini, 2002).

Charles primarily brokered knowledge sharing between projects in different meetings by relaying his views and experiences from both past and ongoing projects. He was a meeting broker who relayed personal experiences and also gave suggestions of elements of one project that could be used in another project. Via the planning meetings he encouraged a site visit and directed the visiting project group to consider specific elements he thought they might find useful. In meeting situations Charles became a living intermediary between actors in different projects. He was able to understand the specific fields of knowledge involved in different

projects and managed to get individuals in these separate projects to communicate. The success of this brokering was based on Charles ability to translate knowledge from one project to another and coordinate this knowledge (Gherardi & Nicolini, 2002; Koch & Theussen, 2013).

Steve brokered knowledge sharing between projects by personally relaying his experiences, while participating in different projects he interacted with the members of these projects. By introducing elements from one project into another he brokered knowledge sharing, in line with Koch & Theussen (2013). Steve was in this sense a multi-project broker who, in contrast to Mike, moved between different projects.

Based on the analysis above it is possible to distinguish four types of brokers: the project restricted broker (Mike), the educational broker (Eliza), the meeting broker (Charles), and the multi-project broker (Steve). Further examples of how these different types of inter-project brokering took place is provided below and categorized by where, i.e. in what *arena*, it occurred.

Arenas for knowledge sharing

Inter-project knowledge sharing occurred in certain arenas. These were forums, like places or settings, where organizational members met and interacted face to face, via telephone, or virtually. In these forums the key individuals acted and facilitated knowledge sharing but not all knowledge sharing was initiated by these. Knowledge sharing also occurred as organizational members reached out to each other, sought knowledge from past projects, and generally interacted at meetings, modules or site visits. Furthermore, in participating in these forums we encountered certain norms that seemed to influence employee behavior and reflect the general attitudes in GotCon.

Informal interactions

In informal settings (hallway encounters, lunch and coffee breaks, daily interactions during work hours, etc.) knowledge was shared between organizational members in a spontaneous fashion. However, as noted above most of the knowledge sharing in these settings were of an intra-project nature. GotCon employees working on the same project daily interacted with one another, helped each other with problems they encountered, and asked their closest colleagues for help when they encountered problems they themselves could not solve. When observing the employees, it was noted that it was common to see them in each other's offices working together and exchanging information. Instances of inter-project knowledge sharing in these informal settings were more uncommon but occurred both by the facilitating actions of Steve and Eliza and in a spontaneous fashion.

Inter-project knowledge sharing occurred as organizational members spontaneously called and emailed colleagues working in other projects. Often the employees sought knowledge from individuals who had the same position or work tasks that they themselves had. Tasked with purchasing, project engineer 1 described that he sought useful knowledge by calling colleagues working in other projects. He asked them questions about purchases and suppliers and used the knowledge they shared with him to for example make purchases from trusted suppliers. During an interview production manager 1 described that he used to call or

email colleagues with questions about how to perform his work. He usually received very explicit answers which he had great use for. Describing this interaction, he said:

> *Production manager*: I call people who, for many years, have or have had the role that I have. I email them and they respond, in less than 24 hours. The knowledge circulation is very good. […] I can send an email where I ask if I should focus on quality self-controls during the planning stages. Should I take it up during the start-up meeting or should I wait four weeks until we have chosen which system to use? I received the response that I do not have to do that during the first meeting but instead I should focus on structure, routines and getting to know people. Then focus on quality on the third meeting.
> *Interviewer*: So, people take time to answer you properly?
> *Production manager*: Yes, they really do, if I send a list with 15 points I get answers on everyone. Basically written in another color. Then the first person sends it to another colleague whom I also emailed and that person answers every point so it is really good.

In this and in similar ways GotCon's employees contacted each other looking for information about how something previously had been performed and used this in their work. The people who were asked were usually helpful and shared what they knew or referred to someone they thought could help.

In informal settings knowledge sharing was also facilitated by Steve and Eliza. Steve in his supportive role were at times present at the Gothenburg office and assisted employees that sought help. An example of this was when a newly hired project engineer [5] had problems creating a workplace disposition plan and sought out Steve with questions about how to properly create one. Relating back to what problems usually occurred at a construction site and what was important to take into consideration, Steve coached the project engineer. Steve pointed out that it was important to place the crane so it reached all parts of the construction site, and to place storage units close to the site so workers would not have to walk far to get tools or equipment. By referring to how they had done it in previous projects and what they had learned from this Steve shared insights and learnings with the project engineer who used these to create the workplace disposition plan. For his expertise and extensive knowledge Steve was also called in to look over plans before the production of project A was initiated. Project engineer 4 described that before the production started Steve helped him make decisions about weather protection and lifts. In informal settings, Eliza facilitated knowledge sharing from previously conducted projects in a similar fashion. When creating bid for contracts project engineers usually found it useful to look at older bids and reuse elements from these to construct new ones. In order to know which specific bids, and what elements of these bids, that were useful they went to Eliza and asked her. In her position Eliza received feedback on bids used in previous projects and knew what usually worked and what did not. Eliza both directly answered queries about this when asked and instructed project manager 1 about which elements of the bids that usually were successful. When project engineer 2 was tasked with constructing a new bid she both contacted Eliza and project manager 1 and received help. With this in hand she constructed new bids based on elements of the old ones.

Analysis: These informal settings constituted an informal arena for inter-project knowledge sharing (Koch & Theussen, 2013). In this arena knowledge sharing was brokered by Steve or Eliza but also spontaneously occurred. Steve brokered knowledge sharing between projects by

on occasion being on site at project A. By participating in project A he was available to the project members to contact and ask for help. As he relayed his experiences and, directly or indirectly, related to earlier conducted projects he brokered knowledge sharing. The examples provided above stems from project A but in his role Steve performed similar actions in multiple projects. However, only when Steve was asked to come and help he actively shared his experiences. He worked mostly in other projects and only on occasion visited the Gothenburg office. Eliza also brokered knowledge sharing in this arena by passing on information assembled from previous projects to a participant in an ongoing project.

The limited and somewhat isolated examples of inter-project knowledge sharing described above suggests that knowledge sharing in the informal arena were an uncommon occurrence. As projects were geographically dispersed and organizational members generally tended to be occupied in their assigned projects few opportunities to interact informally with members of other projects occurred. The knowledge sharing that occurred in this arena furthermore seemed to be related to two cultural norms. A behavior often encountered in this arena was that organizational members actively searched for knowledge and there seemed to be a norm to actively perform this search for knowledge. The examples above depict instances where organizational members search for information about something that could help them in their work. Furthermore, during interviews and observations we encountered the general attitude that an employee at GotCon should search for the knowledge they needed. With a few exceptions most employees prescribed to this norm and tended to actively search for knowledge in their daily work. Another norm evident in this arena, and generally in GotCon's organization, was that employees should help each other. There was a willingness to drop what one was doing in order to help others. This is illustrated in the above examples and we also encountered many more examples of this during our time in the organization. In essence, GotCon's organizational members wanted to help each other and did, but at the same time they expected that if someone needed something they would search for it.

The server

In their work, GotCon's employees had access to an intranet which they referred to as 'the server'. This contained a folder structure of GotCon's ongoing and previous projects as well as official steering documents and support documents. The server gave the employees the possibility to both download documents from other projects and upload their own documents. In this forum, GotCon employees generally searched for and gathered documents from other projects and used these to perform their work tasks. Especially within the areas calculations, bid for contracts, and purchasing GotCon employees used the work other projects had previously performed as templates or to find useful information. Describing how he used the server to gather knowledge about purchasing project engineer 1 described that he accessed documents from other projects, viewed the information recorded, and used this in his work:

> *Project engineer*: All projects are open so it is easy to go back and look at how they have done it. Then you can see what they have done. I usually view inquiries and purchase compilations or bid evaluations. I look at which suppliers they asked, what they charged, who they chose, and why.
> *Interviewer*: In what ways do you use this?
> *Project engineer*: I structure all my documents concerning purchasing based on this. The way you structure documents, queries, and purchases, and contracts is structured in the same way.

As described above in constructing bid for contracts knowledge from previous bids were useful for creating new ones. Several project engineers described that they accessed these via the server and reused elements of them when constructing new ones. Elaborating on this activity project engineer 2 commented that: "[…] you don't have to reinvent the wheel every time", implying that the earlier bid for contracts contained elements which could be reused. Furthermore, project engineer 3 commented that he thought it was unnecessary to create a new bid completely from scratch. When creating a bid for windows he checked how they in other projects had formulated bids and what offers they had received, he then compared those to his own bid and offers. Similarly, when making calculations he searched for how earlier projects had made these and used it to form knowledge about how to create a proper calculation. He commented: *"It is good to be able to see what they included so that you don't miss anything, and what some things cost, what numbers they have used."* In these ways knowledge was shared between projects as GotCon employees accessed and reused elements of previously conducted and/or ongoing projects. GotCon's management also used the server to share steering and support documents (such as project checklists, quality checklists and quality assurance plans) and Eliza and Charles took part in creating and revising these.

Analysis: The server was an arena for inter-project knowledge sharing where GotCon's employees searched for information about how a task had been performed in a previous project and used this to form their own knowledge about how a task should be properly performed. As in the informal arena the knowledge sharing behaviors in this arena were governed by the norm that one should actively search for knowledge. The examples illustrate that GotCon's employees searched for knowledge on the server, and used elements of it in their work. A common fact for these two arenas was that GotCon's employees had to search for knowledge, it was not handed to them. Another notable element of the actions associated with the server arena was that generally the knowledge transfer took place from the server to the user. Most of the employees primarily used the server to gather knowledge but not intentionally to share it, especially not to individuals in other projects. When the employees uploaded documents they did it with their own project and their project colleagues in mind. Interestingly, this is in line with the *search* norm. Employees were not required or encouraged to use the server to share knowledge between projects but they were encouraged to use it to search for knowledge. The occurrences in this arena therefore illustrates knowledge sharing occurring in an unintended way. Knowledge sharing in this arena was not actively encouraged and only marginally brokered but still it occurred as employees continuously sought knowledge here. Mueller (2015) also found that the database, while not intended for inter-project knowledge sharing, sometimes helped new project members to learn from other's experiences. In her study, organizational members accessed this database and searched for reports, in the same manner as in GotCon, but as members did not donate enough time to report writing and reflecting on lessons learned this activity did not always lead to knowledge sharing and learning. Similarly, this might also have been the case in GotCon as organizational members seldom uploaded documents with the intention of sharing it with members of other projects and reflecting on lessons learned was not an activity that employees engaged in.

GotCon academy

The GotCon academy was a corporate function for employee training and education. It was commonly referred to as an activity where knowledge was shared between projects and the general opinion towards it was very positive. All of GotCon's employees took part in different modules continuously and it was a rather normal occurrence. The modules always had an assigned focus area (such as cost control, process management, leadership, calculations, production, organizational culture etc.) and were led by a GotCon employee, often from the management team, or by an external expert. The participants generally came from different projects and had different roles, tasks, experience, and ages. According to Eliza and a consultant involved in administering the academy they made a conscious effort to mix less and more experienced employees. During the study one of these modules was observed which was led by Eliza and focused on process management. During the module some spontaneous knowledge sharing among participant took place but a majority of the knowledge sharing came from Eliza. On occasion a participant, often a more experienced one, shared how they approached a problem or how they performed a task. For example, describing how to conduct a workplace satisfaction survey a project engineer shared with the others how she performed these surveys. The following interaction took place:

> *Project Engineer [6]*: I usually give the craftsmen printed paper forms and ask them to do it immediately, all together.
> *Project Manager [2]*: Then you will have to put it into the computer manually?
> *Project Engineer: [6]*: Yes, I have to but you usually have to do that anyways. It is a good way because the forms get filled. If you email them people forget to do it, even if you remind them. If you give them a paper form they do it.

Spontaneous knowledge sharing like this occurred occasionally during the day but generally it was Eliza who directed the discussions. Eliza had a clear agenda for the day with specific focus areas and a few key points. One example of these key points were to always have an operating schedule when conducting a start-of-project workshop. Eliza made the importance of this clear by emphasizing it several times, writing it on the whiteboard and initiating a discussion about what to include on such a schedule. Another point that Eliza emphasized was to place chairs and tables in small group constellations, referred to as 'islands'. At times during the day the participants were split up into smaller groups to discuss a certain issue. Eliza interacted with the different groups and when one participant asked her about how to place tables and chairs she answered:

> Islands. It is softer and the most relaxed way of sitting together. We have tried to sit in a U-shape but it was too much pressure.

When the whole group reformed and went through what they had discussed Eliza brought the same issue up again:

> I want you to think by yourselves and experiment. But, what I do not want is 20 more years of experimenting. Islands we have experimented with and it is better than to sit like in a classroom or in a U-shape when you are a lot of people.

The operating schedule and how to place tables were elements of how to conduct a start-of-project workshop which Eliza emphasized with extra care. She had during her years at GotCon conducted numerous of these workshops and seemed sure of which elements were

important to consider and what to do and not to do. When an element or issue came up that she though important she emphasized it and started a discussion around it. When issues not considered as important sprang up she steered the conversation away from these, directing the module and the discussions it involved.

Analysis: The academy was a formal arena for inter-project knowledge sharing where participants in general and Eliza in particular shared knowledge, views and experiences. In contrast to the general opinion at GotCon the observations made during this module suggested that it was less of a knowledge sharing forum for the employees participating and more of an education session based on Eliza's views and experiences. The importance of the operating schedule and how to place tables were examples of knowledge which Eliza had gathered through years of conducting start-of-project workshops and by sharing this with the seminar participants she brokered knowledge sharing from past to ongoing projects. This arena was governed by a different norm than the server and the informal arena. In this arena to share knowledge with one another was explicitly encouraged and spontaneous knowledge sharing did take place. Sharing experiences and views were the general accepted behavior and the requirement to actively search for knowledge seemed to be suspended. The interviewees generally expressed a very positive view of the modules, they usually found them rewarding and praised the knowledge sharing aspects. A majority furthermore claimed that they took knowledge with them which they had use for in their work.

Meetings

Throughout the construction process numerous meetings took place. Most meetings were internal construction meetings concerned with the ongoing production and focused on issues in, or aspects of, the construction process. During these meetings it was normal for participants to share their views or experiences when the agenda broached a subject that concerned them. A project engineer involved with production issues discussed these and a ventilation subcontractor discussed ventilation issues. In a few of these meetings inter-project knowledge sharing occurred when an individual with experiences from previous projects shared these. Specifically, Mike and Charles were on occasion observed sharing previous experiences, connecting a past project to an ongoing one. For example, during an internal project meeting Mike at various times shared his knowledge by relating to how things usually unfolded in a construction process. He related ongoing problems, concerning for example ground laying, to the last project he participated in and expressed that it was "the same thing last time". He generalized problems that occurred in the production process and noted that it was "the same problems every time". Based on this he counseled his colleagues on how to solve these problems and also how to communicate these solutions. Another instance of inter-project knowledge sharing occurred in a meeting where both Mike and Charles participated. During the meeting the issue of accidents on the site was discussed. It had come to the attention of the project management that when a minor accident occurred the person involved or injured was ashamed and sometimes failed to report that an accident had occurred. This was an important issue to rectify because of statistical and safety reasons. At the meeting Charles began telling a humorous story of a plumber who in a previous project happened to swallow his screw nut, the plumber was ashamed but still reported the accident. Mike

followed Charles by telling two humorous stories of serious accidents where the people involved where ashamed, and did not want to report their accidents but still did. Mike and Charles related this to the ongoing production of project A where project engineer 4 had hurt his elbow when shoveling snow, in this case he had also been ashamed but had reported the accident.

On occasion meetings of a cross-project nature also took place. These were usually white-collar worker meetings or executive planning meetings. These meetings were few and less common but here employees working in different projects met, interacted, and sometimes shared knowledge. White-collar worker meetings took place approximately once every second month and included employees from two or more projects. During an observation of such a meeting some examples of inter-project knowledge sharing occurred. During a discussion concerning purchasing project engineer 4, working in project A, expressed that he received different prices from one supplier depending on if he ordered online or called/emailed. This was previously unknown to production manager 1, working in project B, who participated in the subsequent discussion that followed this remark. Another problem that a project engineer 4 shared with his colleagues in project B was difficulties that had occurred when consultants had failed to produce drawings at the appointed deadline. This was a recurrent problem that was usually solved by contacting the consultant and expressing the urgency of the situation. The meeting was led by project manager 1 who relayed information from GotCon's management and decisions taken on the planning meetings. He followed a pre-set agenda and let discussions spring up without directly participating in them.

Executive planning meetings took place once every two weeks and was a forum for the management team, the senior employees, and the project managers to discuss issues and make decisions. Statements from interviews suggests that during these meeting issues from different projects were raised and discussed. One interesting example of such an interaction was when Charles encouraged project manager 1 to, along with his colleagues in project A, conduct a site visit. Project A was in its planning phase and Charles had an overview of both this and the ongoing project F. Charles not only encouraged the visit to take place but encouraged members of project A to specifically look at the time management, the morning meetings, and the walls that had been used in project F. The site visit took place and the project A group ended up using some of the same elements that had been used in project F.

Analysis: Meetings were an arena for inter-project knowledge sharing in which and Mike and Charles brokered knowledge sharing and in which organizational members had opportunities to interact and share knowledge with each other. Mike's knowledge brokering was restricted to sharing knowledge with the participant of project A while Charles' brokering spanned across projects. This arena was governed by the same norm as the academy as spontaneous knowledge sharing was encouraged and occurred. GotCon's employees did not seem to actively search for knowledge in meeting situations but instead shared experiences and knowledge without being asked. In this arena examples of inter-project knowledge sharing were a lot less common than examples of intra-project knowledge sharing and only sometimes spontaneously occurred. In situations where members from different projects met some examples of spontaneous inter-project knowledge sharing was occurred, but to a large degree the meetings were centered around relaying information from GotCon's management. In the

example provided above and in other instances project manager 1 while in a position to broker knowledge between projects did not. He was tasked with conducting a meeting where inter-project knowledge sharing did occur but he did not himself participate in brokering this knowledge. This points to the fact that it was not their positions in themselves that made the four identified key individuals into knowledge brokers, it was their actions (Gherardi & Nicolini, 2002). Charles' brokering of knowledge across projects in the planning meetings was tied to his position at the top of several projects, but it was his actions that initiated and facilitated the transfer of knowledge between project F and project A. The site visit that was conducted on Charles' initiative and encouragement was a successful example of inter-project knowledge sharing and will be further outlined below.

Site visits

Site visits were an activity where employees from one project visited the construction site of another project. At GotCon these were conducted on an occasional basis and generally the attitude towards this activity was positive. The employees expressed that to visit other sites inspired them and encouraged social interactions with members from other projects. This led to exchanges of experiences and inter-project knowledge sharing. In addition, the relational aspect of meeting employees in other projects was also appreciated. An interesting example of knowledge sharing during one of these site visits occurred when project group A visited the construction site of project F. As described above this visit had been encouraged by Charles who did not participate in the visit but had directed the visitors to look closely on the time management procedures, the morning meetings, and the cellar walls. Mike, who participated in the site visit, described that before coming to the site he knew about the cellar walls and planned to look to see if they were useful in project A. Mike, and his colleagues, found the walls to be a solution to a moist related issue they faced and after the visit ordered the same types of walls from the same supplier and subsequently used them in project A. When asked about how this occurred Mike explained:

> We went to Uppsala and met them, they had acquired the walls to a school project. Really good, LECA [Light Expanded Clay Aggregate] prefabricated wall system for constructing light walls where you do not want to use plaster because you want better moist resistance. […] We caught this when we were there and it was just to adopt it here [at project A] because we thought it was a great solution. […] It was just something that we uploaded from them, copied, and used here as well.

During the same site visit a similar occurrence took place concerning the time management system and the morning meetings. Again the visiting group had these elements in mind as Charles had encouraged them to look specifically at this. The time management procedures used in project F was not wholly adopted but it influenced how the time management procedures was designed in project A. Project engineer 4 described that they liked parts of the procedures they encountered in project F but that it did not fully fit how he and Mike wanted to work, he explained:

> We had a focus during the visit to look at their time management system and morning meetings and stuff like that. But then when I looked at what they did it was really good but it is not really how we decided to do it. Some things they did me and Mike did not like so much. For example, they had an entire board with time plans which was way too much, eight A4 pages, so we try not to do it exactly like that.

While the project members of project A did not fully agree with the time management procedures they found in project F they were more enthusiastic about the morning meetings. These were short, approximately 15 minutes, early morning meetings which they referred to as pulse meetings. Conducted every day, at 6.45, this was where craftsmen could raise issues they wanted to discuss and the site management could present day-to-day priorities or changes to had sprung up. Project A adopted these from project F and used this type of meetings during the construction of project A. Project engineer 4 noted: "We took these morning meetings which they used and used them and we think they are great."

Analysis: The site visits were an inter-project knowledge sharing arena where employees had the opportunity to interact face to face. This arena seemed to some extent be governed by a sharing type norm but the visitors also came looking for specific elements of the construction process. In other words, even in this arena where sharing knowledge between projects was, more or less, an objective the norm that employees must actively search for knowledge existed and influenced actions. What the visiting group looked for was furthermore influenced by Charles' actions previous to the visit. When asked about what they took with them from this site visit the interviewees all emphasized the elements which Charles had encouraged them to specifically observe. It is an interesting occurrence that no other practical examples of successful knowledge sharing were described by the interviewees and supports the importance of Charles as an inter-project knowledge broker. Mike on the other hand participated in the site visit but was only on the receiving end of the knowledge sharing that occurred. It is of course possible that he shared knowledge when interacting with the members of project F but no examples of this were observed or described during the study. This suggests that Mike not continuously but only on occasion acted as a knowledge broker, and that he was restricted to project A. Overall, the activity of site visits was a formal knowledge sharing arena where mostly informal knowledge sharing occurred. The visiting group were encouraged to look at specific parts of the construction process but did in fact not have a formal agenda for the visit. Along with a majority of the examples described above this suggests that knowledge sharing between projects at GotCon occurred mostly in an unconscious and unplanned manner.

Attitudes and opinions
Related to the norms, behavioral patterns and actions of the employees were their attitudes and opinions. During our time in the organization we encountered certain attitudes that recurred in different settings, groups, and times which were related to how organizational members acted. Generally, the attitudes of the employees at GotCon and the opinions of the key individuals mirrored each other. One general attitude at GotCon was that one should actively search for knowledge. This was also in line with the opinions of the key individuals at GotCon. In interviewing Charles, Mike, and Steve they all, in different ways, described that this was the proper way to act. The following three examples are from separate interviews but describe the same attitude towards searching for knowledge:

> *Charles*: The young must themselves try [to find knowledge] then return with questions and then try. After that you can discuss it together.

> *Mike*: It is up to the one who is initiating a project to be a little curious and want to know more. It is hard for us, who are occupied in a project, to give to the other. It is that project that has to listen

and find out what methods we used, and ask us questions. […] You can't count on that the one who finishes a project to say: 'well now they are initiating a school project, think about this and that'.

Steve: It is up to each and everyone to search, you wonder about something and look for information.

Hand in hand with the attitude that one must search for knowledge was the positive attitude towards helping each other. As noted above, organizational members were on many occasions observed helping one another with everyday tasks and issues. When asked about this behavior and if others were generally willing to help all interviewees claimed that this was embedded in the culture of GotCon. Employees generally showed a willingness to help others when they encountered problems and tended to share what they knew. From the first week of the study this willingness to help with problems and share views and opinions was noted by the researchers as we were from the start of the study met with openness, positivity, and acceptance. The examples above of the key individuals' actions also show this willingness to help and to share experiences, verbally this was also continuously encouraged by these individuals.

A second general attitude in line with the opinions and actions of the key individuals was the attitude towards reading end-of-project reports. These reports were summaries of conducted projects and contained descriptions, drawings, pictures and a project evaluation including a lessons learned section. Among GotCon's management the general opinion was that these were a potentially useful source of information, however these reports were not read nor used. Eliza was in some ways responsible for distributing information and learnings from these reports but expressed that she did not have the time to actively do this. Neither Charles, Mike, nor Steve commonly read these reports and similarly neither did the other employees. The reports were via the server accessible to all employees but were not commonly accessed. When asked about this, GotCon employees expressed that they did not have time to read the reports, did not think these important, or did not know they existed. When asked about if he read the end of project reports project manager 1 answered: "No, it is more fun to call and talk to someone". This related attitude was also widely dispersed in GotCon. Talking to each other, either face to face or by phone, was considered a more fun and interesting way to communicate by than other ways of communication. This was also what the key individuals in GotCon encouraged. On many occasions employees were encouraged to call each other when they encountered a problem. At the end of the observed academy module Eliza explicitly encouraged the participants with the words: "Talk to each other, it is okay to call and call people who has done it before."

A third general attitude at GotCon was how the employees viewed the server. While they to some extent used the server for knowledge sharing it was not considered to be a platform for this. The general attitude was that the server was a place to store and keep track of documents. When asked about the server being a platform for knowledge sharing a few were open for the notion, most were hesitant, and a few were outright opposed. Among the key individuals the view of the server as a knowledge sharing platform was also hesitant and to improve this platform was not prioritized. The implementation of a new intranet with more interactive qualities had been up for discussion but had recently been put on hold.

Analysis: The examples described above concerning attitudes and opinions illustrate that the general attitudes in GotCon towards knowledge related issues were in line with the knowledge brokers' opinions. Both how employees acted and why they acted in these ways was either in line with the brokers' interests or how the brokers themselves acted. Without claiming a causal chain (i.e. what affects what) it is interesting to note how the attitudes of GotCon's employees and the opinions of the brokers are aligned. Furthermore, these general opinions seem to be related to the norms evident in the different arenas, again not claiming causality, this suggests that the opinions and actions of the brokers were aligned with the norms related to how and in what ways knowledge was shared between projects. In sum, the brokers seem to play an active role in inter-project knowledge sharing and their actions and opinions seems to be related to both in which arenas knowledge sharing occurred and furthermore how and why knowledge sharing unfolded in these arenas.

Discussion

The results of the empirical study of GotCon suggests that inter-project knowledge sharing occurred in certain forums, labeled arenas, and was brokered by a few key individuals, labeled knowledge brokers. Knowledge sharing between projects was not limited to the brokering of these individuals but was recurrently initiated and facilitated by their actions. Identifying where organizational members share knowledge between projects, who brokers knowledge sharing, and what influences how this unfolds provides valuable insights into the complex phenomenon of inter-project knowledge sharing. In this paper I argue that inter-project knowledge sharing is not an instrumental process that can be enhanced simply by implementing a new system, either IT or management, or by overcoming cultural barriers as often suggested in KM research (e. g. Kivrak et al., 2008; Dave & Koskela, 2009; Ajmal et al., 2010; Ren et al., 2018). Instead knowledge sharing should be understood in terms of interaction and participation and enhanced by aligning initiatives with the existing norms, interests, and power relations that exists in an organization. Based on the practice-based view on knowledge and by previous research mainly performed by Gherardi and Nicolini (2000 & 2002) and Koch and Theussen (2013), I argue that not only knowledge but also knowledge sharing is situated in organizational practices. What organizational members do is the precursor and prerequisite for knowledge sharing. In a term which reflects the origin of the source material I claim that practice 'paves the way for knowledge sharing', adapting the view of Brown and Duguid (2001) who claims that: "Knowledge, in short, runs on rails laid by practice." (p. 204). The practices that organizational members at GotCon continuously performed created the context where knowledge was or was not shared. These practices were related to the norms existing in the organization and were aligned with the interests and actions of GotCon's knowledge brokers. This relationship between the norms that governed and influenced knowledge sharing and the key role of the knowledge brokers in sustaining and reproducing these norms suggests that the occurrences at GotCon, and the success or failure of knowledge sharing initiatives, is related to the concept of power. With the notion of that norms, knowledge brokers, and power were three important elements of the how and the why of inter-project sharing at GotCon these three concepts are further discussed below.

Norms

In line with the general opinion of the literature in the field of KM the cultural aspects of organizations are in this paper recognized. Using a practice-based approach allowed the identification of cultural characteristics, such as norms, that were enacted in practices and relevant for inter-project knowledge sharing. Norms are related to practices in the sense that norms guide and reflect practices, shaping while at the same time being shaped by practices (Orlikowski, 2002). By using the concept of norms it was possible to outline not just the actions of organizational members but also underlying, sometimes unconscious, reasons for these actions. The empirical results suggest that at GotCon there existed a willingness to *share* knowledge with each other, a willingness to *help* others when asked, and that it was each and everyone's individual responsibility to actively *search* for knowledge. These norms were dispersed throughout the organization and when enacted influenced employees' knowledge sharing behaviors.

In three arenas (the informal, server, and site visit arenas) the general behavior concerning knowledge sharing was to search for knowledge. This norm had a reciprocal relationship with the *help* and *share* norms. It was reproduced, i.e. continuously prescribed to and performed, because of its positive results and acceptance. In other words, when organizational members searched for help or information others helped them and shared experiences or views. This lead to repetitions of this behavior as it elicited positive responses and outcomes. Upon receiving help or information the employee then used what they had received and formed knowledge based on other's experiences or knowing. This process is exemplified in all of these three arenas by accounts of employees emailing colleagues with similar tasks or experiences from similar type of work, using documents from past projects, or re-using elements of a construction process. In this way knowledge sharing was situated in the practices at GotCon, in the behavioral patterns of the employees. The recurring actions of searching for and reusing information, experiences, or elements from other projects constituted a system of interaction, participation, and reproduction. This is in line with the practice-based view of knowledge as being situated in practices, rooted in interaction and acquired through participation, and continually reproduced (Gherardi & Nicolini, 2000).

The *sharing* norm was more prevalent in the meeting and academy arenas where spontaneous inter-project knowledge sharing occurred. Sharing of experiences and knowledge was actively encouraged in these arenas and when knowledge sharing occurred in these arenas it was accepted and appreciated. An aspect of the organizational structure and culture of GotCon relating to this norm, especially in the meeting arena, were the principles of partnering. As described above the partnering concept explicitly incorporated cooperation, participation and interaction. Implicitly this entailed exchanging and using knowledge from different actors collaboratively in the construction process and the primary forum for this knowledge sharing was meetings. The *sharing* norm was supported by the principles of partnering and organizational members continuously acted in accordance with this norm. However, this was mostly evident in an intra-project knowledge sharing fashion and only on occasion the knowledge shared was of an inter-project nature. How this norm is supported and aligned with the explicit and established organizational values is a finding which, although not surprising, highlights the interesting fact that the above mentioned norm of *searching* was not formally encouraged. Mueller (2015) noted that her interviewees explicitly stated that they

could not develop informal practices without these being in line with formal organizational values but also that they changed their practices as the company's characteristics changed. At GotCon the encouragement of the *searching* norm was not found to come from explicit organizational principles but instead from the actions of the knowledge brokers. By applying the concepts of brokering and knowledge brokers, commonly not used in inter-project knowledge sharing studies, the insight that organizational norms were related to the brokers' actions could be made. Wherever the *search* norm originated from it was supported and sustained by the ways in which the knowledge brokers acted and which practices they encouraged.

Overall the cultural factors at GotCon was in line with what Wievora et al. (2013) found to be positive cultural factors for knowledge sharing between projects (collaboration, non-competitiveness, and friendliness). However, a closer examination of the norms identified at GotCon show a more complex and contradictory relationship between cultural factors. While the *help* and *share* norms existed in the organization the *search* norm was more widespread, both in that it existed in more arenas and that it was more evident in employees' behaviors in these arenas. In consequence, the norm to actively search for knowledge might have had negative effects on the knowledge sharing behaviors as organizational member might not have seen it as their responsibility to share. If the norm to *search* trumps the norm to *share*, then knowledge that is created in one project might not be spontaneously shared. In effect, usable knowledge can be left in the project it emerges in, and not shared with other projects, as project members expect others to come look for what they need. Considering the example of the successful knowledge sharing between project A and F during the site visit it is interesting to wonder what would have happened if the visiting group would not have searched for knowledge. Would they have stumbled on the same elements and brought them back to project A? Or would the members of project F have understood what could be useful in project A and shared it with them? The results of the empirical study suggest that as organizational members expected that others search for what they need; they did not consider what could be helpful to share with them. If project A had not come to the construction site of project F and searched for specific elements, then quite possibly knowledge concerning these elements would not have been shared between the projects. This suggests that there is a trade-off between the norms when it comes to inter-project knowledge sharing behavior. Relying on one norm and enacting practices associated with that norm has consequences for the knowledge sharing behaviors overall and might suppress practices associated with another norm. Moreover, this also highlights the high reliance on the brokers in GotCon. With the separation of projects and the norm of *sharing* only evident in some arenas the brokers were essential in facilitating knowledge sharing between projects.

The above discussion outlines which norms were evident in which arenas. By using the concept of arenas for knowledge sharing, adopted from Koch and Theussen (2013), in combination with the concept of norms it was possible to ascertain how organizational members at GotCon generally acted in different forums and underlying reasons for this. Based on this analysis it is interesting to ask the question why organizational members acted differently, with regards to knowledge sharing behaviors, in different arenas. Considering where the *search* norm was most prevalent (in the informal, server, and site visit arenas) these all have in common that this was what the brokers encouraged in these arenas. In contrast

where the *share* norm was most prevalent (in the meetings and academy arenas) sharing was explicitly or implicitly encouraged by the brokers.

Knowledge brokers

Adapting the concept of knowledge brokers from intra-project knowledge sharing research (Koch & Theussen, 2013) this concept were found to amply explain the occurrences of inter-project knowledge sharing at GotCon. In contrast to Koch and Theussen (2013), who focus on how brokers and boundary objects in combination facilitate knowledge sharing, this paper suggests that when considering inter-project knowledge sharing boundary objects are of less importance. Possibly because of the separation between projects being greater than between CoPs, in terms of structural and geographical factors, boundary objects were not found to facilitate knowledge sharing between projects. Instead, the actions of four knowledge brokers were found to be central to the how and why of inter-project knowledge sharing at GotCon. The actions of these brokers made them bridges between different projects in time or in space as they brokered the sharing of knowledge from one project to another. However, the ways in which they did this were somewhat different. Mike and Steve were very experienced individuals who participated directly in projects and relayed their views and experiences. Mike's brokering was restricted to a single project while Steve brokered knowledge sharing in multiple projects. Charles had a position overlooking several projects and managed to identify elements which could be used in other projects. He then interacted with the project groups and managers in different types of meetings and encouraged activities that involved knowledge sharing. Eliza had the same type of overview as Charles and gathered experiences and information from numerous projects. She relayed these in an educational fashion by either interacting with project managers and project members or by sharing her knowledge at the academy. Notably, she was both in charge of the content of the academy modules and led some modules herself. The nature of the brokering conducted by these four individuals led them to be categorized as four different types of brokers (see above). This categorization brings attention to a way in which inter-project knowledge brokering is different from intra-project brokering. First of all, these four individuals can be classified as to belong to the same type of CoP. They were all different types of managers with similar knowledge background and experiences, suggesting that CoPs is not a factor that affects inter-project knowledge sharing. Furthermore, this illustrates how inter-project brokering at GotCon was tied to certain organizational functions and structures. Eliza's and Charles' brokering was especially tied to specific arenas, Mike's to his assigned project and Steve's to his specific role as a multi-project resource. The context of operating in a PBO constrained Mike to only broker in one project as he mostly interacted with people from this project. In contrast Steve, Charles, and Eliza were enabled to broker in different projects as they interacted with individuals from different projects.

Overall, the above discussion brings attention to how inter-project knowledge sharing was characterized by interaction. This was a common element of all the different ways of brokering and an important aspect of knowledge sharing. Knowledge brokering did not commonly take place by writing down information and handing out documents to be read and followed. This did to some extent occur but primarily, in line with Gherardi & Nicolini's (2000) description of the nature of knowledge, brokering between projects occurred through

interaction and participation. Generally, the knowledge broker encouraged, showed, and/or pointed the group or the individual in the right direction by sharing something from another project. Brokering was a social activity where knowledge was shared between projects, most often, orally and knowledge was constructed after the broker had relayed his/her views, information, or experiences. This finding of an oral and social nature of brokering and knowledge sharing is similar to what Styhre (2008) found when studying another Swedish construction company. He noted that to share knowledge this company relied on an oral culture and social capital existing both in the company and in the construction industry. The concept of social capital is not explicitly investigated in this study but the aspects of mutual trust, collaboration and the collective nature of social existence that makes up social capital (Styhre, 2008) were important elements of the inter-project knowledge sharing activities at GotCon. However, the findings of this study suggests that these elements in themselves were not enough to explain the inter-project knowledge sharing at GotCon, because here the brokers played a key role. By relying on the oral and social means for knowledge sharing they brokered knowledge sharing in ways which sustained and reproduced norms regarding knowledge sharing activities. For example, the brokers explicitly encouraged organizational members to continuously search for knowledge. The brokers themselves regarded this behavior as the proper one and they positively responded when met with this behavior. In addition, organizational members at GotCon mirrored this behavior and the norm it represented. In certain settings different norms were encouraged and likewise enacted. An example illustrating this from the empirical study was the contradictory attitude and behaviors regarding the end-of-project reports. While being a potential tool for knowledge sharing between projects these were not commonly read, suggesting that this post-project evaluation system was an unsuccessful measure for inter-project knowledge sharing at GotCon. This questions findings from previous research that recognize post-project evaluation systems as effective ways to create knowledge sharing between projects (e. g. Ren et al., 2018). In practice neither the brokers nor the other organizational members took the time to read these reports and while organizational members were not always aware of these reports the brokers expressed that these were a potential source for useful information. In themselves not reading the reports and not encouraging others to read the reports no norm nor behavioral pattern was set up around this activity and it was not performed. On the other hand, when encountering a problem in their work the brokers, just like many other members of the organization, turned to their closest colleagues for help and called those they thought could help them. In this case their actions both sustained and reproduced the norm of searching. An implication of this is that it is not a formal structure or an available tool that creates inter-project knowledge sharing, it is the behaviors related to these that may or may not lead to knowledge being shared between projects. The findings of this study suggests that these behaviors are furthermore related to which norms exist, which practices that are enacted, and to what ways of acting that knowledge brokers or key organizational members encourage. This reasoning is in line with Mueller (2015) who suggests that project managers can provide cultural prerequisites which are favorable for inter-project knowledge sharing. The findings of this study also show an example of the opposite of this, i.e. cultural prerequisites which are not favorable for knowledge sharing. Exemplified by the dominance of the *search* norm and the failure to use the end-of-project reports.

Furthermore, Wievora et al. (2013) found that leaders were capable of influencing the culture and shaping inter-project knowledge sharing behaviors. At GotCon the knowledge brokers were both located in leadership positions and were individuals that others actively sought help/guidance from. Their actions and interests were also aligned with the norms at GotCon and how organizational members generally behaved. All in all, this supports Wievora et al.'s (2013) conclusion concerning leaders' capability to shape inter-project knowledge sharing behaviors and provides an explanation for this. The findings from this study suggests that it is because of the interactive, participatory, and socially constructed qualities of knowledge that leaders can shape knowledge sharing. By sustaining some practices around knowledge sharing, such as calling colleagues, and not others, such as reading end-of-project reports, the brokers reproduced certain norms which shaped knowledge sharing practices.

Power

The relationship between the knowledge broker's actions, and interests, and the norms suggests that how the brokers acted influenced how other organizational members acted. This relationship can either be a one-way power relationship, i.e. where the organizational members are influenced by the interests of the brokers, or a mutual and shared power relationship, i.e. where the brokers *and* the organizational members' acts are influenced by each others' interests. Either way power is in this sense related to action and not a possession of an individual. As argued by Latour (1986), it is when others act in accordance with someone's will that that person is given power. The action of others is an inherent cornerstone of power and the concept may therefore only be used as an effect, never a cause. In the occurrences at GotCon the knowledge brokers did not exert power over the other organizational members because of their positions at the top of the organization. Instead the knowledge brokers were given power when organizational members acted according to their wishes and interests. Using Eliza as an example: when she encouraged the academy participants to call each other *and* they did so, she was given power. She did not possess power and coerced or forced individuals to act in a certain way; power was the effect and not the cause. Upon reading this introduction of the concept of power one might ask: What does the issue of power have to do with inter-project knowledge sharing? The case of GotCon illustrates that there is an alignment of the brokers' interests and actions and the behaviors of the organizational members. The ways of acting that the brokers encouraged, verbally or by action, were the ways that organizational members tended to act. In this sense power was a recursive and ubiquitous relational effect, as suggested by Gherardi and Nicolini (2000), as it emerged from the relationships among GotCon's members in a recursive fashion. The brokers' interests and encouragement does not explain all individual actions, for example the organizational members used the server in a way unintended by the brokers, but it relates to the practices and the norms enacted at GotCon. In effect, as the brokers were given power by the actions of others they were given power over the inter-project knowledge sharing practices at GotCon. The implication of this is that when considering KM initiatives in GotCon one must take the interests of the brokers into account. Practically, a KM initiative at GotCon should consider that the brokers prefer and encourage methods of communication that entail face-to-face or telephone contact. This renders the popular initiative of implementing an IT systems highly questionable in this organization, and questions the emphasis put on IT as the

primary enabler of knowledge sharing. Especially Ren et al.'s (2018) claim that IT completely rectifies the issue of geographical dispersion seems highly questionable in the light of this study. In general, this finding suggests that when considering KM initiatives for improving inter-project knowledge sharing in any organization one should take the interests and actions of the individuals given power over the knowledge sharing practices into account. This implies that organizations must understand which people influence knowledge sharing practices in their particular organization and which practices they support and reproduce. By basing a KM initiative on this understanding the chance of successful implementation and positive outcomes for knowledge sharing can be enhanced. This finding also suggest that when studying inter-project knowledge sharing researchers should take the issue of power into account and consider the implications that power has on knowledge sharing practices. By understanding how power is given and adhered to researchers can better explain why knowledge in some circumstances is shared and why in some circumstances it is not.

Contextualizing the findings from GotCon it is interesting to consider why a few individuals are given power over such intangible phenomena like norms and practices. There could of course have been more knowledge brokers at GotCon, than the four identified in this study, but the results suggest that only a few individuals had the experience and possibility to act as brokers. A construction project is a demanding and complex context where project members continuously need knowledge to perform their assignments (Dave & Koskela, 2009). The individuals with experience and in roles where they have the possibility to share this experience therefore becomes extremely important as their expertise is continuously needed by other organizational members. Furthermore, in contrast to permanent organizations, PBOs have a low amount of organizational memory (Hanisch et al., 2009). This renders project members to have to rely heavily on the individuals with experience, such as the knowledge brokers in GotCon. These contextual implications create a situation where a few individuals are relied upon and trusted by other organizational members and their opinions and actions gain a high level of importance and relevance. This in turn affects norms in the sense that the actions of these important individuals become the proper or right way of acting, which in term shapes practices. In other contexts, where a more extensive organizational memory exists this may not be the case but in PBOs, especially PBOs acting in knowledge intensive environments, this may be a recurring phenomenon and possible problem. Further research should therefore consider how contextual factors creates dependencies on certain individuals and what implications this may have for knowledge sharing, both in general but especially in project environments.

An aspect of power is furthermore that it can be both enabling and constraining (Gherardi & Nicolini, 2000). The observations made at the academy module showed an example of this duality as Eliza's actions both constrained and enabled knowledge sharing among the participants. She enabled knowledge sharing by creating and operating an arena for this and encouraged the participants to share their experiences with each other. She also constrained knowledge sharing by limiting it to a certain topic and by actively encouraging some aspects of this topic while suppressing others. As the participants at the module acted in accordance with Eliza's interests she was given power in this knowledge sharing arena. In similar ways the power that the brokers are given can have constraining effects on the knowledge sharing behaviors at GotCon. The examples of the end-of-project reports and the

fact that the only practical examples of knowledge sharing from the described site visit was the elements that Charles had, prior to the visit, encouraged the project group to look at are examples of this constraining element of power. Relating these insights concerning the power relationships at GotCon, and their implications, to the discussion of norms and practices a potential practical implication can be made. As power has both enabling and constraining qualities (Gherardi & Nicolini, 2000) and is given to the brokers as others act in their accordance with their will (Latour, 1986), the brokers are given power to influence inter-project knowledge sharing practices. With this power they have the possibility to enable behaviors related to some practices and constrain behaviors relating to other practices. Furthermore, as practices shapes norms (Orlikowski, 2002) the brokers can influence which norms are reproduced and sustained and which are not. In GotCon where the *share* norm was less prevalent in the informal, server, and site visit arenas it could be beneficial for the organization to foster this norm. By supporting and encouraging actions of sharing in these arenas the brokers could influence the practices and in this sense possibly affect or change the norm. In line with these thoughts on the importance of power and its relation to knowledge sharing practices, Mueller (2015) concluded that knowledge sharing practices can only evolve if they resonate with organizational characteristics and the initiatives of project members and leaders. Extending Mueller's (2015) conclusion, this paper argues that the actions of the individuals given power over knowledge sharing practices in an organization can shape and foster practices that enable knowledge sharing between projects. Conversely they can also constrain and suppress these practices. For example, the implementation of an IT system in an organization that relies on oral and interactive knowledge sharing practices, like GotCon, might just cause this suppression and affect knowledge sharing practices in a negative way. It is also possibly that such an initiative is more or less ignored by the organizational members as they already have established practices for knowledge sharing and the implemented initiative is not in line with these.

Conclusion

At GotCon inter-project knowledge sharing occurred in five different arenas and was to a large extent brokered by four knowledge brokers. Furthermore, the knowledge sharing practices at this company was influenced by three norms which guided and shaped knowledge sharing practices. These norms were aligned with the actions and the interests of the knowledge brokers which gave these brokers power over the knowledge sharing practices at GotCon. Often what the brokers did or encouraged was mirrored by other organizational members leading to a reproduction of the norms and practices associated with knowledge sharing. In addition, the context of a PBO was related to in which ways GotCon's employees could and did share knowledge between projects. First of all, the structural and geographical dispersion of projects made face-to-face and informal interactions difficult and led the organizational members to instead share knowledge in formal settings or through phone, email, or virtually. Second, it made the brokers' actions central factors for inter-project knowledge sharing as they had the positions and experience to facilitate knowledge sharing between projects. All in all, this paper argues that practice paves the way for knowledge sharing; where organizational practices supported knowledge sharing it occurred, where

practices inhibited knowledge sharing it did not. What influenced these knowledge sharing practices were the norms of *searching*, *sharing*, and *helping* and these norms were aligned with the brokers' interests and actions. This relationship between the brokers and the norms suggests that the brokers' interests are central to the knowledge sharing practices at GotCon illuminating the relevance of considering the power relationships at the company.

The key findings of this paper have important implications for managers working in PBOs and for all organizations that aim to improve their knowledge sharing. All in all, the findings suggest that to understand knowledge sharing one must take into account the four factors of arenas, norms, knowledge brokers, and power. The interrelationship of these factors must not only be understood but also adhered to when implementing KM systems or adopting knowledge sharing initiatives. This highlights the fact that one size does not fit all, instead initiatives should be customized with regard to these four factors. Practically, this means that before even choosing a KM initiative, managers should map their organizations. They should figure out *where* knowledge sharing takes place, *why* it occurs in these places, *what* norms affect organizational members' actions, *who* the brokers are, and *how* the actions and interests of these brokers affects knowledge sharing practices. In this sense, managers should focus on the *where*, *why*, *what*, *who*, and *how* of knowledge sharing in their specific organization and create a foundational map on which to construct initiatives. Furthermore, this will help manager to understand what the organization does well and not just what it does not do well. With a thorough understanding of the above mentioned factors manager have the possibility to build on their organization's strengths, not just to try to fix their weaknesses.

This paper contributes to the academic debate concerning KM and knowledge sharing in PBOs by emphasizing the contextual and relational aspects of organizations and by arguing that power has a central role in KM. Specifically it identifies four factors which have not before been discussed in inter-project knowledge sharing studies and which together sheds light on how and why inter-project knowledge sharing occurs. By showing how power, a concept seldom taken up in knowledge related studies (Gherardi & Nicolini, 2000), is related to the reproduction of organizational norms, this paper highlights that the actions of a few key individuals can have effects on an entire organization's knowledge sharing practices. Therefore, to introduce the concept of power into the academic vocabulary in KM studies will help organizational researchers to better understand knowledge sharing between projects.

In contrast to some KM studies (e. g. Kivrak et al., 2008; Dave & Koskela, 2009), this suggests that researchers should not propose systems which organizations could/should implement. Instead research should focus on understanding contextual elements, leaving it up to the organizations and their managers to tailor these systems to their specific context.

An inherent limitation to the findings of this study is that the factors found to influence knowledge sharing at the company are local elements. The risk exists that inter-project knowledge brokers who are given power over knowledge sharing practices is an isolated phenomenon and therefore not generalizable to other organizations or contexts. However, previous studies have highlighted the importance of leaders' behaviors for knowledge sharing practices (Wievora et al., 2013; Mueller, 2015), and the relevance of knowledge brokers (Koch & Theussen, 2013). Building on these studies and with the results of the case study in mind this paper argues that these elements, their relationship, and the implications of this are relevant for both researchers and managers in other organizations and contexts.

References

Ajmal, M., Helo, P., & Kekäle, T. (2010). Critical factors for knowledge management in project business. *Journal of Knowledge Management*, 14(1), 156-168.

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

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

Collis, J., & Hussey, R. (2009). *Business research: A practical guide for undergraduate & postgraduate students* (3.rd ed.). Palgrave Macmillan. Basingstoke.

Cook, S., and Yanow, D. (1993). Culture and Organizational Learning. *Journal of Management Inquiry* 2(4) (December). Reprinted in Michael D. Cohen and Lee Sproull, eds., Organizational Learning. Newbury Park, CA: Sage, 1995.

Cox, A. (2012). An exploration of the practice approach and its place in information science. *Journal of Information Science*, 38(2), 176-188.

Dave, Bhargav, & Koskela, Lauri. (2009). Collaborative knowledge management - A construction case study. *Automation in Construction*, 18(7), 894-902.

Diedrich, A. (2004). *Engineering knowledge: How engineers and managers practice knowledge management*. BAS. Göteborg.

Diedrich, A., & Guzman, G. (2015). From implementation to appropriation: Understanding knowledge management system development and introduction as a process of translation. *Journal of Knowledge Management*, 19(6), 1273-1294.

Eisenhardt, K. (1989). Building theories from case study research. (Special Forum on Theory Building). *Academy of Management Review*, 14(4), 532-550.

Flyvbjerg, B. (2006). Five Misunderstandings About Case-Study Research. *Qualitative Inquiry*, 12(2), 219-245.

Goulding, C. (2002). *Grounded theory a practical guide for management, business and market researchers*. London ; Thousand Oaks, Calif.: SAGE.

Gherardi, S., & Nicolini, D. (2000). To Transfer is to Transform: The Circulation of Safety Knowledge. *Organization* 7(2), 329-348.

Gherardi, S., & Nicolini, D. (2002). Learning in a constellation of interconnected practices: Canon or dissonance? *Journal Of Management Studies*, 39(4), 419-436.

Hanisch, B., Lindner, F., Mueller, A., & Wald, A. (2009). Knowledge management in project environments. *Journal of Knowledge Management*, 13(4), 148-160.

Israilidis, J., Siachou, E., Cooke, L., & Lock, R. (2015). Individual variables with an impact on knowledge sharing: The critical role of employees' ignorance. *Journal of Knowledge Management*, 19(6), 1109-1123.

Kivrak, Serkan, Arslan, Gokhan, Dikmen, Irem, & Birgonul, M. Talat. (2008). Capturing knowledge in construction projects: Knowledge platform for contractors. *Journal of Management in Engineering*, 24 (2), 87-95.

Koch, C., & Thuesen, Christian. (2013). Knowledge sharing in construction partnering projects redundancy, boundary objects and brokers. *International Journal of Project Organisation & Management: IJPOM*, 5(1), 156-175.

Kvale, S. (2006) Dominance Through Interviews and Dialogues, *Qualitative Inquiry*, 12(3): 480-500.

Latour, B. (1986). The power of association. In Law, J. (Ed.), *Power, Action and Belief: A New Sociology of Knowledge?* Routledge and Kegan Paul, London.

Lundberg, Mary, Lidelöw, Helena, & Engström, Susanne. (2017). Methods used for knowledge management and organizational learning in the practice of construction projects: A systematic literature review. *Proceedings Of Working Papers From The Arcom And Beam Centre Early Career Researcher And Doctoral Workshop On Building Asset Management*, Proceedings of working papers from the ARCOM and BEAM Centre Early Career Researcher and Doctoral Workshop on Building Asset Management.

Martin, P., & Turner, B. (1986). Grounded Theory and Organizational Research. *The Journal of Applied Behavioral Science*, 22(2), 141-157.

Matayong, S., & Kamil Mahmood, A. (2013). The review of approaches to knowledge management system studies. *Journal of Knowledge Management*, 17(3), 472-490.

Mueller, J. (2014). A specific knowledge culture: Cultural antecedents for knowledge sharing between project teams. *European Management Journal*, 32(2), 190-202.

Mueller, J. (2015). Formal and Informal Practices of Knowledge Sharing Between Project Teams and Enacted Cultural Characteristics. *Project Management Journal*, 46(1), 53-68.

Nicolini, D., Gherardi, S., & Yanow, D. (2003) *Knowing in Organizations: A Practice-based Approach*, Taylor & Francis Inc., New York.

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

Orr, J. (1996) *Talking about Machines: An Ethnography of a Modern Job*, Cornell University Press, Ithaca, NY.

Ren, X., Liang, L., & Deng, X. (2018). Knowledge transfer between projects within project-based organizations: The project nature perspective. *Journal of Knowledge Management*.

Silverman, D. (2013). *Doing qualitative research* (4.th ed.). Thousand Oaks, CA: Sage Publications.

Styhre, A. (2008). The role of social capital in knowledge sharing: The case of a specialist rock construction company. *Construction Management and Economics*, 26(9), 941-951.

Suchman, L. (2000). Organizing Alignment: A Case of Bridge-Building. *Organization*, 7(2), 311-327.

Van Maanen, J. (2011). Ethnography as Work: Some Rules of Engagement. *Journal of Management Studies*, 48(1), 218-234.

Wastian, M., Rosenstiel, L., West, M., & Braumandl, I. (2015). *Applied Psychology for Project Managers* (Management for Professionals). Springer Verlag.

Watson, T. (2011). Ethnography, Reality, and Truth: The Vital Need for Studies of 'How Things Work' in Organizations and Management. *Journal of Management Studies*, 48(1), 202-217.

Wenger, E. (1998) *Communities of Practice Learning, Meaning, and Identity*, Cambridge University Press, Cambridge.

Wiewiora, Trigunarsyah, Murphy, & Coffey. (2013). Organizational culture and willingness to share knowledge: A competing values perspective in Australian context. *International Journal of Project Management*, 31(8), 1163-1174.