



UNIVERSITY OF
GLOUCESTERSHIRE

at Cheltenham and Gloucester

***A REVISED THEORETICAL FRAMEWORK
FOR THE ROLE OF COMMUNITIES OF PRACTICE
IN LEARNING AND KNOWLEDGE SHARING
WITHIN A GEOGRAPHICALLY DISPERSED
ORGANIZATION IN AN EMERGING ECONOMY
IN LATIN AMERICA***

Matthias Paus

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of the degree of Doctorate in Business Administration (DBA)

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Abstract

This thesis is about communities of practice [hereafter: CoPs], learning and knowledge sharing within the geographically dispersed organization Komatsu in Chile, which is an emerging economy in Latin America. Chile is characterised by a unique cultural and macroeconomic context and thus particularly suitable to broaden the scope about CoP theory. The research questions revolve around the forms that CoPs take within this context as-well-as their contribution to learning and knowledge sharing.

The literature review sheds light on the aspects of learning, knowledge sharing and CoPs in a comprehensive manner. It suggests that it is unsuitable to think of a single CoP that spans across geographically dispersed organizations, but rather to consider multiple interconnected CoPs. The boundary processes constitute the pivotal aspect in fostering learning and knowledge sharing among them.

This exploratory case study about shovel maintenance within Komatsu Chile, conducted within the social constructionism paradigm, provides evidence that CoPs are organised within a *hierarchically-structured network*. Extending beyond the premise that CoPs are bound together by shared practice (Brown & Duguid, 1991, 2001b), the research puts forward the argument that *CoP Glue*, (meaning a reified abstraction, known and accepted throughout the network of CoPs) constitutes the mechanism that holds them together. As part of the revised theoretical framework, it is advocated that *CoP Alterity*, along the dimensions of practice, domain and community (Wenger, 2011), is the aspect according to which CoPs can be differentiated.

This revised theory opens up an interesting field of future academic enquiry. From a practitioner perspective the research has generated interesting findings and suggestions, which ought to be considered by those wishing to enhance learning and knowledge sharing within geographically dispersed organizations.

Declaration

I declare that the work in this thesis was carried out in accordance with the regulations of the University of Gloucestershire and is original except where indicated by specific reference in the text. No part of the thesis has been submitted as part of any other academic award. The thesis has not been presented to any other education institution in the United Kingdom or overseas. Any views expressed in the thesis are those of the author and in no way represent those of the University.

Signed:



Date: April 23rd, 2015

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Picture 1: Shovel maintenance team Chuquicamata.

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***This thesis is dedicated to my parents,
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Chapter 1 Introduction

The objectives of this research consist in the exploration of the role of communities of practice [hereafter: CoPs] for learning and knowledge sharing within Komatsu Chile, a geographically dispersed organization in an emerging economy in Latin America. The results of this research will be reflected in a revised theoretical framework about CoPs. In the Introduction Chapter the background of this research will be presented first, then the research questions as-well-as underlying aims and objectives will be depicted. Afterwards, the motivations for which this research has been initiated, as-well-as the significance for its theory and practice will be discussed. Finally, the structure of the remainder of this dissertation will be summarised.

1.1 Background

Based upon the foundational work of Lave and Wenger (1991) about legitimate peripheral participation, CoPs have been identified as the vehicle for learning among its members. Newcomers join the community, learn the practice from those with more experience and move towards their centre. CoPs consist in groups of people that constitute autonomously and mutually engage in a joint enterprise within a shared domain of interest (Wenger, 2011). A pivotal feature of CoPs is their superior capability to share highly tacit knowledge among its members, which is embedded into the practices they engage in (Brown & Duguid, 1998; Tallman & Chacar, 2011). CoPs also take an important position in the context of organizational knowledge sharing overall, which implies learning on behalf of the perceiving unit as part of bigger social learning systems (Brown & Duguid, 1998, 2001b; Wenger, 2000). Thus, the contribution of CoPs within the organizational context is significant, because learning and knowledge sharing are pivotal for the survival and prosperity of organizations (Grant, 1996; Kogut & Zander, 1992; Nonaka, 1994; Szulanski, 1996).

Owing to the complex nature of knowledge, which is constructed in a socio-historical context (Berger & Luckmann, 1991) and more or less tacit and explicit along a continuum (Nonaka & von Krogh, 2009), many organizations struggle to learn and share knowledge among their subunits efficiently (Szulanski, 1996). Particularly the replication of operating routines that generate superior results within a certain area of the organizations (frequently termed *best practices*) has been determined as “one of the most important and widespread practical management issues” (Szulanski, 1996, p. 27).

A review by Amin and Roberts (2008) of more than 300 articles published within the last 20 years depicts that the term CoP has become imprecise, incorporating a broad range of diverging concepts. In another chronological analysis about the different CoP theories, Cox (2005) clearly depicts the shift in meaning they have gone through. Initially they were described as small groups of people with the purpose to learn a craft (Lave & Wenger, 1991). Within the later conceptualisation however, they were also regarded as large groups of people focused on innovation (Wenger, McDermott, & Snyder, 2002). CoP theory has also created commercial interest among consulting companies. This may have led to the identification of different types of groups of CoPs, even though they may not be compliant with their fundamental requirements (Kimble & Hildreth, 2004; Roberts, 2006).

In spite of the inconsistencies regarding the understanding of CoPs (Amin & Roberts, 2008), there seems to be little doubt about their value in terms of learning on a local level (Wenger 2000, 2006). However, they are frequently challenged regarding their capacity to absorb external knowledge and contribution to innovation (W. M. Cohen & Levinthal, 1990; Swan, Scarbrough, & Robertson, 2002), their purposeful steering within the organizational context (Wenger et al., 2002) and their lack of consideration for power asymmetries (Contu & Willmott, 2003). Besides that, there is an eminent need to research the forms they can take in geographically dispersed organizations (Duan, Nie, & Coakes, 2010). Some leading authors suggest that CoPs can incorporate thousands of members and even span national

boundaries (Wenger, 2000; Wenger et al., 2002), whilst others define them as small, local groups that depend on face-to-face interaction (Brown & Duguid, 1998; Brown & Grey, 1995; Vaast & Walsham, 2009). This contradiction leads to the understanding that CoPs are necessarily different with regard to their proximity and the size of their membership (Roberts, 2006). Particular challenges in this context revolve around the sharing of tacit knowledge across spatial and cultural distances (Ambos & Ambos, 2009; Gertler, 2003). There is no clarity as to the extent to which CoPs are suitable to share tacit knowledge, as long as they do not overcome intra-organizational boundaries (Gertler, 2003). Furthermore, there are pending questions about their dependence on formal organizational structures (Roberts, 2006).

Therefore, the process about learning between different CoPs requires more investigation (Oborn & Dawson, 2010; Orlikowski, 2002). Particular academic focus should be allocated in extending the geographic scope of the research, because the cultures where CoPs are embedded are argued to have a significant impact on them (Handley, Sturdy, Fincham, & Clark, 2006; Roberts, 2006). In line with this, Roberts (2006) raises the question whether societies characterised by strong social ties also host more effective CoPs.

With regard to their geographic reach, Brown and Duguid (2001b) put forward the argument that local CoPs are frequently embedded in broader networks of practice [hereafter: NoPs], consisting of communities of communities, bound together by a common practice. This interesting suggestion has received surprisingly little attention in the literature. Wenger et al. (2002) may be referring to these when they talk about 'distributed' CoPs.

Whereby a broad range of scholars have discussed the elements that contribute and impede knowledge sharing in general, their exploration in the context of CoPs within geographically dispersed organizations requires further attention (Orlikowski, 2002; Ramsten & Säljö, 2012; Roberts, 2006; Thompson, 2005).

CoPs may also not have the same importance, and thus role, in different industries (Kasper, Mühlbacher, & Müller, 2008). This research has been conducted within Komatsu Chile, a Japanese manufacturer and distributor of construction and mining equipment. The company also provides maintenance services to its customers, who are situated in different mining sites throughout the country. The sales and maintenance of shovels has been a focal point of attention for Komatsu Chile in recent years: while it has been a good business in general, there are significant differences in service quality among the different mining sites, which puts an important part of business at risk. The issue about the diverging levels of service are directly linked to the preceding introduction about CoPs. These generally prove their value in relation to learning on a local level, but their impact on learning and knowledge sharing within a geographically dispersed organization beyond their intra-organizational boundaries is questioned. In particular, the process of shovel maintenance within Komatsu Chile has been the focus of this research.

1.2 Research Questions

As outlined in the previous section, there are several aspects within CoP theory that require further exploration. These have been consolidated in three overarching research questions which will be addressed throughout this project:

- What forms do CoPs take within a geographically dispersed organization in an emerging economy in Latin America?
- What is the contribution of CoPs to learning and knowledge sharing within a geographically dispersed organization in an emerging economy in Latin America?
- What are other relevant aspects that contribute to or impede learning and knowledge sharing between CoPs within a geographically dispersed organization in an emerging economy in Latin America?

Answers to these questions will be beneficial to scholars and practitioners who are interested in the fields of learning and knowledge sharing in general, as-well-as to CoP

theory in particular. From an organizational standpoint this research is also very significant, because knowledge sharing and learning are key priorities for Komatsu Chile, as the general manager expressed in a personal conversation (August, 18th 2014), in which the research questions, aims and objectives were discussed.

1.3 Research Aim and Objectives

This research aims to revise the theoretical framework about CoPs informed through exploratory research about shovel maintenance within Komatsu Chile. In line with this, an exploratory case study on the subject has generated the primary data to provide answers to the outlined research questions. Previously, a thorough literature review was conducted, aiming to clarify theoretical conceptualisations and definitions. Furthermore, the literature review has provided initial insights about the research questions and shed light on aspects of it in terms of knowledge sharing and learning across CoP boundaries that have been further assessed in the latter research phase. This constitutes three overarching research objectives that have determined this project:

- To research the existing literature to explore the forms that communities of practice can take in the context of knowledge sharing and learning.
- To gather and analyse primary data to identify the forms CoPs can take, and their role for knowledge sharing and learning within a geographically dispersed organization in an emerging economy in Latin America.
- To identify, from the data, what other elements, if any, influence learning and knowledge sharing in the context of CoPs within a geographically dispersed organization in an emerging economy in Latin America.

1.4 Research Motivation and Significance

Each researcher is consciously or unconsciously driven by epistemological and ontological presuppositions, which influence the way in which the research is carried out (Crotty, 1998; P. Johnson & Duberley, 2000). This research project is founded on the framework of social

constructionism, postulating that meaning is not discovered, but constructed in a social context and evaluated based on its social utility (Crotty, 1998; Gergen, 1999). Therefore, each research project, conducted and assessed within the framework of social constructionism, is unique (Burr, 2003). A pivotal aspect of good research thus consists in showing reflexivity about the motivation in research (Breen, 2007; Crotty, 1998; R. B. Johnson, 1997; Yardley, 2000). This section provides a summary of the reasons why this research project has been conducted, as-well-as its significance for theory and practice.

Throughout a professional career in multinational companies in Germany and for the last nine years in Latin America with foundations in Chile, the researcher has experienced the significant challenges associated with learning and knowledge sharing within geographically dispersed organizations. Whilst processes were generally carried out rather homogeneously within the same organizational and geographic unit, significant discrepancies across different sites were detected. In the light of this the decision was made to further inquire into the reasons why knowledge sharing and learning are impeded across different sites. The initial work focused on the way in which knowledge was created and was strongly influenced by the work of the influential author Nonaka and his associates (Nonaka, 1994; Nonaka & Konno, 1998; Nonaka & Peltokorpi, 2006; Nonaka & von Krogh, 2009; Nonaka, von Krogh, & Voelpel, 2006). Following this line of enquiry, an interest in the concept of learning was born (Argyris, 1976, 1977; Argyris & Schön, 1996; Elkjaer, 2009; Illeris, 2009, 2011). Within this context, social theories of learning in general and the conceptualisation of CoPs in particular, caught the attention of the researcher (Brown & Duguid, 1991, 1998, 2001b; Lave, 2009; Lave & Wenger, 1991; Wenger, 1998, 2000, 2009, 2011; Wenger & Snyder, 2000). Whilst CoP theory provided rather satisfying answers with regard to the fact that processes within the same context are carried out rather homogeneously, it seemed to the researcher that it did not provide sufficient understanding about the dynamics of CoPs within geographically dispersed organizations.

The need to further explore this was underpinned by several internal discussions within Komatsu, where people complained about the difference ways in which maintenance, particularly in the case of large hydraulic shovels in the mining sites, was carried out. The way people learn and share knowledge across boundaries is also likely to become more relevant for Komatsu, who are aiming to significantly extend their presence throughout Latin America. Furthermore, the academic significance of this undertaking was supported by various scholars calling for research of this type (Ambos & Ambos, 2009; Gertler, 2003; Oborn & Dawson, 2010; Ramsten & Säljö, 2012; Roberts, 2006). This all reaffirmed the need to explore the forms of CoPs within a geographically dispersed organization in Latin America, namely Chile, and its contribution to learning and knowledge sharing.

1.5 Structure of the Dissertation

This thesis is structured into seven Chapters:

The first Chapter (**Introduction**) lays out the background of the thesis and clarifies the research questions, aims and objectives. It furthermore declares the motivations that have led the researcher to engage in this project, emphasising the significance of the research for theory and practice.

The second Chapter (**Literature Review**) encompasses the theoretical conceptualisations and definitions that the research project is founded upon. CoPs have emerged in the context of social learning theory (Lave & Wenger, 1991); therefore, the first part of the literature review sheds light on current theories of learning. Afterwards, the associated, yet different, ideas about knowledge sharing are described, which are of central importance for the research project. Following this, CoP theory is thoroughly assessed. In the concluding section of the literature review, the framework underlying the research is illustrated.

Chapter Three (**Research Context**) provides insights about the context in which the research project has been embedded. Firstly, some general characteristics about Chile - the country the researcher has been living in for more than nine years - are presented.

Afterwards, details about Komatsu Chile in general and shovel maintenance in particular are provided.

In Chapter Four (**Methodology**) a detailed account of the methodology that the research has been based on is provided. This contains the presentation and justification of the adopted research paradigm, clearly indicating its methodological implications. It also embraces the data collection methods and analytical framework as-well-as the ethical considerations, which have been adopted throughout the research process. Preceding some reflective considerations, the adopted research design is explained.

In the following Chapter (**Research Findings and Analysis**) the results of the fieldwork and analysis are depicted according to the three major themes that have been identified: the hierarchic network of CoPs; boundary processes within the hierarchic network of CoPs and context-specific aspects of Chile.

In Chapter Six (**Discussion**) reflections about the three overarching research questions, which have emerged throughout the research process, are portrayed. It also details reflections about the way in which organizations can deliberately steer CoPs, in consideration of the thoughts about the research questions.

The final Chapter Seven (**Conclusions**) contains the revised theoretical framework about CoPs according to the research title. It also provides considerations about the emerging consequences for theory and practice. Furthermore, the limitations of the research project and suggestions for future research will be presented. Concluding reflective remarks are stated in the final section of this dissertation.

Chapter 2 Literature review

One objective of this thesis is the review of the literature, to explore the forms that CoPs can take within a geographically dispersed organization in Chile, in the context of learning and knowledge sharing. In line with this, it is necessary initially to critically assess the concepts of learning and knowledge sharing, which are the fundamental aspects that CoPs are built upon (Lave & Wenger, 1991; Wenger, 2000; Wenger & Snyder, 2000). Furthermore, it is vital to provide clarity about the theoretical concepts and definitions within the fields to ensure consistency in the execution and argumentation for the remainder of this research.

Learning, knowledge sharing and CoP theory have been subjected to an extensive amount of research in different academic areas. However, there are only a few attempts to study these fields in a mutually comprehensive manner (Easterby-Smith & Lyles, 2011; Lyles, 2014), stressing their intertwined and interdependent nature. In particular, Spender (2008) claims with regard to knowledge management, in a way which embraces knowledge sharing and learning, that whilst complementary in nature, “the two literatures run curiously parallel” (p. 160). He furthermore states that “it is remarkable how seldom learning theory is even referred to in the knowledge management literature” (p. 165). On the other hand, the influential scholars Kogut and Zander (1992) argue that studies of learning are of little value as long as they are lacking a clear framework of knowledge. In summary, there is an evident link between knowledge sharing and learning (Blackler, 1995; Yanow, 2004), which both have been strongly influenced by CoP theory (Brown & Duguid, 1991; Elkjaer, 2009; Illeris, 2009) throughout the last decades. Therefore it is of value to discuss them comprehensively within this thesis. A particular issue in this research context are the inconsistencies in understanding and usage of the different terminologies. This refers as much to learning and knowledge sharing in general, as to CoP theory in particular (Amin & Roberts, 2008).

The first part of this literature review will address learning. Afterwards, knowledge sharing will be critically scrutinised. After a thorough assessment of CoP theory, the major outcomes,

particularly with regards to the gaps in literature, which have informed the research questions are summarised.

2.1 Learning

Beyond the widely-accepted proposition that learning constitutes a pivotal aspect of the competitive advantage of organizations (Argyris & Schön, 1996; Senge, 1990), learning in general has received an incremental amount of attention throughout the last century owing to its explicit recognition as a necessity of human life (Dewey, 2014) and its ubiquitous presence wherever activities occur (Lave, 2009; Wenger, 2009). It has however, passed through many different phases, which may explain that it is nowadays frequently perceived as a “vogue term” (Contu, Grey, & Ortenblad, 2003, p. 932) but also a generally “good thing” (p. 933).

Organizational learning is generally attributed to changes in the behaviour of people, leading to better results in comparison to a previous point in time (Spender, 2008). Within traditional perspectives there also resides the claim that these changes are to occur in spite of continuity of those stimuli that generate action; assuming the possibility that environmental factors could remain static (Weick, 1991). However, learning may also happen without any observable changes in conduct, when it only leads to a better understanding of the respective phenomenon (Elkjaer, 2009). Organizational learning is linked, and sometimes reduced to, learning curves, which provide evidence that performance of mechanical activities improves by repeatedly executing them, which can be called learning by doing (Argote, Beckman, & Epple, 1990; Darr, Argote, & Epple, 1995; Epple, Argote, & Devadas, 1991; Reagans, Argote, & Brooks, 2005).

Traditional learning theories are often based on behaviourism, focusing on stimulus-response relations and selective reinforcement, minimising pain and maximising pleasure (Piaget & Inhelder, 1969). This is argued to change behaviour or cognitive structure as

suggested within cognitive learning theories (Wenger, 2009). These treat environmental factors as independent variables of learning (D. A. Kolb, 1984).

Moving beyond the traditional theories of learning, the American philosopher and psychologist John Dewey was among the first who advanced a theory of learning based on experience, which is converted into knowledge. In contrast to traditional theories of learning, he emphasised its process. The understanding that learning is a process, generating knowledge has indeed found broad acceptance among scholars and practitioners (Duncan & Weiss, 1979 as cited in Weick, 1991).

Many use the concepts knowledge creation (Blackler, 1995; Bresman, Birkinshaw, & Nobel, 1999; Nonaka, 1994), knowledge transfer (Easterby-Smith, Lyles, & Tsang, 2008; Gupta & Govindarajan, 2000) and knowledge sharing (Dyer & Nobeoka, 2000) synonymously for organizational learning. This may have led to the lack of clear terminology within the field (Duan et al., 2010). This is because they can be regarded as part of learning, which according to the influential scholar Illeris (2009, p. 3) embraces “any process that in living organisms leads to permanent capacity change and which is not solely due to biological maturation or ageing”. In the following sections some of the most relevant considerations in terms of learning will be discussed.

2.1.1 Experience

It may be regarded as a widely accepted fact that experience plays a central role in the learning process. According to Weick (1991, p. 121) experience is manifested through “perception and interpretation of events”. Elkjaer (2009, p. 74) argues that “experience is the relation between the individual and environments, ‘subject’ and ‘worlds’, which are the terms I use to connote a socialised individual and the interpreted world”. The central role of experience on learning is depicted by D. A. Kolb (1984), who defines learning as “the process whereby knowledge is created through the transformation of experience” (p. 38).

A. Y. Kolb and Kolb (2005) point out the six propositions of their learning theory, which has been very influential, and are based on experience:

1. Learning should be understood as a process not as an outcome.
2. Learning builds upon prior knowledge, termed relearning.
3. Learning is about the resolution of dialectical conflicts of adaption to the world.
4. Learning is a holistic process of adaption to the world.
5. Learning involves the interaction between the person and the environment.
6. Learning is about the creation of knowledge.

Within this theory, the learning process is triggered by a *concrete experience* (CE), which initiates *reflective observation* (RO), followed by an *abstract conceptualisation* (AC) to then start an *active experiment* (AE).

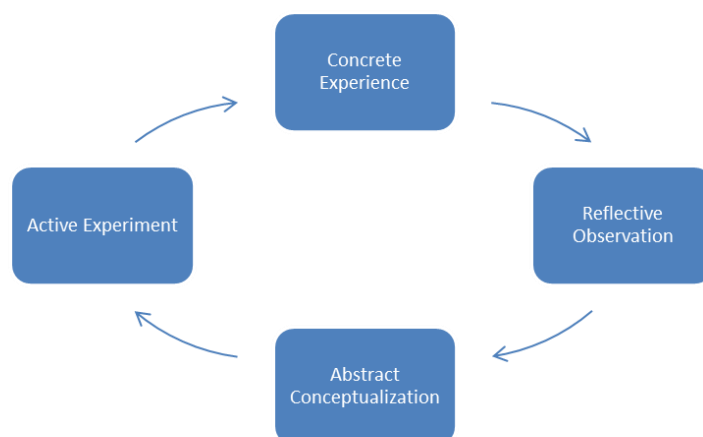


Figure 1: Experiential learning adopted from A. Y. Kolb and Kolb (2005).

Whilst the model of experiential learning may be regarded as simplistic, as pointed out by Mezirow (2009), it has had a big influence on contemporary learning theory, highlighting the role of experience and connecting it with learning. It has been suggested that some learners have different preferences in their learning and thus focus more on one dimension or the other. However, the role of experience is pivotal either way, causing reflection, rejection, emotional response of action as Mezirow (2009) points out. However, experience may also

lead to no learning at all as Elkjaer (2009, p. 81) argues: “Some experience never enters consciousness and communication, but remains emotional and subconscious.” Accordingly, and in line with Dewey (2014), Elkjaer highlights the role of discourse, which may be in the form of language or other forms of communication, such as pictures, to elevate experience to consciousness. Notwithstanding this, it may be argued that even emotional or subconscious experiences lead to learning, even though the learner may not be explicitly aware of them. Still, in line with Elkjaer (2009), this research will indeed emphasise the role of language, as it will become evident throughout the remainder of this dissertation.

Mezirow (2009) puts forward the assumption that people learn from experience as a separated aspect of the social context in which they emerge. In line with this Lyles (2014) articulates the question about the process through which collectives process experience. However, both of these claims miss the point in light of the adopted research paradigm of this research, because individuals are neither separated from context nor from collectives, but deeply embedded in a socially constructed world (Berger & Luckmann, 1991).

2.1.2 Disruptions

According to leading scholars (D. A. Kolb, 1984; Mezirow, 2009) learning occurs in the context of differences between expectation and experience, triggering inquiry (Elkjaer, 2009) and the creation of knowledge (Tsoukas, 2009). D. A. Kolb (1984) refers to a quotation from Hegel: “Any experience that does not violate expectation is not worthy of the name experience”.

There is a long history of research about learning generated through disruptions, which arises when new information conflicts with prior knowledge schemes within the context of complex learning tasks as D’Mello, Lehman, Pekrun, and Graesser (2014) explain. These authors argue, among others, that confusion is helpful for learning, as it initiates cognitive activities and implies more reflection and processing. However, if confusion is beyond a certain level it becomes counterproductive to learning. In particular then, when it induces

peripheral difficulties like explaining aspects in a language the learner is not familiar with (Craig, Graesser, Sullins, & Gholson, 2004; D'Mello et al., 2014). Beyond this, it may also be 'mystery' that inspires learning, departing from the understanding that learning is an intentional activity to solve problems, but that it may be seen as a reflective process that occurs without clearly stated problems, embracing emotions and creativity (Gherardi, 1999).

There is a lot of discussion about the affective and cognitive aspects that influence learning (Craig et al., 2004; D'Mello et al., 2014). Cognitive disequilibrium is likely to generate confusion and thus initiate an "effortful cognitive deliberation, questions and inquiry that aim to restore cognitive equilibrium" (Craig et al., 2004, p. 243). Craig et al. (2004) list the impact affective states have on learning activities. Those who for example have a larger amount of motivation are likely to generate better learning. Learning is advocated to always take place in an emotional state, which can impact learning positively or negatively. For instance, Goleman (2006) points out that students do not learn when passing through a state of anxiety, anger, depression or boredom (Craig et al., 2004). Nevertheless, the introduction of difficulties in a learning environment may be desirable (Bjork & Linn, 2006). Acknowledging the roles of disruptions, this research will shed more light on how it influences learning and knowledge sharing in a geographically dispersed organization within the framework of CoPs.

2.1.3 Learning spaces

A. Y. Kolb and Kolb (2005), inspired by Lewin's conceptualisation of Life Space, argue furthermore that the space in which learning occurs is an important aspect of learning. This space incorporates a social dimension of learning beyond the previously described psychological aspects, an argument that is supported by influential learning theorists (Illeris, 2011). Among others, A. Y. Kolb and Kolb (2005) refer to CoP, in the context of situated learning, as Life Spaces. Therefore it must be acknowledged that a life space is not necessarily physical. The other dimension they refer to is *ba*, a concept put forward by the influential Japanese scholars Nonaka and Konno (1998). *Ba* is described as "a shared space

for emerging relationships” (p. 40), which can be physical or mental. They argue that knowledge is intangible and necessarily embedded in *ba*, uniting physical spaces (e.g. office facilities), with virtual spaces (e.g. email groups) with those embedded within people (e.g. mental spaces). It is understood as a place where individuals who join this shared space acquire knowledge through experience, manifested in interactions with each other. However, despite the intangible nature of the space, *ba* also constitutes a frame in time and place. To ensure sustainability of organizations ‘ba’ should be established in a multi-layered manner throughout the organization (Nonaka, Kodama, Hirose, & Kohlbacher, 2014). Whilst Nonaka and Konno (1998) argue that *ba* can be created, it is questionable whether this is really possible, to the same extent that the purposeful creation of CoPs is widely recognised as a difficult undertaking.

The conceptualisation of learning spaces is important in the context of this research, because a focal point of awareness does explicitly reside in understanding the role of geographical dispersion. The research aims to understand to what extent such an organization can provide an adequate space for learning in the dispersed context.

2.1.4 Learning outcomes

There has been a tendency to regard learning with an emphasis on outcomes, manifested in knowledge (Illeris, 2009, 2011), which is embedded in mental schemes or patterns and can be differentiated into four categories. The first is *Cumulative* learning, which takes place when something new “with no context of meaning of personal significance” (Illeris, 2009, p. 13) is obtained. This type of learning happens predominantly in early childhood and is therefore regarded as not relevant within the research context. *Assimilative* learning occurs when a basis of personal meaning is existent, upon which further learning builds. W. M. Cohen and Levinthal (1990) argue that this type of learning is the most productive. *Accommodative* learning requires the learner to challenge the reliability of an existing scheme, such as that gained within a different context. The fourth dimension, *transformative*

learning is “characterised by simultaneous restructuring of a whole cluster of schemes and patterns in all of the three learning dimensions” (Illeris, 2009, p. 13). In the context of this type of learning, Kegan (2009) differentiates between technical or informational and adaptive or transformational learning. Whilst informational learning is about, knowing more, characterised by ‘filling in the form’, the latter assumes a change in epistemology, a different form of knowing; only this, ‘changing the form’ can be coined transformational learning. Engeström (2009, p. 57) advocates that “expansive transformation is accomplished when the object and motive of the activity are reconceptualised to embrace a radically wider horizon of possibilities than in the previous mode of the activity”. According to W. M. Cohen and Levinthal (1990), learning capabilities are nearly the same as problem solving, whilst the former is about the assimilation of knowledge, the latter is about its creation.

Teece, Pisano, and Shuen (1997) differentiate between learning as a process in which recurring execution and experimentation improve performance, and learning as the identification of new opportunities. From an organizational perspective this may be described as either exploitation, which is to be understood as improved performance and efficiency gains, or exploration, the creation of something new (O'Reilly & Tushman, 2008). March (1991) argues that the adequate balance between exploration and exploitation capabilities within a firm represents a critical component for company survival and well-being (Gibson & Birkinshaw, 2004; Lavie, Stettner, & Tushman, 2010). Those companies that are able to efficiently manage this balance, by answering the dynamic business requirements of today, while also assuring survival in the long term, can be coined ambidextrous (Levinthal & March, 1993). While there seems to be a general agreement that ambidexterity between exploitation and exploration is important for corporations, the proposals on how to reach this balance are different. CoPs have been associated with all of these learning outcomes.

2.1.5 Learning as a process

The focus on learning as a process has emerged since traditional behaviourism and cognitive theories have lost their dominant influence in the social sciences. Engeström and Sannino (2012) claimed that theories about organizational learning are generally weak in terms of explicating the manifold learning processes that have emerged over the years. They argue that the term process is used in a loose and unreflective fashion. Because of this several conceptualisations about the learning process will be briefly described in the following section:

2.1.5.1 Transformative learning

Transformative learning was introduced by Jack Mezirow in 1978 and is based upon the epistemological foundations of Jürgen Habermas, who distinguishes between *instrumental* and *communicative learning*. Whilst the former builds upon a hypothetical-deductive approach, attempting to verify the beliefs about truth based on empirical testing, communicative learning applies an analogical-abductive logic, which seeks to intellectually and empathetically understand the frames out of which a statement emerges (Mezirow, 2009). Transformative learning seeks to alter these frames of reference so that the likeliness that beliefs and opinions guide the right actions increments (Mezirow, 2009). The frames of reference contemplate cognitive (thinking), conative (acting) and affective (feeling) components and explain the *habits of the mind* as-well-as differing *points of view*. *Habits of mind* are frequently outside of awareness and primarily contemplate cultural and historic aspects: experiences, others and one, whilst *points of view* are usually more evident, manifested in explicit beliefs and assumptions. A habit of mind may cause individuals to disapprove of others from a different social historic context owing to their difference (ethnocentrism) and thus hold a negative point of view towards them. Transformative learning is about the advancement of assessing beliefs about the truth, by critically reflecting

on the frames of reasoning of oneself and others adopt, as-well-as holding discourse on assessing their truthfulness.

Mezirow (2000) argues that there is no fixed truth and that conditions change. Therefore human beings are in a constant process of negotiating meaning. Adult learning is described as inheriting the “contextual understanding, critical reflection on assumptions, and validating meaning by assessing reason” (Loc. 219). Transformative learning is about critically questioning one’s own and others’ tacit assumptions and expectations in the meaning making process. Mezirow (2000) understands learning as “the process of using a prior interpretation to continue a new or revised interpretation of the meaning of one’s experience as a guide for future action” (Loc. 213).

2.1.5.2 Double-loop learning

One of the most influential concepts of organizational learning is double-loop learning (Argyris, 1976, 1977; Argyris & Schön, 1996). Illeris (2011) states that Argyris and Schön (1996) were the first to use the term organizational learning, putting it into the context of management tools and assuming that individuals within the organization learn on behalf of it. They associate organizational learning with the acquisition of information (a broader concept) the respective process of obtaining it, processing and storing it and finally conveying it to a learner. They initiated a conversation that may have been, and probably still is, awkward for learning theorists; they questioned whether the learners are individuals or the organizations themselves. It must be acknowledged that during daily conversations organizations are treated as units of analysis, which may occur because of their distant perspective; recognising the organization as an indivisible and uniform unit or regarding it as an impersonal agent. Upon the presupposition that individuals are the owners of knowledge, it could be argued that organizations know less than their members. Argyris and Schön (1996) draw on the metaphor of an organism to explicate the nature of organizational activity, reflected in the theory-in-use, and thus organizational learning:

“An organization is like an organism, each of whose cells contains a particular, partial, changing image of itself in relation to the whole. And like such an organism, the organization’s practice stems from these very images: its theory-in-use is dependent on the ways in which its members represent it. Hence, our exploration of organizational learning must not deal with static entities called organizations but, as Karl Weick pointed out (1969), with active processes of organising.” (Argyris & Schön, 1996, p. 14)

Argyris (1976) defined learning as the detection and correction of errors, which are manifested in the ineffectiveness of actions. Argyris (1976) further argued that the effectiveness of learning can be increased by incrementing the social or organizational factors that provide better information on the one hand and the receptivity to corrective feedback. As long as learning does not embrace the questioning of “fundamental design, goals, and activities” (p. 376), it is named single-loop learning and is primary in the correction of errors. When those fundamental aspects of the organization are subjected to learning, learning questions underlying values and assumptions, it can be called double-loop learning. In the latter, underlying values and views of oneself and others can be questioned and altered. Argyris points out that there seems to be a tendency for single-loop learning within groups and organizations, which even though stated more than 30 years ago, may still be regarded as a valid observation. Single-loop learning is primarily associated with that which leads to the improvement of organizational tasks, whilst double-loop learning alters the values and criteria by which performance is evaluated.

Espoused theories of action are those which people report about their behaviour, whilst theories in use are the ones that are actually executed. Double-loop learning requires being aware of the theories in use and altering those, which is difficult to obtain through lectures or theoretical discussions (Argyris, 1976, 1977; Argyris & Schön, 1996). Double-loop learning is about questioning underlying corporate policies and objectives (Argyris, 1977), which is

difficult because it may be perceived as against organizational norms. This leads to double-binds (Bateson, 1972) where employees are trapped in a situation where the adherence to one norm to not question the company's policies implies ignoring another truth, which says that something is not working (Argyris, 1977). This puts emphasis on the role of power, which Bateson (1972) elaborated in the context of Schizophrenia. Argyris (1977) talks about the dilemmas of power with which leaders are faced, and this implicitly may lead to double-binds and single loop learning. As much as an enquiry about the modes of learning within CoPs is needed, the implications that power asymmetries have with regards to this also require further assessment.

2.1.6 Social learning theory

Classical learning processes separate action from thinking (Elkjaer, 2009; Lave, 2009). However, organizational learning may also be seen as a fundamentally social process, which not only relies on the conceptualisation of teaching and learning, but emerges in the context of collective efforts in resolving problems (Teece et al., 1997). Learning is not only about knowledge but also the ability to apply it in socially accepted and recognised ways (Brown & Duguid, 2001b).

The concept of situated learning has been influenced by Activity Theory (Engeström, 2001, 2004, 2007) as the leading authors Lave and Wenger (1991) state in the acknowledgements of their seminal work "Situated learning: Legitimate peripheral participation". Lave and Wenger (1991) put forward the argument that traditional learning concepts put too much focus on the internalisation of knowledge, differentiating between the inside and the outside. Activity itself generates changes in knowledge and action; as Lave (2009) states, these two concepts encompass what Lave considers *learning*. Learning constitutes in an application in practice (Senge, 1990). McDermott (1993, as cited in Lave 2009) argues that learning is not an explicit activity itself, but manifested in constant changes of people within social settings. These changes are understood as learning. The proposition that learning is a situated

activity is a key characteristic of what Lave and Wenger (1991) term *legitimate peripheral participation*. According to this, newcomers learn when they join a community of practice and engage in the task to become full members of the community and move to the centre of it. However, learning is not a condition but rather in itself a form of membership. It is important to know that Lave and Wenger (1991) postulated that there is no fixed centre in the activity of *legitimate peripheral participation*, owing to the dynamic nature of understanding by incrementing involvement. Situated learning is beyond the concept of “learning by doing” and “learning in situ”, as it is to be understood as an “integral and inseparable aspect of social practice” (Lave & Wenger, 1991, p. 31). Another key difference is the presupposition that every activity occurs in a social context and that the agent, activity and the world mutually constitute it. Thus, learning is not a separated activity from being (Wenger, 2009). Situated learning is embedded in daily practice, rather than classroom settings (Contu & Willmott, 2003).

A central point within the concept of *legitimate peripheral participation* is power, which amongst others ways, is manifested when newcomers aim to obtain legitimacy to join the community (Contu & Willmott, 2003; Kimble & Hildreth, 2004). Legitimation may be understood as individual power transformed by the group into authority, as directed power (Emerson, 1962). Newcomers on the one hand are aiming to obtain full participation in the community, but are also likely to bring new innovative thoughts, which imply power conflicts (Contu & Willmott, 2003). Whereby Lave and Wenger (1991) stress the central position of contradiction, power and conflict, they assume that agreement and continuity of the communities of practice are somehow naturally obtained (Contu & Willmott, 2003). By researching the role of CoPs in a dispersed organization in an emerging economy in Latin America, namely Chile, more light has been shed on the role of power in the context of learning.

Arguing in favour of a social theory of learning Wenger (2009) puts forward four premises which are consonant with the underlying research paradigm of social constructionism: First, he argues that people are social beings, which may sound obvious but is a key aspect of this theory. Second, knowledge is not context-free but necessarily linked to a valued endeavour. Third, knowing is about engagement in the pursuit of this valued enterprise. Finally, the product of learning is meaning. This does however, not necessarily contradict the preceding sections, which have assessed the role of experience and disruptions for learning and furthermore circumscribed learning in terms of space, outcomes and processes. The latter, will constitute the analytical level based upon which the valued enterprise that CoPs are engaged in, the practice will be assessed.

2.2 Knowledge Sharing

The role of knowledge in light of the competitive advantage of the firm has gained great importance over the last few decades (Grant, 1996), particularly regarding the capability to create and transfer knowledge efficiently (Kogut & Zander, 1992). Notwithstanding to this, it may be considered a difficult task to define the term knowledge (Spender & Scherer, 2007), a “tricky concept” (Tsoukas & Vladimirou, 2001, p. 975). Because of this complexity some scholars even raise questions about the necessity of agreeing on a formal definition, whilst others expressed the risk of associating too many concepts to the term knowledge, which might convert it into an “all-encompassing and therefore, little revealing concept” (Tsoukas & Vladimirou, 2001, p. 975). The question about the nature of knowledge has been worked on since ancient Greek times (Grant, 1996), but only rather recently has become of increased interest within the context of organizational sciences, where it may be regarded as a “watchword” as Orlikowski (2002, p. 250) points out.

The first part within the following sections will deal with a critical assessment of the different conceptualisations of knowledge and the definition of the terminology that will be applied for the remainder of this research. This also influences the analytical framework upon which

CoPs in the research context have been evaluated. Afterwards, the different associations of the concept of knowledge sharing will be explicitly addressed, which beyond learning constitutes a pivotal focus of attention within this thesis.

2.2.1 Knowledge definition

It may be argued that there two predominant perspectives on knowledge in the organizational context. Scholars predominantly influenced by the positivist school of thought refer to a taxonomic perspective of knowledge, which postulates that knowledge inherits the characteristics of a thing (Orlikowski, 2002). This can be possessed by individuals and organizations (Tsoukas, 1996). In attempting to categorise knowledge it does not embrace the postulated premise that it does not constitute a descriptive fact, but depends on the position of the observer (Tsoukas, 2000). Furthermore, the outlined understanding has been critiqued for being of rather static, objectified and functionalist nature (Marshall & Rollinson, 2004). Concluding the above, Cook and Brown (1999) have coined this conceptualisation of knowledge as an epistemology of possession. The other perspective does not neglect the existence of knowledge as a possession, but argues that it is ultimately always manifested in practice and reciprocally constitutive (Orlikowski, 2002). This perspective has been coined as the epistemology of practice (Cook & Brown, 1999), in which knowledge is not static and objectified but “inherently indeterminate and continually emerging” (Tsoukas, 1996, p. 11). In line with this, knowledge is characterised “as an active process that is *mediated, situated, provisional, pragmatic and contested*” (Blackler, 1995, p. 1021, italic in original).

As a recent literature review by Erden, Schneider, and von Krogh (2014) outlined, the majority of scholars who focus on the study of social practices like CoP theory, reject the perspective of knowledge as an epistemology of possession but incline towards a practice-based perspective of an epistemology of practice. The latter also encapsulates the proposition that knowledge emerges out of the negotiation of meaning in a social context (Berger & Luckmann, 1991; Marshall & Rollinson, 2004), which is central to CoP theory

(Wenger, 1998). “Minds do not act separately from bodies, nor does knowledge act separately from engagement in practice” (Holland & Lave, 2009, p. 2). While practice is intuitively linked to doing, it is understood that this is in connection with meaningful action (Cook & Brown, 1999). Various scholars advocate for the usage of the terminology knowing rather than knowledge to emphasise the focus of action and practice (Orlikowski, 2002). However, for the context of this thesis the term knowledge has been adopted as mutually embracing the epistemologies of practice as-well-as of possession (Cook & Brown, 1999).

Aiming to specify the conceptualisations about knowledge, the following sections will address two of the most relevant aspects, according to which knowledge can be categorised. This is on the one hand, about the differentiation between tacit and explicit knowledge, and on the other, about the ownership of knowledge, which can be social or individual.

2.2.1.1 Tacit versus explicit knowledge

Polanyi (1966) is frequently cited as stating that individuals “know more than they can tell”, which has converted into a basic premise of tacit knowledge. This also leads to the understanding that tacit knowledge, while possessed by somebody, is ultimately always enacted in practice (Nonaka, 1994). Maturana and Varela (1987, p. 29) argue “all doing is knowing, and all knowing is doing” (see also Orlikowski, 2002). Initially tacit knowledge has above all been regarded as problematic because of the difficulties in sharing it with others (Kogut & Zander, 1992). A frequently adopted example in relation to this consists in psychomotor skills like riding a bicycle or swimming. These are skills that are difficult, if not impossible, to codify even though an individual is fully aware of them, because they emerge in action (Gertler, 2003; Tsoukas, 1996). In light of the difficulties in consciously capturing tacit knowledge it is frequently associated with an undesired and negative character. It is assumed to present a lacking understanding of the underlying structures (Teece et al., 1997) determining it as an “informal, inchoate, or obscure kind of knowledge” (Cook & Brown,

1999, p. 384). For organizations it does indeed constitute something difficult to control – it is frequently argued to stand opposite to explicit knowledge, which embraces knowledge that can be codified (Kogut & Zander, 1992; Spender & Grant, 1996). Explicit knowledge provides organizations with the sensation of control. However, rather than opposing tacit and explicit knowledge they should be understood as situated on the same continuum (Nonaka & von Krogh, 2009), different in its level of abstraction (Spender, 1996). Explicit knowledge alone will never suffice, but always requires a basis of tacit knowledge in executing it (Duguid, 2005).

Beyond the psychometric skills that are encompassed in tacit knowledge, it also inherits another dimension beyond consciousness (Gertler, 2003), an unarticulated background upon which agents are acting in a social world (Tsoukas, 1996). In line with this, tacit knowledge can be grouped into a technical and cognitive dimension (Nonaka & Konno, 1998). Technical knowledge is to be understood as the know-how for the execution of psychometric skills, whilst the latter is constituted in underlying values and norms, that the knowledge holder may not even be aware of (Gertler, 2003; Spender, 1996). Even though a variety of scholars believe that tacit knowledge can be explicated verbally (Tsoukas, 1996), others believe the opposite, arguing that it cannot be made explicit (Spender, 2008). However, in spite of the discussions about the ability to codify tacit knowledge, the relevant concern is about the way that it is applied and amplified in practice. If the basis for learning and knowledge sharing is not restricted to the codification of knowledge, this concern loses its validity. Particularly because of this, CoPs have achieved an increasing amount of interest as they permit the replication of tacit knowledge among its members. The mutual negotiation of meaning within a CoP not only embraces the technical but also the cognitive dimension of tacit knowledge. Tacit knowledge in its purest form will only be available to those that share the same context (Gertler, 2003) and will never be stable or equal among different people because it is “inherently indeterminate and continually emerging” (Tsoukas, 1996, p. 11).

The previous discussion leads to the understanding that tacit knowledge not only resides within individuals, but also within groups (Erden, von Krogh, & Nonaka, 2008; Spender, 1996). Reber (1996, as cited in Spender, 1996) argues that the tacit knowledge of a group is given because of the social-cultural context. However, whilst culture influences the tacit knowledge within CoP, it is argued to predominantly emerge through the mutual negotiation of meaning and legitimate peripheral participation within CoPs. Whilst individuals can share and learn tacit knowledge as participants of CoPs, it may be regarded as a difficult undertaking to share individual, but above all group tacit knowledge, the most relevant type of organizational knowledge (Erden et al., 2008; Spender & Grant, 1996) across boundaries of CoPs. Lacking understanding about the mechanisms that contribute to tacit knowledge sharing may be why too many organizations seem to rely on the codification of tacit knowledge as the means to overcome this challenge. In the research context, this may be underpinned by the fact that process documentation constitutes a central building block of Komatsu's corporate strategy with the aim to standardise processes. It is likely that this was influenced by an early conceptualisation about the difficulties in managing tacit knowledge. Kogut and Zander (1992) suggested the codification and simplification of individual and small group owned knowledge was the answer to the high cost of recreation and transfer across the organizational structure.

The previous discussion emphasises the need to explore the role and contribution of CoPs with regard to the mediation of tacit knowledge across boundaries within a geographically dispersed organization (Gertler, 2003; Lindkvist, 2005).

2.2.1.2 Social versus individual knowledge

Beyond the preceding discussion about the nature of knowledge as tacit and explicit, it is a worthwhile undertaking to discuss the differences between individual and social knowledge. In line with this, there are two major perspectives. The first one states that organizational knowledge is the sum of individual knowledge within an organization, whilst the other argues

that organizational knowledge is part of the organization, embedded in operational routines (Blackler, 1995; Spender, 1996). While each person is “born into a world of meaning” (Crotty, 1998, p. 54), it may be regarded as safe to argue that every individual enacts knowledge, which is however, constructed in a social context (Berger & Luckmann, 1991). The relevant question is thus, rather about the nature of knowledge in social constructions, such as organizations. In line with Wittgenstein, Tsoukas (1996, p. 14) argues that social knowledge “is not an aggregation of individual experiences but a set of background distinctions, which underlie individual actions”. Building on the important work of Simon (1947), Spender (1996, p. 53) suggests that “there has been a wide recognition that the assumption of an atomistic individual may not serve organizational analysts well”. However, the importance of the social context does not lead to social determinism, which argues that society is the only force that shapes people, but rather that people themselves construct the social reality that they have to later respond to (Burr, 2003; Spender, 1996). Daft and Weick (1984) postulate that organizations contain cognitive systems and memories, which are more lasting than the agents that form part of the organization, materialised in “mental maps, norms, and value over time” (p. 285). Narratives can constitute another important repertoire for the collective mind (Weick & Roberts, 1993). They do not have an essence (Tsoukas, 1996) but are constructed in a social context (Berger & Luckmann, 1991). Tsoukas (1996) mentions that various scholars conceptually apply the understanding of human mind, with its impressive capabilities of connections, as a metaphor for organizations, like the collective mind (Weick & Roberts, 1993). Apart from that, people talk about organizations, thus it may be claimed that they exist as real entities (Weick, Sutcliffe, & Obstfeld, 2005). However, this raises the question about where the knowledge is located, particularly the tacit knowledge, assuming that there is no “mythical collective subject” (Engeström, 2001, p. 140) in the concept of Platonic pure forms (Tsoukas, 2000).

Taking the perspective that knowledge is manifested in action, can also be conceptualised on a collective level, by what Tsoukas (2000) terms ‘heuristic knowledge’. This knowledge is

claimed to reside within communities and is historically built based upon collective experience. Within this perspective individuals draw their knowledge from this collective base. Whilst enacted by individuals, Tsoukas (2000) postulates that knowledge becomes organizational when individuals collectively agree generalisations and rules to draw distinctions in their actions. Spender (1996, p. 53) argues that “both the individual and collectives have knowledge based identities”.

Corresponding to Berger and Luckmann (1991) it is also advocated that knowledge lies within social practices (Erden et al., 2014). Within the theoretical frame, social practices are the locus where knowledge is embedded and enacted (Erden et al., 2014). In line with Reckwitz (2002) it is tautological to state that practices are social, because they are necessarily embedded into a social context. Within practice theory, the world consists in diverse social practices, with the individuals as carriers of the practices and those that connect different practices as Reckwitz (2002) argues. Social knowledge may thus be regarded as situated within the individuals and the mutual relations they engage in, which can be understood as routines.

Particularly those scholars who advocate methodological individualism push towards research to understand how organizations can deal with the aggregation problem of combining individuals to achieve a common goal (Felin & Foss, 2009). When rejecting methodological individualism a mechanism or concept of aggregation must be defined (Brusoni & Rosenkranz, 2014). This will be discussed further in the methodology chapter.

The discussions above propose a standpoint for this thesis that rejects the frequently discussed dichotomies in knowledge management theory, supporting Blackler (1995, p. 1032) who states the following: “Knowledge is multi-faceted and complex, being both situated and abstract, implicit and explicit, distributed and individual, physical and mental, developing and static, verbal and encoded”. For the purpose of this work a pluralist

epistemology has been advanced, in line with leading scholars of the field (Nonaka & Peltokorpi, 2006; Spender, 1998).

2.2.2 Routines

A wide range of scholars and practitioners argue that knowledge is embedded within organizational routines (Cohendet & Llerena, 2003; Feldman, 2000; Feldman & Pentland, 2003; Spender & Grant, 1996; Teece et al., 1997; Tsoukas, 1996) and depict these as the unit of analysis (Becker, Lazaric, Nelson, & Winter, 2005). The conceptual description of routines may stem from the aggregation problem, which necessarily evolves in the context where the knowledge holders are not solely individuals, but social entities such as organizations (Foss, 2003). Routines are thus to be understood as collective phenomena, metaphorically similar to skills on the individual level (Becker, 2004; Felin & Foss, 2009). M. D. Cohen and Bacdayan (1994) advanced the argument that routines depict the memory of organizations, predominantly incorporating procedural knowledge, which is not restricted to, but strongly depends on tacit knowledge. This does not imply equal and symmetric distribution of the embedded knowledge through the organization, though. Rather, knowledge is argued to be dispersed among different actors who engage into the execution of shared routines (Becker, 2004). Pentland and Feldman (2008) argue that routines are the foundation of any organizational process that requires coordination among different actors.

Routines may be understood as a relatively stable and recognisable pattern of mutually dependent actions, which emerge once the system obtains equilibrium between the desired and real outcomes, and acted upon using a recurring pattern of stimuli in a specific context (Feldman, 2000; Feldman & Pentland, 2003). The relative stability of routines emphasises their important role in maintaining the coherence of the respective organizations (Amin & Cohendet, 2000). However, whilst the term 'routine' may lead to the conclusion that it has a rather static character, Feldman (2000) points out that most routines she studied were actually subject to and also the driver for substantial change, as deviation of actions initiate

learning (Feldman & Pentland, 2003). This is valid in the context where they have the characteristics of 'live' routines, those that require human agency, versus 'dead' routines, which do not require human interaction (Pentland & Feldman, 2008).

According to Zollo and Winter (2002) routines are the outcome of learning processes, which either contribute to the functioning of the respective organization as operating routines or as integral components of its dynamic capabilities (Katkalo, Pitelis, & Teece, 2010; Teece, 2007). These may be understood as search routines, which aim to change the operating routines in light of the survival and prosperity of the organizations within a competitive environment. It is worth mentioning though, that routines are not solely an outcome, but that the learning process in itself constitutes a high level routine. Their improvement is thus of strategic relevance for organizations (O'Reilly & Tushman, 2008). These learning routines are frequently delineated between exploitation and exploration (March, 1991). The objective of exploitation is to enhance efficiency, productivity, control, certainty, and to reduce variation whilst exploration on the other hand implies search, the creation of something new, and is explicitly aiming to induce variation (Gupta, Smith, & Shalley, 2006; Lavie et al., 2010; O'Reilly & Tushman, 2008). Thus routines are not only the locus where knowledge is enacted but also a driver for learning (Parmigiani & Howard-Grenville, 2011).

It is important to take into account that routines do not only include the abstract idea of its structure, the *ostensive* aspect. They also contemplate the execution, the *performative* aspect, which is influenced through the environment in which they are embedded, especially the social context (Feldman & Pentland, 2003). However, both aspects are not to be regarded as oppositional but rather as mutually constitutive (Feldman & Orlikowski, 2011). Therefore it may be argued that communities ultimately define routines (Cohendet & Llerena, 2003). As a side note, the differentiation between *ostensive* and *performative* can be derived from the much earlier developed distinction between espoused and enacted theories of action (Argyris & Schön, 1996).

Whilst others argue that knowledge is also stored in formal procedures, norms, rules and forms (March, 1991), it may be questioned if these are capable of encompassing tacit knowledge, the most valuable and difficult to copy source of knowledge, as long as they are not enacted through operational routines (Rerup & Feldman, 2011). In line with the vibrant discussions about the knowledge sharing within organizations, research also particularly indicates the difficulties in replicating routines (Jensen & Szulanski, 2007). It is also noteworthy that routines are not to be confused with rules, which predominantly represent formal behavioural expectations (Geiger & Schröder, 2014). Organizational routines are manifested explicitly in rules or implicitly in culture (Spender, 1996).

As with many concepts covered within this dissertation, the term “routines” lacks clarity regarding its definition, which according to Felin and Foss (2009, p. 161) may be owing to the fact that “routine” is converted into “a catch-all concept for those collective-level aspects of an organization that many contribute to the relative rigidity of firm level behaviour”. A commonly articulated aspect however, lies in the structural or ostensive as-well-as relatively stable aspects that routines inherit (Feldman & Pentland, 2003). These are also the pivotal aspects that have been incorporate in the definition of routines for this research.

2.2.3 Knowledge flows

It may be argued that at least some discrepancies regarding the discussions about knowledge flows within organizational settings arise because of inconsistencies in the adopted terminology. First, however, reference should be made to the important work of Szulanski (1996). He has significantly driven academic discussions about the movement of superior knowledge that is embedded in one part of the organization, termed best practices, to other parts of the organization. However, his research has revealed difficulties in the enterprise to transfer knowledge within organizations. There can be little doubt about the value of best practice sharing within the organization. However, researchers present diverging explanations and suggestions about this topic.

Frequently, knowledge flows are assessed based, among other things on the direction of the flow, vertical or horizontal, the characteristics of the actors and the type of knowledge (Michailova & Mustaffa, 2012). However, within a context where knowledge is not solely understood as an epistemology of possession, this does not suit this research enquiry.

In traditional theories of the firm the transfer of knowledge is subjected by transaction costs (Spender, 1996), which is grounded on the assumption that knowledge obeys the logic of markets (Ghoshal & Moran, 1996). However, the ownership of knowledge cannot change as other products, because of the socially constructed nature, which makes it highly context dependent. The conceptualisation of transfer is associated with information processing (Carlile, 2004) and aims to replicate an organizational routine as close as possible to the origin in another organizational setting (Szulanski, 1996). The transfer is regarded as a process, which starts with the formation of a transfer seed and finishes with a satisfactory performance in the receiving unit (Szulanski, 2000). The transfer of knowledge has occurred when a receiving unit accumulates or assimilates new knowledge (Bresman et al., 1999), learns from the experience of others (Easterby-Smith et al., 2008), replicates practices in another organizational setting (Teece et al., 1997) and changes behaviour (Argote & Ingram, 2000). In line with this, knowledge transfer is usually regarded as a unidirectional endeavour, built upon an implicit power asymmetry between those that know and those that do not.

As outlined above, transfer of knowledge starts upon an epistemology of possession, postulating “an objectification or commodification of knowledge, extrapolated from its context” (Yanow, 2004, p. S15). Those scholars that advocate in favour of transfer typically assume that “important knowledge resides in an explicit or at least potentially explicit form (...) somewhere in the organization” (Kasper, Lehrer, Muehlbacher, & Mueller, 2013, p. 334). Inkpen and Tsang (2005) argue that the concept of knowledge transfer does not sufficiently shed light on the aspect of tacit knowledge, because of which, it cannot be transferred systematically but only replicated (Ancori, Bureth, & Cohendet, 2000). Recognising the

existence of tacit knowledge, Grant (1996, p. 11) postulates that its transfer is “slow, costly and uncertain” and cannot truly be transferred but only appropriated.

Additionally, the secession of knowledge from the specific social-cultural context, in which it has been socially constructed (Berger & Luckmann, 1991; Lave & Wenger, 1991) presents a concern for researchers situated within the social constructionism paradigm (Kasper et al., 2013).

The conceptualisation of knowledge transfer may be appealing to an organizational manager, as it provides the premise of control over resources that flow (Gupta & Govindarajan, 1991). However, it is likely to fail if the transferred knowledge contemplates a significant amount of tacit knowledge, which is dependent on socially constructed and negotiated meaning. This does not contradict the benefits of unidirectional knowledge transfer though, which without a doubt may generate significant benefits. However, particularly in terms of the highly context specific knowledge that CoPs are concerned with, it is not regarded as the adequate conceptualisation of knowledge movements across different organizational settings.

Diverging from the contextualisation of unidirectional knowledge transfer, much research applies for an understanding of knowledge translation, postulating that different contexts require different interpretations (Carlile, 2004). This embraces the negotiation of shared meaning (Choi & Johanson, 2012; Yanow, 2004), which is a suitable conceptualization for research involving a geographically dispersed organization and conducted within the paradigm of social constructionism. Another concept includes the transformation of knowledge, which emerges when novelty requires changes in interdependent areas (Carlile, 2004). Knowledge is necessarily embedded into a social context (Berger & Luckmann, 1991) and it could therefore be argued, that each sharing activity implies a transformation to be applicable at the recipient unit's level (Hong & Nguyen, 2009).

The definition of knowledge sharing for this thesis emphasises the aspect of learning. It is not about disembedding knowledge from one community and embedding it in another, but to provide the means through which people in other communities can construct meaning out of it in their respective social context. In her commentary on Brown and Duguid (1998, p. 43) Wanda Orlikovski argues the following: "Sharing knowledge (...) is seen as enabling people in other communities to learn their activity that enacts knowledge." A focus within the approach is the aspect of negotiation, which necessarily leads to an assessment of power asymmetries that may influence knowledge sharing.

2.3 Communities of Practice

Research about situated learning has led Lave and Wenger (1991) to highlight the role of CoP, which exist in nearly any context where people are mutually engaged and committed to a joint enterprise and learn together (Wenger, 2000, 2011). Brown and Duguid (1991) took CoPs to the organizational context, arguing that these present the vehicle for learning and knowledge creation, in a context where canonical practices, understood as work theories espoused by the organization, but detached from practice, are inefficient to get the job done. Within CoPs the members learn and create knowledge by sharing explicit and implicit knowledge through interaction in practice (Brown & Duguid, 1991). This engagement can either stem from a passion or a concern about something they do and attempts to learn more in order to perform better (Wenger, 2011). CoP theory has had a significant impact in taking "learning out of the clutches of individualism" (Elkjaer, 2009, p. 86), a perspective that is generally regarded as outdated (Spender, 1996) and this is in line with the underlying research paradigm of this thesis.

However, today CoP may be regarded as an "elusive term" (Rock, 2005, p. 77), which is characterised by many diverging interpretations. Cox (2005) provided an insightful assessment about the evolution CoP theory has experienced: The first approach emphasises the role of legitimate peripheral participation, based upon which newcomers

learn a craft and become full members of the CoP (Lave & Wenger, 1991). In the same year Brown and Duguid (1991) provided a conceptualisation in which CoPs create new knowledge through the interaction between explicit and tacit knowledge, to improve work practices in a context where espoused theories of work are not adequate in getting the job done. Later, one of the initiators of CoP theory shifted the focus to the negotiation of meaning, the construction of identity and the aspect of multi-membership of members in different CoPs (Wenger, 1998). The final conceptualisation that Cox (2005) presents embraces the transformation of CoPs as a managerial tool in organizational settings to foster innovation and improve performance, as elaborated by Wenger et al. (2002). Recently, the focus of CoPs has been put on the value they create in the context of networks (Wenger, Trayner, & de Laat, 2011). Interestingly, Duguid (2008), one of the most influential scholars in the fields of CoP theory, recently associated some of the principal problems in determining CoPs, with the fact that people do not understand the initial work of Lave and Wenger (1991) well enough. It is argued that this evolution, while productive in the advancement of knowledge and improvement of practice, has led to research about CoPs that significantly diverges because of inconsistencies in definitions and terminology.

Furthermore, interesting challenges have emerged particularly in the context of CoPs in geographically dispersed organizations. This is because some regard CoPs as tightly knit groups of people who know each other through face-to-face interaction and have worked together for a long time (Brown & Duguid, 1998; Brown & Grey, 1995; Vaast & Walsham, 2009). Others describe CoPs with thousands of members, spanning across national borders (Wenger et al., 2002). However, the latter may be potentially regarded as too broad, diffuse and diverse to be determined as CoPs in the predominant understanding (Lindkvist, 2005; Wenger, 1998).

This research contributes in this context, by assessing the form that CoPs take within a geographically dispersed organization and by furthermore assessing to which extent they

contribute to learning and knowledge sharing. In the following section, the analytical aspects upon which CoPs can be assessed will be elaborated. Afterwards, some of the most relevant points of critique will be discussed.

2.3.1 Dimensions of CoPs

Wenger (2011) defines CoPs as “groups of people who share a concern or passion for something they do and learn how to do it better as they interact regularly” (p. 1). This definition embraces the essence of CoPs but for its own sake does not provide the basis for the analytical work necessary. Building upon this definition, Wenger associates three fundamental dimensions to CoPs, namely their community, domain and practice (Wenger, 2004, 2011; Wenger et al., 2002). It is not an easy undertaking to clearly separate the content of each dimension, because of their interconnected and mutually dependant nature. However, with the aim to establish an analytical framework for this research, each of the respective dimensions will be described in the following sections, outlining the fundamental aspects that have been adopted within the analytical framework.

2.3.1.1 Community

The first part of the definition presented by Wenger (2011) refers to groups of people that interact regularly, which may be associated with the dimension of community. This leads to the fundamental understanding that “CoP is inherently and irreducibly a social endeavour” (Duguid, 2005, p. 109), deeply rooted in social learning theories as opposed to traditional theories outlined above. However, the dimension of community is most likely the aspect that has been subjected to the most significant amount of discussions within CoP theory. Community may have the connotation of a “rather large, helpful and friendly, bounded group” as Cox (2005, p. 11) argues, and “carries with it quite a heavy baggage of idealist connotation” (Lindkvist, 2005, p. 1193) with it. Indeed, communities are colloquially associated with harmony, whilst CoPs can be well categorised by aspects such as disagreement, challenges and competition (Wenger, 1998).

In general there does not seem to be a commonly agreed definition of what a community is (Cox, 2005; Roberts, 2006). Because of different understandings of the term, some scholars have advocated for different categorisations like collectives of practice (Lindkvist, 2005) or epistemic communities (Hakanson, 2010). However, just as community, these terms are also subject to potential differences in understanding. Within the following the adopted understanding of community for this research will be presented.

Within the framework put forward throughout this research, community embraces the aspects of membership, which is informed by boundaries and proximity as-well-as the quality of the relationships, with reference to the peripheries of the CoP.

Membership necessarily implies the existence of boundaries, which can have different characteristics, but without boundaries there cannot be a community. Boundaries represent a discontinuity in action of interaction because of a distinction from others (Akkerman & Bakker, 2011). Peripheries on the contrary imply continuity and belonging, referring to a degree of participation (Wenger, 1998; Wenger et al., 2002).

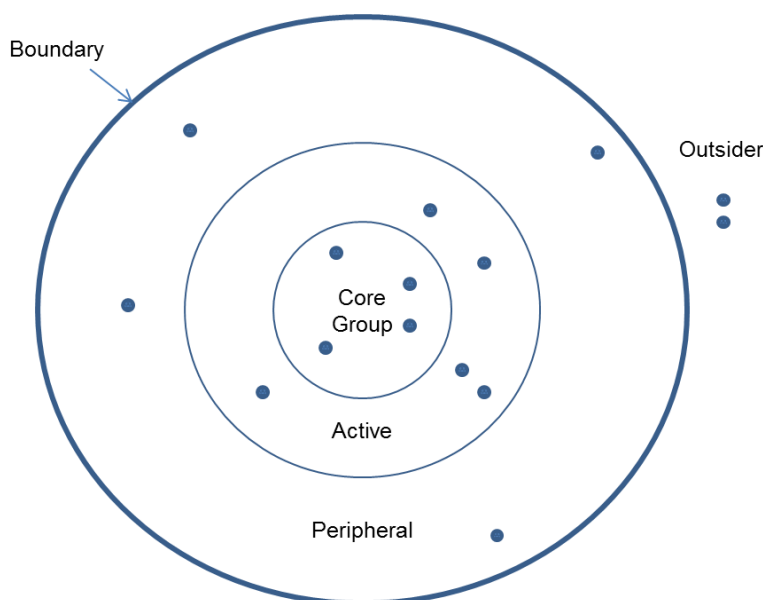


Figure 2: Degrees of participation adopted from Wenger et al. (2002).

Peripheries have been a central theme within the initial conceptualisation of CoP, with regard to the social learning theory of legitimate peripheral participation (Lave & Wenger, 1991). Boundaries are usually fluid in nature and are not always explicitly defined, as an example provided by Wenger (2000, p. 232) illustrates well:

“Sit for lunch by a group of high-energy particle physicists and you know about boundary, not because they intend to exclude you, but because you cannot figure out what they are talking about.”

A key aspect in joining a community relates to being able to join conversations (Gherardi & Nicolini, 2002).

It is argued that boundaries of CoPs are defined because of different degrees of proximity (Boschma, 2005; Knobén & Oerlemans, 2006; Mattes, 2012). People who have never experienced proximity cannot constitute a CoP. Proximity, while usually associated with it, is not restricted to geographic or spatial proximity (Knobén & Oerlemans, 2006). Particularly in the earlier discussions about CoPs, this has been argued to be vital to permit legitimate peripheral participation to happen (Lave & Wenger, 1991). It is argued that proximity furthermore embraces *cognitive proximity*, the degree to which people hold a common stock of knowledge and expertise (Boschma, 2005). If two people, while working on different continents have an advanced knowledge about the hydraulic system of a shovel, they have cognitive proximity. *Social proximity* refers to the strength of ties and depends upon the “amount of time, the emotional intensity, the intimacy (mutual confiding) and the reciprocal service which characterise the tie” (Granovetter, 1973, p. 1361). *Organizational proximity* relates to extent to which organizational structures provide shared relations. Because of the scope of this research, these four categories of proximity seem to suffice, even though scholars advocate in favour of further distinctions, like technological, cultural and institutional proximity (Knobén & Oerlemans, 2006). It appears that many discussions about the forms of CoPs diverge because of different conceptualisations of proximity, assuming *geographic*

proximity “as a catch-all phrase” (Mattes, 2012, p. 1088). CoPs should be assessed based upon the types of proximity their boundaries are defined upon.

Depending on the quality of relationships within the community, boundaries can either support or impede learning (Wenger, 1998, 2000). On the one hand, the existence of boundaries can provide the members with the security that allows them to take risks they would not take outside of them (Wenger et al., 2002). Whilst homophily, the desire of individuals to be bound with others that are similar, is argued to facilitate learning and knowledge sharing (Makela, Kalla, & Piekkari, 2007) it may limit the innovative potential of CoP. However, whilst strong ties are beneficial on the inside of a CoP for learning, they may be so strong that they inhibit learning from external stimulus (Granovetter, 1973; Hansen, 1999), causing implicit assumptions to remain unchallenged (Wenger et al., 2002). Zietsma and Lawrence (2010, p. 214) refer to the metaphor of CoP as a “fortress under attack, there was a great deal of noise and action at the perimeter, but life carried on inside, away from the embattled boundaries”. The learning theorist Elkjaer (2009, p. 87) postulates that CoPs are limited with regards to creativity and innovation, because of the “tendency to recycle knowledge rather than critically challenge and extend it”.

Irrespective of whether strong or weak ties exist, trust is a central coordination mechanism within CoP theory (Roberts, 2014). Trust may be understood as “the willingness to accept vulnerability based on positive expectations about another’s intentions or behaviours” (Li, 2005, p. 80). In a relation of trust there exists less fear of opportunistic behaviour of another party, which thus contributes to collaborative behaviour (Tsai & Ghoshal, 1998). Missing trust may generate defensive routines (Argyris & Schön, 1996). This may lead to double-binds, where people are captured in a situation where the adherence to one norm (e.g. to not question the company’s policies) implies ignoring another truth (e.g. that the policy is counterproductive in fulfilling another corporate requirement, like fulfilling a customer need) (Argyris, 1977). This concept has been highlighted by Bateson (1972) in the context of

schizophrenia within personal relationships and has also been adopted to the organization context (Argyris, 1976, 1977; Argyris & Schön, 1996).

Another highly relevant aspect in this context is about legitimation, because in spite of proximity, people who want to join a CoP, thus strive to move from the boundary to the periphery, need to earn legitimation. While some advocate that CoPs are closed systems (Vaast & Walsham, 2009) others associate them with boundaries that “are not fixed, but flexible, continuously shifting, porous in nature and difficult to identify” (Roberts, 2006, p. 631). Within the research CoPs understood closed systems, manifested through boundaries, which are subject to constant change. Roberts (2006) postulates that CoPs “will include members of varying standing in terms of experience, expertise, age, personality, authority within the organization and so on” (p. 627). Furthermore, CoPs are characterised by members that join and leave (Roberts, 2006). The members of CoPs may not even be consciously aware of the fact that they belong to a community (Lindkvist, 2005). This has implications for this research, because people within the research phase were not asked about the existence of communities but groups, because they may not think of themselves as a community (Brown & Duguid, 1998).

Whilst it is advocated that trust is a pivotal aspect within communities, it does not imply idealist connotations (Lindkvist, 2005) about harmony and friendship. As a matter of fact, participation in a community can include disagreement, challenges and competition (Wenger, 1998).

2.3.1.2 Domain

The second part of the definition presented by Wenger (2011) relates to a shared concern or passion for something, the collective intention (Wenger et al., 2011). A pivotal aspect of CoPs consists thus in the fact that they are not restricted to the task they execute (Wenger, 2004) but by a domain, the *raison d'être*, which assembles around the common identity, purpose and values, which hold together the members and encourage participation and

contribution (Wenger, 2011; Wenger et al., 2002). Beyond the competences that the members of the CoP value and the purpose for which they get engaged, identity constitutes a central feature within this context.

Identity relates to the participation in the social meaning making process within the communities that people are members of, as Wenger (1998) argues. Identity is a crucial aspect of being in the world, defining what individuals feel to belong to and what they do not, as-well-as about what they are and what they are not. Wenger furthermore argues, in line with the adopted research paradigm, that it is wrong to associate identity either with the members or the community. Each individual is embedded within a social context and identity resides in these mutually intertwined relations. However, this does not obviate the unique character that identity has for each member, because their meaning making process is unique. But the production of meaning emerges out of the social communities they are part of. He synthesises “it is as misleading to view identities as abstractly collective as it is to view them as narrowly individual” (Wenger, 1998, p. 148). Further, identity is not stable but continuously emerging. The assumption that people participate in different communities implies that their identity is shaped through “living the experience of boundaries” (Wenger, 1998, p. 160), or multi-membership. However, people do not have multiple identities, but need to reconcile their identity within different contexts. Supervisors of a maintenance team learn on the one hand about the maintenance itself – on the other hand they are likely to belong to a community of supervisors with whom they share the practice of supervision. In the context they need to reconcile the identities depending on the communities where they are, materialised among others in the language they apply (Gherardi & Nicolini, 2002). Language plays a central role in the process of meaning making and according to Tusting (2005) has not been sufficiently explored yet. “A dialogue is a joint activity between at least two speech partners, in which a turn-taking sequence of verbal messages is exchanged between them, aiming to fulfil a collective goal” (Tsoukas, 2009, p. 943). Productive dialogue alters distinctions of the individuals involved, which is a key feature of those who are

knowledgeable (Tsoukas, 2009): it may lead to *conceptual combination*, where at least two concepts are combined in a new way. *Conceptual expansion* occurs when the use of already existing concepts is systematically expanded. *Conceptual reframing* is about the application of a concept in another context. From a critical perspective it can happen that the practice leads to an “own language and culture” that cannot be understood by others, and thus limits the potential benefits for the wider organizational context (Wenger et al., 2002).

Because the formation of identity happens in a social context, there exists a constant and useful tension within CoPs, which may be augmented when newcomers strive to join (Handley et al., 2006). The domain is the aspect where Wenger et al. (2002) propose that organizational leaders can interact by helping the CoP to shape itself. In line with this Alvesson and Willmott (2002) highlight identity-regulation as the means through which organizations can shape identity, which is argued as a tension to the identity-work that the members of the organization engage in to construct identity (Handley et al., 2006).

2.3.1.3 Practice

The third emphasis within the definition of Wenger (2011) embraces doing and learning, which is materialised in practice. While there has been a focus on the aspect of communities within research, Duguid (2005) stresses that the aspect of practice requires more attention. Indeed, a central aspect of CoPs is the fact that members are practitioners who share a common practice and develop a repertoire of shared resources (Brown & Duguid, 2001b; Wenger, 2011). A practice is not restricted to an activity but above all to the social negotiation of meaning associated with it. This again alters the activity as a mutually intertwined and interdependent process.

The negotiation of meaning happens through participation and reification as Wenger (1998) highlights. Participation emphasises the participatory character of CoPs. Members get involved in the community, enterprises and activities, manifested through their membership of the community, and form parts in the construction of its identity. Reification, on the other

hand, refers to the processes and products that give a platform to the meaning making process. Whilst these products may be rather abstract Tusting (2005) illustrates the concept making reference to a book (reification), which does not make meaning until someone engages in reading it (participation). A conversation (participation) builds upon a language (reification). Whilst two aspects contribute to this process, it is not to be understood as a dichotomy but rather as a duality, where both are mutually influencing (Wenger, 1998). Out of the interplay between reification and participation, meaning is continuously negotiated and influenced through the world that the CoP is embedded in and the experiences it makes (Figure 3). In line with this Duguid (2005) argues that learning not only requires access to codebooks but furthermore it has to be able to decode them adequately.

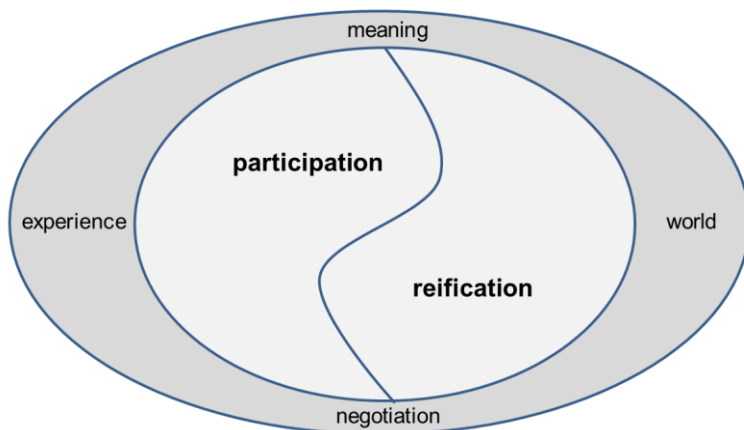


Figure 3: The duality of participation and reification according to Wenger (1998).

The social learning theory of legitimate peripheral participation suggests that newcomers join a community by learning to engage into the practice from those with more experience, who are allocated closer to the centre of the CoP (Lave & Wenger, 1991). This is not necessarily an intentional act (Lindkvist, 2005). Through this interaction, people learn how to carry out their work, which is not defined by abstract knowledge materialised in work instructions, called canonical practice, but rather in non-canonical practices that serve to get the job done (Brown & Duguid, 1991). Wenger (1998) argues that practice emerges to manage sometimes contradictory institutional demands. It enables individuals to do their work,

without having to know everything, because of a communal memory. This provides the entry point for newcomers of the community and creates an atmosphere where the activity itself is “woven into rituals, customs, stories, events, dramas, and rhythms of community life” (Wenger, 1998, p. 45).

However, practice does not only involve acquiring expertise knowledge about the ‘doing’, which some newcomers may already have (Yanow, 2004). In a personal conversation with Yanow (2004) the influential scholar Orr, who knew of CoP theory because of his ethnographic studies about copier technicians, argues the following:

“It (...) seemed that the idea of legitimate peripheral participation was not readily applicable to the technicians I worked with, principally because all of them were experienced and many experts.” (Yanow, 2004, p. S21)

Whilst this may intuitively seem to be a reasonable argument, it is important to understand that legitimate peripheral participation is not only concerned with the activity itself, but the process of becoming a practitioner. This not only embraces the acquisition of “codebooks but the ability to decode them appropriately” (Duguid, 2005, p. 113), which confers to the socially constructed meaning of the CoP. Practice is manifested as a shared repertoire of experiences, stories, tools and routines to solve problems (Wenger, 2011).

Based on the above, the practice is characterised in the way CoPs execute their tasks and learn together. For the analytical framework of this research it is argued that organizational routines present the locus where the tasks they execute are embedded. The characteristics of these routines are mutually dependent with the knowledge the CoP embraces, according to the definition presented previously in this Chapter. For the analytical framework, the social learning within and between CoPs has been categorised according to the learning process, outcomes and space.

2.3.2 CoPs within an organizationally dispersed context

As already outlined in the introductory Chapter, a particular interesting question that has emerged in recent years concerns the form and role of CoPs within geographically dispersed organizations (Roberts, 2006). Possibly because of a lack of explanations, it may be argued that the concept of CoP has “occasionally been stretched well beyond its capacity” (Duguid, 2005, p. 115). Because of the restricted proximity among those that belong to big, geographically dispersed organizations it is unlikely to be able to assume that all people involved in the same tasks constitute a single CoP. This is supported by scholars who advocate that CoPs require at least at one point in time to have had geographical proximity (Hakanson, 2010; Vaast & Walsham, 2009). Further, even if they have experienced this, their efficiency may be reduced because of potential ‘disconnectedness’ (Wenger et al., 2002). In spite of recent theorising about virtual CoPs (Fang & Chiu, 2010; Roberts, 2014), it is also believed that IT solutions alone are unlikely to overcome the challenges of missing proximity (Brown & Duguid, 1998; McDermott, 1999). Wenger et al. (2002) therefore differentiate between CoPs and those termed ‘distributed’ CoPs, which are not geographically proximate. Therefore, and to foster the understanding about CoPs within geographically dispersed organizations, two aspects will be addressed in the following sections which seem to be of particular relevance in further understanding the contribution of CoPs to learning and knowledge sharing. On the one hand, the conceptualisation of networks of practice constitutes a viable form in which CoPs can be connected within wider networks. On the other hand, because knowledge moves differently within than between CoPs (Brown & Duguid, 1998), the boundary processes that different CoPs are subject to will be assessed.

2.3.2.1 Networks of practice

Because of the understanding that CoPs are rather small groups Brown and Duguid (2001b) put forward the postulation that bigger organizations are configured as NoP, consisting in

“closely affiliated CoPs” (Tallman & Chacar, 2011, p. 279), which facilitate knowledge sharing throughout the network (Swan et al., 2002). It is argued that NoP are bound together because of a shared practice (Brown & Duguid, 2001b; Gherardi & Nicolini, 2002). They supposedly do not inherit the social context that CoPs depend upon. Because of this, the knowledge that moves within the NoPs needs to be disembedded and then embedded again, which leads to the understanding that it cannot be rich tacit knowledge (Brown & Duguid, 1998; Duguid, 2005) and requires transformation (Tagliaventi & Mattarelli, 2006). Therefore, it is important to acknowledge that the understanding of practice within this framework is different than within the CoP (Vaast & Walsham, 2009), focused rather on the execution of the tasks, in the form of routines, rather than learning and joint meaning making. Different CoPs with interconnected practices engage in some form of discourse to foster learning, a process that is characterised by a balance between harmony and dissonance as-well-as consonance and the opposing, cacophony (Gherardi & Nicolini, 2002). This research will shed light on the extent to which these may influence knowledge sharing and learning within a geographically dispersed organization.

Wenger et al. (2011) differentiate between CoPs and NoPs mainly because of their different emphasis on identity, stating:

*“The **community** aspect refers to the development of a shared identity around the topic or set of challenges. It represents a collective intention – however tacit and distributed – to steward a domain of knowledge and sustain learning about it” (p. 11, bold in original).*

Particularly in the context of this research project it is worth stressing that they do not regard the distributed nature of a community as a restriction for the existence of a CoP. Wenger et al. (2011) propose the following understanding of a network:

*“The **network** aspect refers to the set of relationships, personal interactions, and connections among participants who have personal reasons to connect. It is viewed*

as a set of nodes and links with affordances for learning, such as information flows, helpful linkages, joint problem solving, and knowledge creation” (p. 11, bold in original).

They argue though, that networks and communities neither exist in pure forms, nor are they opposing each other, but actually develop jointly (Wenger et al., 2011). They furthermore advocate that “a dynamic interplay of both community and network processes” (p.13) positively contributes to social learning. This is because a community that has too much inward looking focus may be incentivised to absorb knowledge from the outside, whilst a network that lacks self-awareness may be strengthened by community building processes to “give rise to care and intentional engagement” (p. 12). This supports the understanding that social learning can take place in geographically dispersed organizations where the different actors might not even know each other (Agterberg, van den Hooff, Huysman, & Soekijad, 2010). The learning that occurs in NoPs is not well understood and it can be questioned whether it can be described as situated learning, because of the lack of geographic proximity (Vaast & Walsham, 2009).

NoPs are similar to CoPs, but its members are not closely connected, instead they are characterised by weaker social ties owing to the geographical dispersion (Agterberg et al., 2010; Tagliaventi & Mattarelli, 2006). In line with this, Agterberg et al. (2010) propose an assessment about NoP according to their embeddedness, which they differentiate as follows:

- *Organizational embeddedness* – the relevance and integration of the respective knowledge within the organizational context.
- *Embeddedness in practice* – the relevance and integration of the respective knowledge within the dispersed organizational units.
- *Relational embeddedness* – the strength of the social relations within the NoP.

- *Structural embeddedness* – the degree to which the members are connected and know each other.

The authors argue, based on their research, that organizational leaders who have “expertise-based authority” (Agterberg et al., 2010, p. 103) should define the content of the NoP, contributing thus to the dimension of *organizational embeddedness* and *embeddedness in practice*. By emphasising aspects that are relevant on an organizational level, and because of the interrelated nature of content and connection, the authors argue that this will also contribute to the *relational* and *structural embeddedness*. However, aiming to explicitly steer NoPs may have negative consequences if it aims to impose a “frozen negotiation” (Bowker & Star, 1994, p. 104 as cited in Brown & Duguid, 1998) to the multiple CoPs that form part of the NoPs. This may ultimately make CoPs vanish (Tallman & Chacar, 2011; Thompson, 2005). Furthermore, there are eminent issues in obliging people into a multidisciplinary context, which may generate defensive behaviour rather than search for integration (Gherardi & Nicolini, 2002; Oborn & Dawson, 2010). Neither the structure nor the dynamics of NoPs to foster knowledge sharing and learning are well understood yet. Among others things, it is not clear to what extent a shared practice (understood as similarity in the executed routines) alone holds NoPs together, which are generally associated with weak social ties.

2.3.2.2 Boundary processes

As outlined above, boundaries are a central aspect within CoP theory. However, they can become obstacles for learning within CoPs if they impose the incorporation of new stimuli, which may take away their dynamic (Wenger, 2000). Because of the described conceptualisation of a network of interconnected CoPs, the questions about boundary processes become particularly relevant in this research context.

To make the learning process at the boundaries fruitful the following aspects should be given attention (Wenger, 2000):

- Shared interest in a similar practice.
- Open engagement with real differences with some common assumptions.
- Commitment to suspend proper judgements.
- Translation mechanisms.

This translates into three dimensions upon which the value of boundary processes can be evaluated (Wenger, 2000): *Coordination* refers to the extent to which the respective practice is understandable by others. If highly technical or context specific vocabulary is used, this may make proper coordination impossible. *Transparency* postulates that the intentions and purpose of those involved in the boundary processes are clearly understood by the others. It must be clear what is strived to be accomplished through the interaction. Finally, *negotiability* requires providing a space where those involved open up to discuss their practice and underlying assumptions. If the latter is not given, boundary processes may solely reinforce already established power relations. This is, among others reasons, the case, when organizations impose the negotiation of meaning in the respective social context, aiming to “pre-empt it, trying to impose compliance and conformity” (Brown & Duguid, 1998, p. 104), what Bowker and Star (1994, p. 104 as cited in Brown & Duguid, 1998) call “frozen negotiation”. Particularly at the boundaries between different CoPs power issues become highly relevant (Oborn & Dawson, 2010; Tagliaventi & Mattarelli, 2006).

From a pragmatic perspective and regarding knowledge as separated from practice there are claimed to exist three reasons that may impede knowledge flows across organizational boundaries (Carlile, 2002; Scarbrough et al., 2004): The *syntactic boundary* exists owing to difference in language of the respective communities or missing communication channels. The strategy to overcome this boundary is the establishment of transfer mechanisms (Carlile, 2004). *Semantic boundaries* may exist when the interpretation of the transferred knowledge varies to an extent that impedes the application in the receiving unit. The approach suggested by Carlile (2004) is to translate the knowledge. This implies the

clarification of meaning by negotiating between different interests. *Political boundaries* arise when the knowledge transferred inherits a high degree of novelty for the receiving unit and thus requires transformational learning.

Beyond the understanding of the requirements and challenges boundary processes are exposed to, Wenger (2000) claims that there are different mechanisms to facilitate them:

People who move within an organization, leaving one and joining another community, can act as boundary spanners, which can be much more important to knowledge sharing than formal mechanisms (Brown & Duguid, 2001b; Oborn & Dawson, 2010; Wenger, 2000). These knowledge brokers, as they are frequently termed, are those who facilitate knowledge sharing among different CoPs (Oborn & Dawson, 2010; Wenger, 1998). They can have different characteristics, but must, on the one hand enjoy sufficient legitimacy within the respective communities to be heard, and on the other hand, be able to bring new insights that foster the learning in the receiving CoP (Wenger, 2000). They may belong to either one or both CoPs (Brown & Duguid, 1998; Wenger, 1998). However, they can also be outsiders, who aim to create a new space between different CoPs (Oborn & Dawson, 2010). Successful boundary spanners are sympathetic to the social constructions of others and able to generate effective interpersonal relationships within the different contexts (Williams, 2002).

The concept of *boundary objects* was introduced by Star and Griesemer (1989). They consist in abstract or concrete objects that embody forms of reification and thus constitute the basis upon which the respective communities can socially construct meaning around them through participation (Wenger, 1998):

“They have different meanings in different social worlds but their structure is common enough to more than one world to make them recognisable, a means of translation. The creation and management of boundary objects is a key process in developing

and maintaining coherence across intersecting social worlds” (Star & Griesemer, 1989, p. 393).

Boundary objects can materialise in work instructions, safety guidelines (Tagliaventi & Mattarelli, 2006), language, titles, tools (Wenger, 1998), blueprints (Oborn & Dawson, 2010), explicit procedures and routines (Wenger, 2000) and even in common knowledge itself (Swan, Bresnen, Newell, & Robertson, 2007). A key feature is that they “are shared and shareable in different problem solving contexts” (Carlile, 2002). Because they are socially constructed they are understood and enacted in different ways across different CoPs, and therefore they can help to bridge boundaries. Metaphors that are shared across boundaries can present particularly suitable boundary objects (Brown & Duguid, 1998). Business processes, understood as boundary objects, provide a mean to provide boundary processes, if they allow enough space for the involved communities to align among each other and with the organization as a whole (Brown & Duguid, 1998). They can coordinate the orchestration of “different communities so that their practices, while allowed to flourish, don’t grow out of touch with one another” (Brown & Duguid, 2001a, p. 93). Boundary objects are charged with meaning that is socially constructed (reification), but the way CoPs engage in negotiating this meaning (participation) varies (Wenger, 1998). They can therefore facilitate, but not ensure learning and knowledge sharing across boundaries.

To have constructive boundary processes requires both boundary spanners and boundary objects. Swan et al. (2007, p. 1821) synthesise that the “inter-relationship between ‘boundary objects in use’ and ‘boundary spanners in practice’ has shown to be crucial in the emergence and development of joint fields of practice.” It is necessary though to further assess the role and characteristics of boundary processes, with regard to their contribution to knowledge sharing across geographically dispersed organizations.

2.3.3 Critical considerations

As briefly outlined in the introductory Chapter, there are several aspects within CoP theory that have been subjected to critique. The most relevant points of attention according to this seem to revolve around power, steering and the capacity of CoPs to absorb external knowledge. These points will be discussed in the following section.

2.3.3.1 Power

In their seminal work Lave and Wenger (1991) already recognised that the influence of power relations on the learning process within CoPs required further analysis. This is because social relations are always grounded on some type of dependencies, which are subject to power asymmetries, that are executed and materialised within these relations (Emerson, 1962; Tsoukas & Mylonopoulos, 2004). Power can be understood as “the ability or capacity to achieve something, whether by influence, force, or control” (Roberts, 2006, p. 626). However, power is not to be understood in static terms as something that is possessed but rather as dynamic, residing in relationships (Marshall & Rollinson, 2004). While power is of no great concern for cognitivist learning theories, where learning occurs inside the minds of individuals, it becomes highly relevant in the context of social learning theories (Elkjaer, 2009).

Within CoPs, characterised by boundaries, power is executed by allowing or rejecting newcomers to participate and more so, by the negotiation of meaning (Contu & Willmott, 2003; Thompson, 2005). Those at the centre of the CoP are likely to hold more power than those at the periphery (Roberts, 2006). Fox (2000) argues that newcomers are faced with the dilemma to adapt to the on-going practice of a CoP on the one hand, while simultaneously contributing to their shaping based upon the novel stimulus they bring, on the other. CoP norms can have a negative impact on the development of the individuals, when they are so powerful that they impede the free and positive development of its members (Wenger et al., 2002). Already Dewey (2014) took power into consideration in the context of

learning, suggesting that young people born into a society may be against it and therefore require direction. Those who act out of a position of power are claimed to have a stronger influence on the construction of social reality than those with less power (Mills, 2003 as cited in Weick et al., 2005). Additionally, the innovative potential of CoPs can be reduced, when power asymmetries reject novelty stimuli and diverging perspectives (Swan et al., 2002).

Power issues not only relate to the members or non-members of CoPs, but also to the position of the CoP within the wider organization (Swan et al., 2002). Some authors argue that CoPs, owing to their informal power, may have a negative influence on business performance, if their own interests are opposing those of the organization (Kimble & Hildreth, 2004). CoPs, while not necessarily assigned with formal power, are likely to own a significant amount of power due to their strategic independence (Mudambi & Navarra, 2004; Mudambi, Pedersen, & Andersson, 2014). Nevertheless, CoPs are also subject to power exercised by the organization within which they are embedded. Among other things, the organization can influence the required space for CoPs and either restrict or enable their joint enterprise. Using the term CoP rhetorically may also serve as a mechanism “to facilitate the control of professional groups over which managers have little authority” (Roberts, 2006, p. 626; Swan et al., 2002).

As outlined before, individuals participate in various and thus necessarily different CoPs, which to potentially could lead to conflict (Handley et al., 2006). Wenger (1998) refers to the process of change that managers undergo, after they have been recently promoted and thus belong to two different CoPs, for example the *claims processors* on the one hand and the *claims managers* on the other, which is likely to lead to “intra-personal tensions as-well-as instabilities within the community” (Handley et al., 2006, p. 648). In response to these tensions, Handley et al. (2006) point out different positions an affected individual may take: one possibility is for the newcomer to refrain from participating fully, therefore staying *marginal*, to not compromise the previously constructed identity within another CoP.

Alternatively, the individual may take a *contingent position*, which implies adapting its practice at least partially to the new CoP to reduce potential conflict. Finally, the individual may decide *not to join* the CoP. Members who move between different CoPs must be able to adapt to the identity of the CoP where they are currently participating (Tagliaventi & Mattarelli, 2006). Within the organizational context it can be questioned whether people can be members of multiple CoPs which engage in a similar practice (Handley et al., 2006), which is particularly in the context of a geographically dispersed organization a relevant question.

2.3.3.2 Organizational steering

Another relevant point of critique within CoP theory concerns the purposeful steering of CoPs. In general, they are claimed to be autonomously built and held together by common values, shared social context, mutual engagement and commitment to a joint enterprise (Wenger, 2000, 2011; Wenger et al., 2002; Wenger & Snyder, 2000). In addition, they are frequently advocated to emerge spontaneously and independently of formal organizational structures (Swan et al., 2002) and to be of either formal or informal character (Fox, 2000).

The autonomous character of CoPs, adhering to the definitions provided above, leads to uncertainty regarding the ways in which organizations can actively construct and steer them (Thompson, 2005). It also carries along the “unavoidable risk of dysfunctional behaviours” (Wenger et al., 2002, p. 159). CoPs are directed and motivated by a shared interest, which does not necessarily match the organizational objectives (Kimble & Hildreth, 2004). Organizational steering is also difficult because learning, the essential aspect of CoP, is not a matter of conscious design or recognisable rationalities and cognitive frames” (Amin & Cohendet, 2000, p. 107).

There is, at least in theory, a general agreement among practitioners and academics that CoPs cannot be built, but rather facilitated (Roberts, 2006) or cultivated (Wenger et al., 2002) through indirect intervention (Thompson, 2005). In practice, notwithstanding this, it

seems that many organizations treat CoPs as if they were more or less manageable work units. If there is too much intervention from the outside though, CoPs are at risk of failing (Cox, 2005; Wenger et al., 2002). However, the lack of steering may also avert the leveraging of locally developed CoP knowledge into wider organizational practices (Swan et al., 2002). It may, nevertheless also be argued that this is owing to a lack of understanding of the autonomous dynamics of CoPs embedded within NoPs that influence knowledge sharing and learning.

There are several aspects where organizations can support the cultivation of CoPs. Wenger et al. (2011, p. 12) suggest the following: “Sharpen the understanding of what are the common issues or domain, what value people get from participating, and what they are trying to achieve.” This revolves essentially around the domain of the CoP, suggesting that the organization should not focus on aligning the ‘what’ and ‘how’, but rather on the ‘why’ (Sinek, 2009). By shifting this understanding it is likely that the practice will be adopted. Furthermore, the organization may use boundary objects, like business processes, to shape the practice the CoP is involved with. These must be managed in a way that they “permit rigor without rigidity” (Brown & Duguid, 2001a, p. 93), which is a difficult balance to obtain. This happens in a difficult interplay of power asymmetries, where total flexibility stands opposite to a “frozen negotiation” (Bowker & Star, 1994, p. 104 as cited in Brown & Duguid, 1998). There is furthermore the need to assess to what extent CoPs, as-well-as NoPs, are dependent on formal organizational structures (Roberts, 2006). It could be safely argued that people who work on the opposite sides of a country are less likely to constitute a CoP than those that work in the same site. This research will provide further evidence about this aspect.

2.4 Reflections

Throughout this Chapter the theoretical context within which this research project is embedded has been elaborated. Furthermore, this literature review has provided initial asides about the stated research questions.

First of all, as outlined in the introduction, the principal definitions about learning, knowledge sharing and CoPs were elucidated.

Learning is above all a social endeavour that people get engaged in to negotiate meaning, based upon experiences made within their worlds (Wenger, 2009). For analytical purposes it can be furthermore described according to the space where it occurs, which is not solely a geographic location (A. Y. Kolb & Kolb, 2005; Nonaka & Konno, 1998) and the quality of the outcomes through which it is materialised in practice. These can be assimilative, accommodative or transformative (Illeris, 2009). Learning is deeply embedded in practice and constitutive of knowledge. The mutually constituting relationship between knowledge and action is considered to be learning, as argued by Lave (2009).

Knowledge is frequently assessed in terms of dichotomies between explicit and tacit, as-well-as social and individual knowledge. For the purpose of this research, a pluralist epistemology has been adopted (Nonaka & Peltokorpi, 2006; Spender, 1998) regarding knowledge as “multi-faceted and complex, being both situated and abstract, implicit and explicit, distributed and individual, physical and mental, developing and static, verbal and encoded” (Blackler, 1995, p. 1032). In the organizational context knowledge is embedded in routines. There are various terminologies adopted in the context of knowledge flows. Within this thesis, knowledge sharing embraces the aspect of learning, which happens through CoPs, who make meaning out of knowledge they receive from other locations.

Within the analytical framework CoPs can be characterised according to the three principal dimensions, which include the community, domain and practice. These are mutually dependent and intertwined, an understanding that must be embraced when analysing them.

The community aspect contemplates the membership as-well-as the quality of the relationships, which are both dependent on proximity, which is not restricted to geography (Boschma, 2005; Knoblen & Oerlemans, 2006; Mattes, 2012). The domain revolves around the values, purpose and, above all, identity of the CoP, which is to be understood as its *raison d'être*. It emerges out of practice, within which meaning is negotiated. The practice includes the organizational routines that the CoPs execute. These have different qualities in terms of the type of knowledge they focus on. Furthermore, practice relates to the fact that CoPs are ultimately about learning and can thus be analysed based upon the learning space, outcomes and associated processes.

Beside the comprehensive review and definition of learning, knowledge sharing and CoPs, which provide the basis for the further analysis, the literature review has above all revealed gaps with regards to the forms that CoPs take within a geographically dispersed organization. In terms of the research question, this literature review provides evidence that it is unlikely to think of a single CoP that spans geographically dispersed organizations, but rather of multiple CoPs, which are connected through an overarching NoP. However, the characteristics of the CoPs that conform the NoP, the way in which they are inter-connected as well as the aspects that contribute to knowledge sharing and learning between them is not sufficiently explored within the current body of literature, yet. This research will provide evidence and a revised theoretical framework to close these gaps.

Chapter 3 Research Context

As outlined in the introduction, several authors call for further research about CoPs, knowledge sharing and learning in different cultural, geographic and organizational contexts (Ambos & Ambos, 2009; Gertler, 2003; Kasper et al., 2008; Michailova & Mustaffa, 2012; Roberts, 2006). Based on the adopted research paradigm, the context within which research has been conducted has a significant impact on the results, because meaning is always a social construct and thus depends upon context (Berger & Luckmann, 1991; Burr, 2003). With the aim to revise the theoretical framework about CoPs and thus contribute to theory and practice, this research has focused on CoPs embedded within shovel maintenance, within Komatsu Chile. The researcher has been embedded within Komatsu and Chile for a significant amount of time and has therefore gained sensitivity to cultural aspects that have been relevant for the research project. People depend on culture, which guides behaviour and the way experiences are shaped (Crotty, 1998). It is impossible to regard the results obtained detached from context or to try and separate them from it. Therefore, the next paragraph will provide a macroeconomic as-well-as a cultural assessment of Chile. Furthermore, it will shed light on the organizational context within which the research project has been embedded.

3.1 Chile

In March 2014 left-wing Michelle Bachelet took office as president of Chile for the second time, following right-wing Sebastian Piñera. Throughout her campaign she highlighted the goal to reduce the eminent inequality in the country and is currently pushing ambitious tax, education and labour reforms. Whilst these reforms are commonly advocated to have significantly influenced the recent slow-down in the Chilean economy, they address fundamental legislative problems that the country has been subject to throughout the last few decades.

In 1973 General Augusto Pinochet overthrew the socialist president Salvador Allende and started his military regime. During this period the country was shocked with a severe wave of violence against opposing forces. However, supported by the so called 'Chicago Boys', the military regime also gave birth to the "deepest and most successful socioeconomic revolution in Chile" (Prieto Larraín, 2011, p. 5), based on neo-liberalistic foundations. In 1990 Chile turned into a democracy again, but beyond that kept the economic system implemented during the military regime. This part of history is present even today in Chilean society. It manifests itself in a latent conflict between people who privilege the economic reforms over the severe wave of violence the country had suffered and vice versa.

3.1.1 Macroeconomic highlights

Today, the Foreign and Commonwealth Office ("Overseas business risk - Chile," 2014) of the UK describes Chile as a modern, stable and well balanced economy. It furthermore states that it is aiming to become the first 'fully developed' economy of Latin America, having already significantly reduced its poverty headcount ratio in the last few decades (Figure 4).

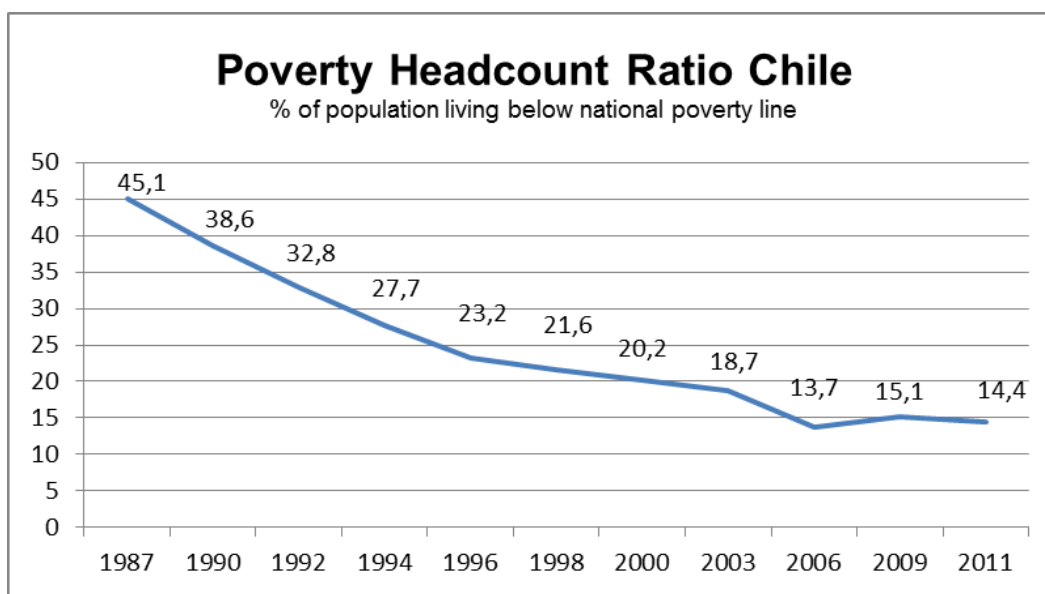


Figure 4: Poverty headcount ratio Chile ("Poverty headcount ratio at national poverty lines (% of population)," 2015).

Today, Chile is the only South American member of the OECD and has grown with an average of 4.5% GDP between 1980 and 2013 ("Overseas business risk - Chile," 2014). Its GDP in 2013 has been at 21,990 USD per capita versus an average of the rest of the OECD listed countries of 36,460 USD per capita ("Gross domestic product (GDP)," 2014). Furthermore, Chile has a relatively low unemployment rate of under 7% ("Gross domestic product (GDP)," 2014). In terms of corruption Chile ranks 22nd out of 177 countries, with a score of 71, the same results as France and below the UK with a score of 76 and Germany with a score of 78 (International, 2013). On the human development index, which expresses life expectancy and quality, Chile takes position 41 above Portugal, a developed country ("Human development report," 2014). The country is characterised by its economic and financial stability, with low inflation rates ("Inflation Chile," 2013) and counts on more free trade agreements than any other country in the world ("Die Wirtschaft Chiles," 2015).

The principal economic activity that has contributed to this development is the mining sector, which is advocated to form part of the Chilean identity ("Chile, país minero," 2015), contributing an average of 14,3% (2003-2014) to the national GDP (Figure 5). In this context copper presents by far the most important mineral, which the Chilean economy is very dependent upon (Figure 6).

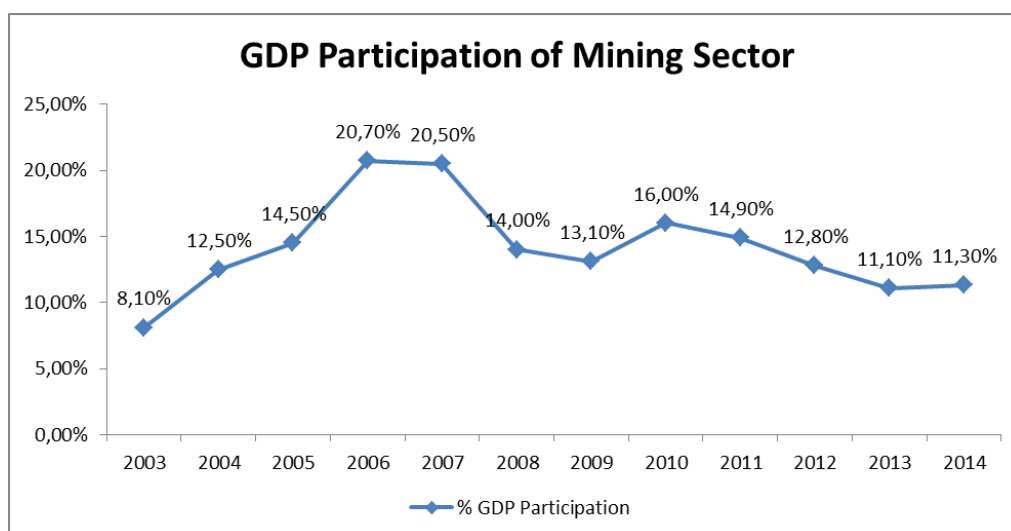


Figure 5: GDP participation of mining sector ("Minería en cifras," 2015).

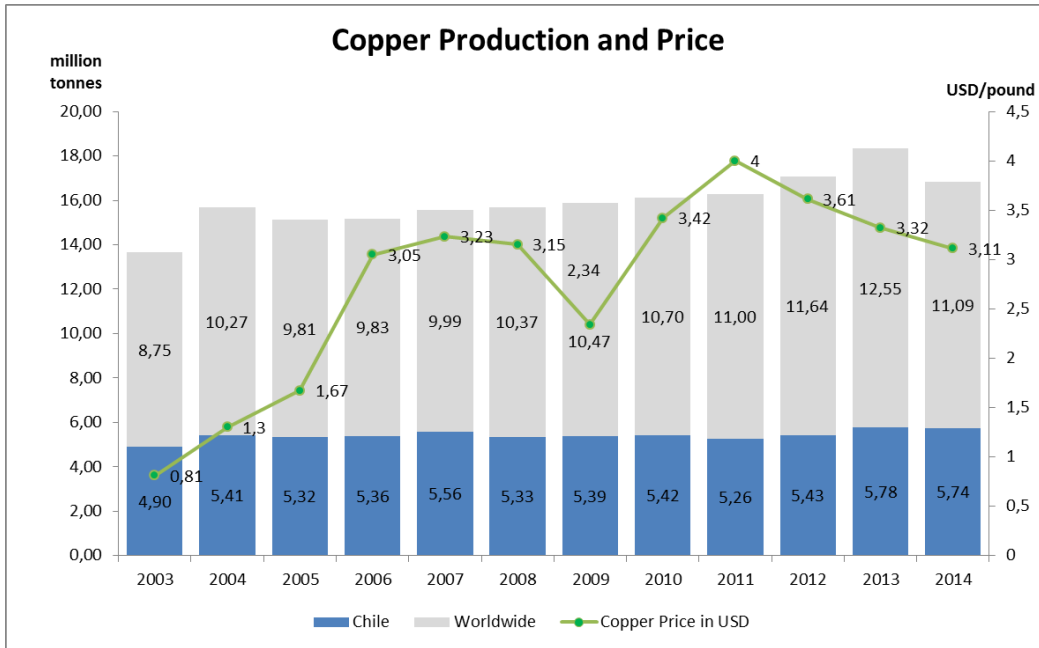


Figure 6: Copper production and price ("Minería en cifras," 2015).

Whilst all these indicators throw a very positive light on Chile, the country has been facing serious problems with regards to inequality, which is by far the highest within the OCED as illustrated in Figure 7 ("Income inequality," 2015).

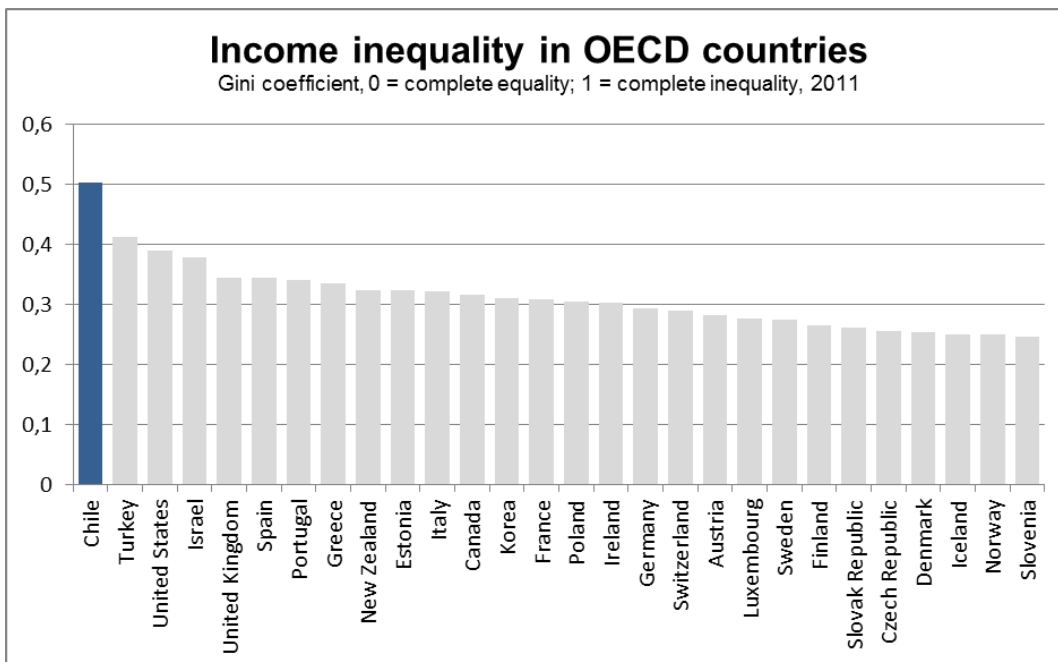


Figure 7: Income inequality in OECD countries ("Income inequality," 2015).

Another aspect that has been subject to significant public debate refers to education, where Chile in each performance dimension measured by the PISA takes one of the lowest rankings among all OECD countries (Figure 8, Figure 9 and Figure 10).

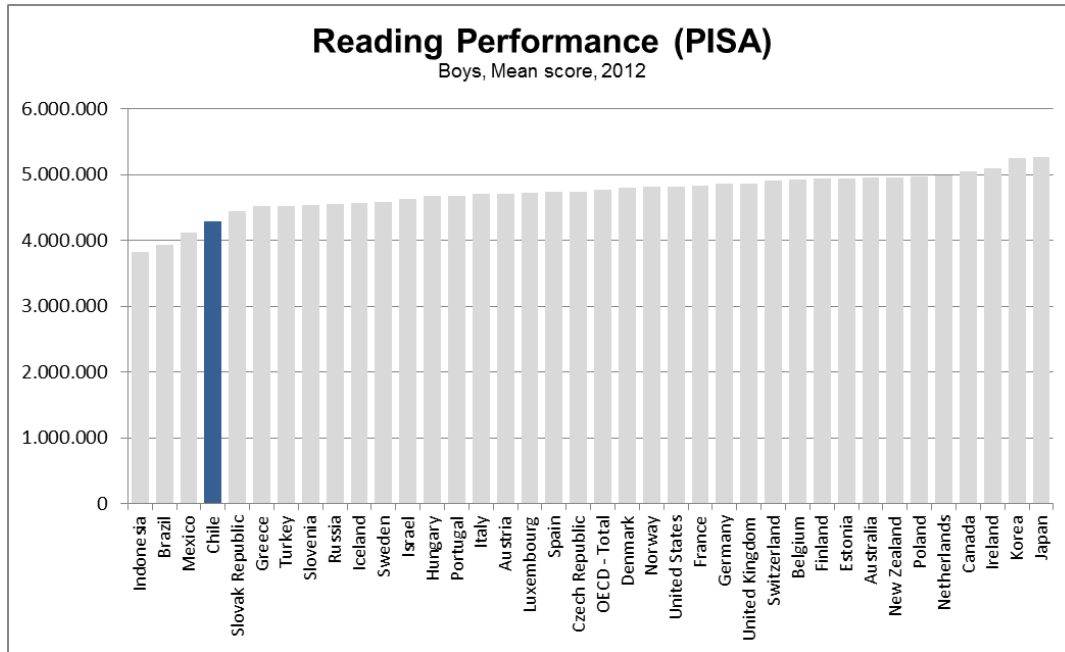


Figure 8: Reading performance (PISA) ("Reading performance (PISA)," 2015).

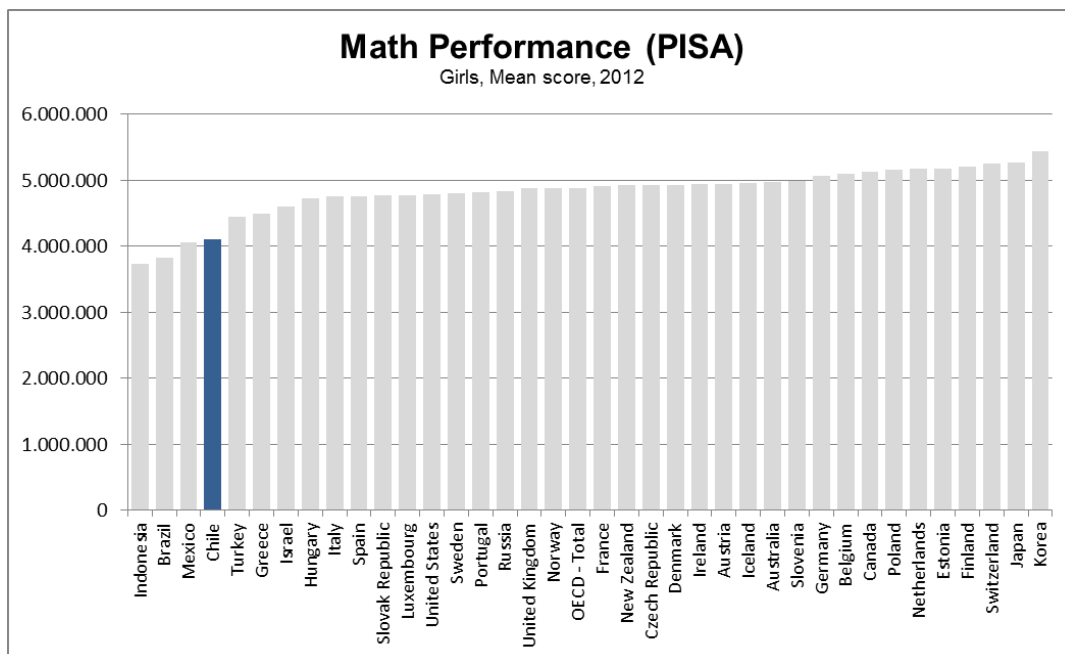


Figure 9: Math performance (PISA) ("Mathematics performance (PISA)," 2015).

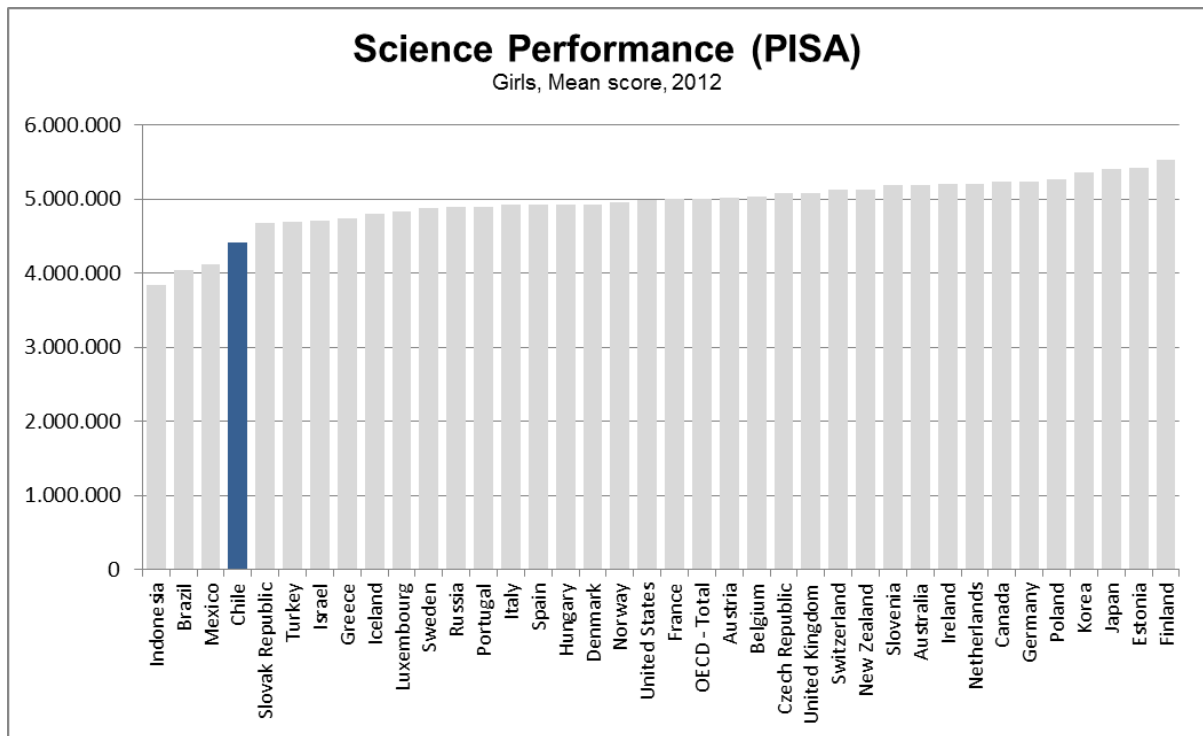


Figure 10: Science performance (PISA) ("Science performance (PISA)," 2015).

If these results were assessed in the context of other Latin American countries, the country would take a much better position. However, “that Chileans are Latin Americans is self-evident truth for everyone except for Chileans themselves” (Prieto Larraín, 2011). Chileans generally do not compare themselves with other Latin American countries but with developed countries in Europe and North America. In spite of the fact that there are differences between the countries in Latin America, it may yet be regarded as a rather homogenous culture because of “similar colonial history and, in most cases, common language and religious background, as-well-as having similar social problems” (Perez Arrau, Eades, & Wilson, 2012, p. 3136). The following section will shed light on some of the principal cultural Chilean traits.

3.1.2 Cultural traits

In general, Chileans are considered to be warm hearted, hospitable and characterised by “a strong identity and inveterate love for their country” (Prieto Larraín, 2011, p. 22), which as

outlined above has made significant progress over the last few decades. In addition to this, there are several cultural traits, which should be considered when conducting research in Chile. The most relevant of these according to Gomez and Rodriguez (2006) and in line with the perspective of the researcher are depicted in the following section:

3.1.2.1 Paternalistic authoritarianism in social relations

Paternalistic authoritarianism is materialised as a culture in which powerful elites rule and supposedly protect the remainder of the society, who are characterised as lacking maturity in exercising their proper liberty wisely (Gomez & Rodriguez, 2006; Rodríguez & Ríos, 2009). Gomez and Rodriguez (2006) trace this back to the seventeenth century, where landlords established a system, termed 'hacienda' to dominate the wider society under a paternalistic umbrella. This cultural trait is still present today throughout Chile, including in family and professional life. The eminent power asymmetries that it carries become evident, amongst others, when superiors address their subordinates informally ('tu'), whilst subordinates address their superiors formally ('usted'). Frequently, they further add 'Don', which is the acronym for 'from noble origin' ('de origin noble') to highlight the better status of the superior. It is remarkable that particularly the subordinated feel comfortable with this situation. This shows how deeply embedded these power structures are within the Chilean culture. Organizational leaders prefer autocratic and directive structures "habitually avoid conflict, are relationship oriented and are assertive and aggressive" (Perez Arrau et al., 2012). A recent survey among Chilean executives confirms their preference for hierarchical structures with formal authority over flat, rather egalitarian organizational configurations (Hatun, Friedrich, & Mesquita, 2006; Perez Arrau et al., 2012). The paternalistic relationship puts the worker into the position of a "socially constructed childish person, with no capacity to decide and not being allowed, nor willing, to take full responsibility of the related consequences" (Rodríguez & Ríos, 2009, p. 324). In family, life this is manifested in machismo, and particularly present

in the context of the less educated and lower income population. In this context women are usually assigned the traditional role of housewife and child carer (Perez Arrau et al., 2012).

These structures also lead to discrimination within Chilean culture in general (Maturana, 2014). Examples in daily life embrace education, which has been described above as a significant challenge that Chile is facing today. To enter a private school, the children as well as the parents are interviewed to assess whether they fit in. In several schools children will not be accepted if their parents are not married or have not been to the same school as their children. Another materialisation of paternalistic authoritarianism is manifested in the current labour laws, which significantly restrict the freedom of association, collective bargaining and ability to strike (Durán-Palma & López, 2009) and impose the cultural embedded power asymmetries. Recent efforts of the government led by Michelle Bachelet to carry out educational and labour reforms in this context have found stark opposition within the economic elite of the country. This all seems to reinforce “a hierarchical order in which female, indigenous, uneducated and poor oppose male, Caucasian, educated and rich” (Gomez & Rodriguez, 2006, p. 50).

3.1.2.2 Legalism and double discourse

Legalism refers to the “discursive justification of specific actions, decisions and behaviours on the base of existing laws and regulations” (Gomez & Rodriguez, 2006, p. 51). It serves as a mechanism to reduce uncertainty (Prieto Larraín, 2011) in a context where the neo-liberalisation of the market has encouraged individualism and competition. In line with this trait, people tend to restrict their actions to what is legally required and relate the obtained consequences to the adherence to those. It may cause a lack of the critical assessments of underlying assumptions and conditions, thus leading to a culture reluctant to accept transformational changes (Perez Arrau et al., 2012).

Those who find gaps in rules or laws can justify their actions on the fact that they did not break any law. They are considered as ‘vivos’, which is similar to swifts and is particularly

present for those people that lack formal power (Gomez & Rodriguez, 2006). Double discourse proposes that discourse about one's actions and behaviour can significantly diverge (Perez Arrau et al., 2012). This is among others manifested in the common wisdom that the declaration to do something right now ('altiro') is not to be regarded as literal. Also, in general it seems that people feel less accountable to commitments they make.

It is remarkable that in a society where law has "cult status" (Gomez & Rodriguez, 2006) the legal framework still consists predominantly in the one established during the military regime led by Agosto Pinochet (Durán-Palma & López, 2009).

3.1.2.3 Tendency to fatalism and conservatism

There is a tendency in Chile for determinism, assuming that "lives are totally determined by the outside world (...) and that 'there is nothing they can do about it'" (Gomez & Rodriguez, 2006, p. 53), and that people are "subordinated to a natural order" (Perez Arrau et al., 2012, p. 3142). This can result in conformism and resignation because of the previously determined future.

Until 100 years ago Chile used to be isolated with the Pacific on the west, the Andes on the east, the hostile Atacama Desert in the north and the Cape Horn in the south (see Appendix 1). This is argued to have created a sensation of periphery and may have contributed to this cultural trait (Prieto Larraín, 2011). It also impacts the previously described cultural traits, making Chileans less likely to question underlying assumptions and conditions, as-well-as reluctant to accept transformational changes.

3.1.2.4 'Compadarazgo' and friendship networks

Gomez and Rodriguez (2006) argue that the belonging to a group constitutes a pivotal aspect of Chilean society, which aims to establish "mechanisms of solidarity and reciprocity developed in order to minimise uncertainty and guarantee security through the help of others" (p. 56). *Compadarazgo*, a Spanish term associated with friendship, implies moral

and social obligations are materialised in mutual favours, which secures the trustworthiness within the network of relatives, friends or acquaintances. Those within powerful networks enjoy respect within society and can access favours and resources that others cannot attain. In an organizational context, leaders will treat people that are associated to their network favourably, beyond formal structures and processes. This is because favours are paid with favours ('favores con favores se pagan'), which can be categorised as sacred (Gomez & Rodriguez, 2006; Prieto Larraín, 2011). In line with this, it is worth emphasising the central role of family within Chilean culture, which provides stability and comfort to its members (Gomez & Rodriguez, 2006; Prieto Larraín, 2011).

Whilst relations within networks of friends or family are particularly strong (Gomez & Rodriguez, 2006; Perez Arrau et al., 2012), Chileans are unlikely to trust in people they do not know personally (Valenzuela & Cousiño, 2000). Indeed, interpersonal trust in the society is low (Perez Arrau et al., 2012; Valenzuela & Cousiño, 2000). This is underpinned by several studies that have been conducted within recent years: in the report published by Latinobarómetro (2009), only 15% agreed that they 'generally trust in other people' (Figure 11). According to the "Society at a glance 2011: OECD social indicators" (2011) only 13% of Chileans trust other people. In another study conducted by Valenzuela and Cousiño (2000) only 14% of the Chilean responded yes to the question 'do you trust in other people?'. Maturana (2014) attributes the loss of trust within Chilean society to the lack of focus on mutual respect and increasing focus on competition, including winners and losers. However, the Pinochet reign may have also contributed to this lack of trust. It may have further been a side effect of the neo-liberal politics that have significantly contributed to the economic growth on the one hand, but on the other hand negatively influenced the trust in institutions that protect people.

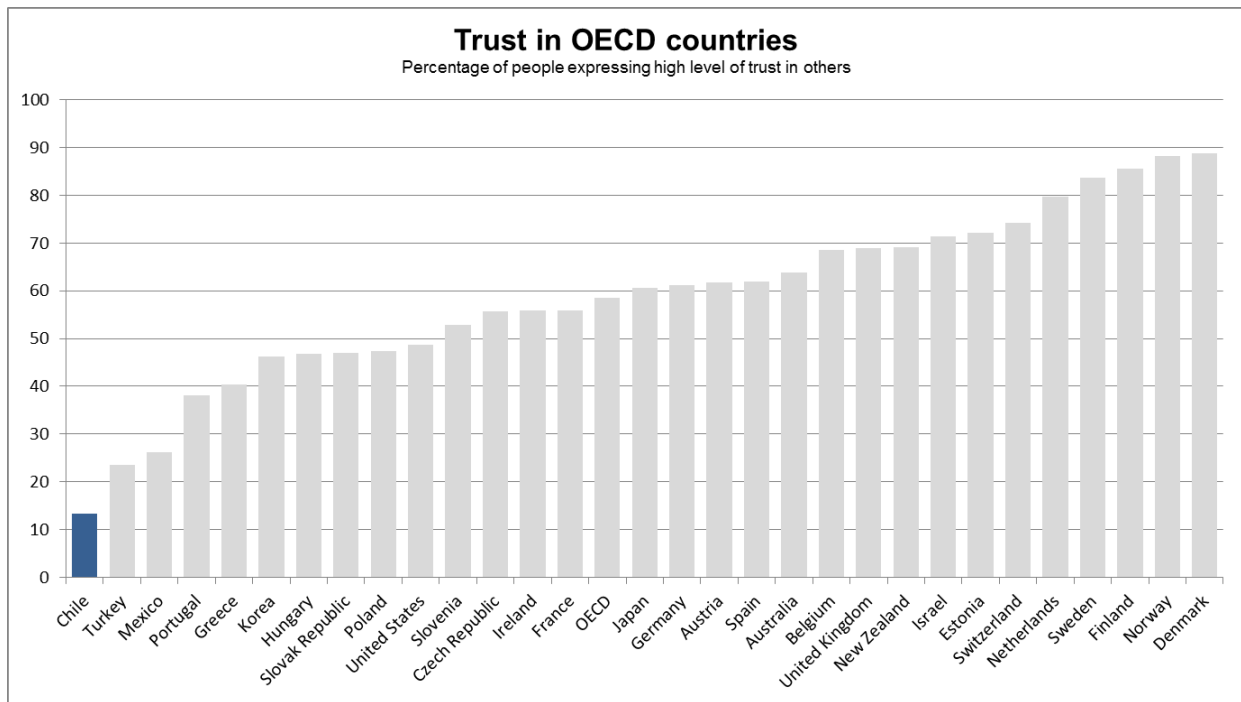


Figure 11: Trust in OECD countries ("Society at a glance 2011: OECD social indicators," 2011),

Within this section a summary about Chile has been provided. The macroeconomic information as-well-as the presented cultural traits are regarded as helpful in understanding the context within which the research project has been embedded. In the next section, light will be shed on Komatsu Chile, the company within which the research has been conducted.

3.2 Komatsu

Komatsu is a Japanese manufacturer founded in 1921 with more than 47,000 employees worldwide and with net sales in excess of 16 billion USD in the FY 2013 (April 2013 - March 2014). The main business consists in the manufacturing and distribution of construction and mining equipment, utilities, forestry machines and industrial machinery (Komatsu, 2014a). The focus of this research has been on Komatsu shovels, whose factory is located in Düsseldorf, Germany.

The first electric driven rope shovel was built in the industrial region of Duisburg, Germany, by the German company Carlshütte, which was taken over by another company, Demag in 1925. In 1954 Demag had built the first fully hydraulic excavator, which is today exhibited at

the Komatsu Mining Germany facility in Düsseldorf. Because of the growing demand for bigger shovels, the company started to increase the size of their hydraulic shovels between 1972 and 1986. In 1996 Demag and Komatsu entered into a joint venture, before Komatsu took full control of Demag in 1999. In 2004 Komatsu introduced the PC 8000, followed by the PC 3000 in 2005, the PC 5500 in 2006 and the PC 4000 in 2012 (see Appendix 2).

3.2.1 Komatsu Chile

In Chile, Komatsu has been present for more than 40 years and has been operating since 1999 in a joint venture with the US American engine manufacturer Cummins Incorporated. Komatsu Cummins currently employs more than 5,600 people throughout Chile (status April 2014) and has had net sales of more than 1.5 billion USD in the fiscal year 2013 (March 2013 – April 2014) (Komatsu, 2014b).

In a country where the mining business constitutes one of the most important economic drivers, the principal business of Komatsu resides in the mining sector. The associated revenues are composed of the sales of shovels, dump trucks, earth moving equipment, front loaders and its respective spare parts and components. Additionally, the repair and maintenance of these presents a significant part of business to Komatsu Chile, particularly the MARC contracts (*Maintenance And Repair Contracts*). Within these contracts, customers pay a predefined monthly rate for a contractually defined availability of the respective equipment. Komatsu manages all aspects in ensuring the operational continuity of the respective machines, including the associated labour costs, most spare parts and the operation of the respective Komatsu site.

Komatsu is currently the only company that is operating hydraulic shovels in Chile. This is chiefly because of their good quality and the accompanying positive reputation within the few big organizations that are involved in mining activities in Chile. Nevertheless, while the quality of the hydraulic shovels has led to a significant increase in fleet size, the adequate maintenance and repair has presented challenges throughout recent years. This is

manifested in numerous MARC contracts, where Komatsu struggles to meet the agreed availability levels. Furthermore, customers complain that the repair times are higher than expected. Today, Komatsu faces a different situation than in previous years – because of the decreasing copper prices the biggest mining companies are making efforts to optimise costs. In line with this, they are evaluating alternative options to the Komatsu shovel and are reviewing scenarios in which they insource their maintenance and repair. Beyond the associated commercial considerations, it is thus vital for Komatsu to ensure satisfying service levels within the MARC contracts to ensure the current business. It is worth stressing that the shovels constitute critical equipment within the mining sites. Whilst the failure of a dump truck does not stop the overall operation because of the generally big fleet of them, the failure of a shovel is significantly more critical, because of the few in number that are operating.

An important issue for Komatsu Chile is depicted in the inconsistencies in fulfilling the contractually agreed MARC service levels across sites. The main reason for this is argued to reside in the quality of the maintenance and repair work, which is carried out by the mechanics within the mining sites. Today there are only a few people within Chile who are trained in shovel maintenance, which has forced the organization to contract people that do not fit the necessary requirement. However, the shovels are complex machines, with many different sub-systems and thousands of potential errors. In confronting this situation, Komatsu has, among others, launched plans to standardise processes, reinforce formal training and improve HR selection processes. Nevertheless, today there does not seem to be a solid understanding of the reasons owing to which service levels vary so significantly between the different sites. This research has contributed to this understanding.

3.2.2 Shovel operations in Chile

Out of the 50 Komatsu shovels that are currently operating in Chile (2 PC 4000, 33 PC 5500 and 15 PC 8000), 27 are attended according to MARC contracts in 11 different mining sites (Table 1).

Branch	Mining Site	PC 5500	PC 8000	PC 4000	Total
Iquique	Collahuasi	5	1		6
	Quebrada Blanca	2			2
Calama	Chuqicamata	3			3
	Gaby		1		1
	Mina Sur	3			3
	Ministro Hales	1	2	1	4
	Radomiro Tomic		1		1
Antofagasta	Escondida	1	2		3
	El Tesoro		1		1
Copiapo	Casarones		1		1
Centro	Andina	2			2

Table 1: Shovels managed as MARC contracts in Chile.

There are significant climatic and geographical differences between the different mining sites (see Appendix 3). Collahuasi and Quebrada Blanca, which belong to the Iquique branch are situated more than 4,000 metres above sea level and characterised by very low temperatures at night as-well-as significant amount of snow during winter. The people who work in these sites stay the whole shift in the hotel facilitates that the mining operator offer to their subcontractors. The mining sites around Calama belong to the state owned company Codelco and are situated a close distance to the city. People working in these return to their proper homes or hotels if they are from another city, on a daily basis. The temperatures can be high during the day but do not reach the extreme low temperatures during night as in the northern mining sites. It hardly ever snows within the mining sites pertaining to the Calama branch, which are situated roughly between 2,000 and 3,000 metres above sea level, making them less hostile working environments than in Iquique. The conditions in the mining sites belonging to Antofagasta and Copiapo are similar to those in Calama, even though

people stay in the hotels of the mining sites during their shifts. The Andina mining site is close to Santiago, the central region of Chile, and is situated around 4,000 metres above sea level, with very cold temperatures in winter and much snow. For the purpose of this research it has been decided to put focus on the mining sites belonging to the Calama branch. These sites involve the maintenance and repair work for 12 shovels and were regarded as a particularly interesting case to evaluate learning and knowledge sharing in the context of CoP, because of their geographic proximity.

3.2.3 Shovel maintenance and repair

There are three major areas involved in shovel maintenance and repair (Figure 1). Even though there are further areas that influence shovel operations (e.g. Parts Division, Supply Chain, HR), these three have constituted the focus of the work, because they are the most directly involved in the actual maintenance and repair activities.

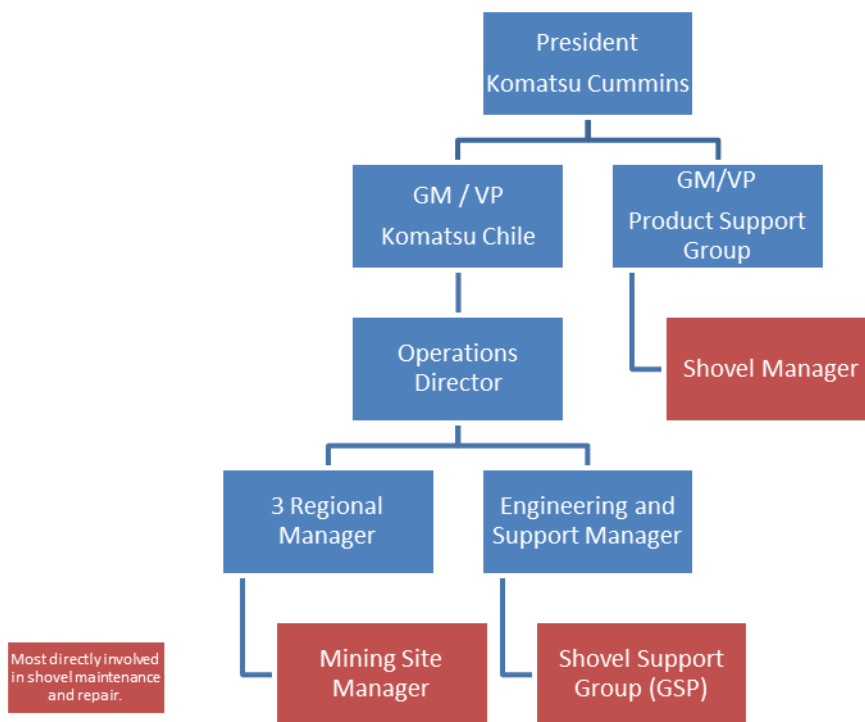


Figure 12: Areas most directly involved in shovel maintenance and repair.

Within a typical MARC shovel operation there are four areas reporting to the **Mining Site Manager** as illustrated in Figure 13 (Komatsu, 2015a). The number of people employed in each function, except management, depends on the size of the respective operation. Furthermore, the Komatsu operation, in line with the mining customers, is continuous throughout the year, including nights, weekends and holidays. This leads to two different working formats: the people who work according to the 7/7 theme are divided into four shifts. They work seven days or nights and then rest for seven days. These shifts change at 7am and 7pm every day. The other theme is known as 4/3. People employed according to this work every week from Monday to Thursday from 7am to 7pm. Most people work in the office facilities within the mining sites that are provided by the mining customers to Komatsu. However, because of the size of the shovel it cannot be moved to a workshop, but the people working in the Operations department have to move to the shovel within the mining pit to carry out their work.

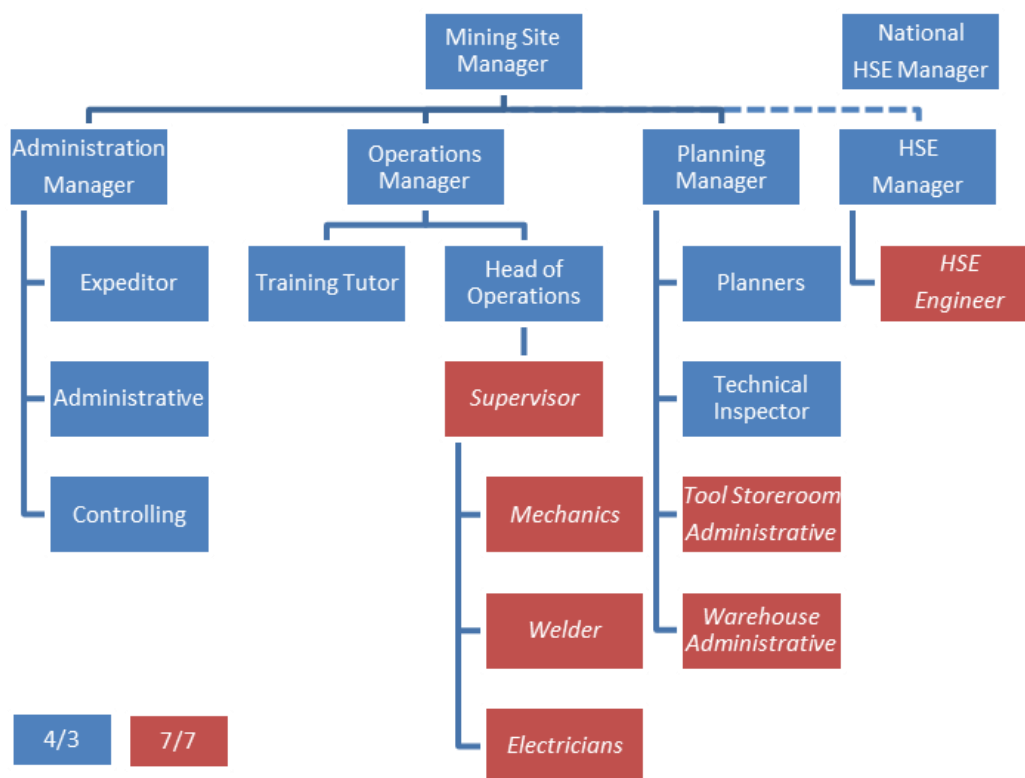


Figure 13: Typical organizational structure of a MARC shovel operation.

The principal areas and tasks involved in the MARC contract consist of:

Administration is responsible for the coordination and management of all formal aspects that are required for the continuity of the operation, including documentation about personnel related matters, assistance control, employee benefits, personnel transport as-well-as communication with external authorities (e.g. auditors). Another critical task embraces the permits that those who want to enter a mining site need. This becomes especially important when external support from the Product Support Group (PSG) or Shovel Support Group, in Spanish 'Gerencia de Soporte Palas' (GSP) is required. Unless they get their permits on time, they cannot enter the site and provide the requested support.

Operations are generally the biggest area within MARC contracts. They are responsible for carrying out the required operational tasks for the maintenance of the shovels as-well-as the repair of unexpected failures that may emerge during the operation. The mechanics are divided according to different specialities, including mechanics, electricians and welders. Among the mechanics and electricians, some are called specialists. However, there is no formal definition according to which they obtain this title. It is generally attributed to those with more experience and supposedly superior knowledge and skills than others. Together with Planning, Operations is generally regarded as the most relevant area within a mining site. The quality according to which they execute their tasks has a significant impact on the service level of the shovels. Because of their tasks, they are generally located within the mining pits, thus spatially separated from the other functions of the MARC contract. Because of this they are frequently attributed with a rather autonomous character, separated from the other functions.

The *Planning* area is focused on the definition of the maintenance and repair plans that Operations are supposed to execute. In line with this they ensure the availability of the required support equipment (e.g. lubrication truck, man lift), spare parts as-well-as major components. Because the maintenance and repair work has to be carried out in the mining

pit, proper planning is vital to ensure that operations come with the required tools, spare parts and support equipment to execute their work, otherwise the maintenance and repair time lengthens. Furthermore, Planning is supposed to coordinate the execution of the maintenance and repair work with the customer. This includes the planning of the time and space where the works are supposed to be carried out.

Another function covered within each mining sites consists in *Health, Safety and Environment (HSE)*, which ensures the compliance of all processes related to risk prevention and physical wellbeing of the workforces. It furthermore strives to foster a culture focused on health, safety and environmental protection within the site. Generally the HSE Engineers join the Operations people when these carry out their work in the mining pit, to ensure safe work practices.

The **GSP** consists in Senior Specialists who have a high level of practical and expert knowledge about the different aspects involved in the maintenance and repair work of shovels. Whilst this group has been formalised in 2009, the people belonging to it have been working together for more than 15 years in different mining sites, where the individuals were stationed. Organizationally, GSP belongs to the Operations group of Komatsu Chile. Most of its members belonged to the first site in which Komatsu conducted shovel maintenance within the MARC format, Mina Sur. Afterwards the members moved throughout the country, working in different sites. A particular focus of the GSP consists in the resolution of complex problems which the local mechanics cannot manage to resolve. A further central objective is the technical on-site training of the Specialists, in particular, and the mechanics in general. This aims to increment shovel performance for current projects and prepare people for future growth of the shovel operations within Chile. They also regard themselves as a bridge between the different units that are involved in shovel maintenance, including the PSG, the training group, HR (above all in terms of selection), commercial area and the spare parts

division. The Senior Specialists pertaining to the group spend most of their time within the different mining sites and support the local mechanics with the complex repair work.

Komatsu Chile furthermore has specialist engineers who belong to the **PSG** for shovels. They are closely aligned with the Komatsu factory and their mission consists in providing high level specialist support in terms of shovel performance (Komatsu, 2015c). They also function as the bridge between the Komatsu shovel operations in Chile and the factory in Germany. On the one hand they feedback information to the factory so that they can incorporate this information in their planning and potential improvements to the shovels, and on the other hand they support the factory in ensuring the execution of the so called field campaigns. These include general adjustments and changes that have to be made to all shovels operated throughout Chile, generally to increase performance or safety. However, within the organization there have been significant challenges in implementing these (Komatsu, 2014c), which may lead to the understanding of improvement opportunities in terms of the collaboration between PSG and the Komatsu Chile operations. Generally, the PSG engineers are assigned to various Komatsu mining sites, which they support when these face challenges that they are not able to resolve on their own. In this case the PSG group engage into what they coin ‘troubleshooting’, which consists of a series of steps in determining the root causes of problems. The results are documented and send to the respective mining site, or, depending on the nature of the cause, to the shovel factory in Germany. This activity is considered a central responsibility within the PSG group. However, the focus of PSG does not generally include the actual execution of the required work, but rather the technical assistance in finding causes and suggesting solutions.

3.3 Reflections

The challenges that Komatsu is facing in light of the inconsistencies in complying with contractually agreed MARC service levels across sites have made this a relevant research endeavour from an organizational perspective. From an academic perspective, it furthermore

extends the organizational context within which research about CoPs has been conducted (Kasper et al., 2008). The fact that this research has been carried out within Chile – characterised by unique cultural traits and macroeconomic context as demonstrated throughout this chapter – has also broadened the geographic and cultural scope about CoP studies as requested by various researchers (Ambos & Ambos, 2009; Gertler, 2003; Michailova & Mustaffa, 2012; Roberts, 2006).

Chapter 4 Methodology

The objective of this chapter is to explain and justify the adopted methodology. The initial task in this context is the description of the underlying research paradigm and the methodological implications it entails. In the following part, the method for data collection, as well as the analytical framework will be presented. Then, the ethical considerations that have been relevant and were adhered to for the entire research process will be elucidated. Afterwards, the research design will be described in detail so that the process and the underlying assumptions that have informed the generation of the data become clear. Finally, reflections regarding the adopted methodology will be presented.

4.1 Research Paradigm

Each researcher is consciously or unconsciously driven by epistemological and ontological presuppositions that determine the way in which the research is undertaken (Crotty, 1998; P. Johnson & Duberley, 2000). Whilst those philosophical assumptions underlying research are neither testable (Popper, 1959) nor refutable (Godfrey & Hill, 1995), their clear exposition is an essential component of good research. Collier (1994, p. 16) rightly synthesises the following: “A good part of the answer to ‘why philosophy’ is that the alternative to philosophy is not no philosophy, but bad philosophy”. However, a wide range of scholars do not clearly describe their philosophical foundations, but merely research using the conventionally accepted positivistic paradigm (Nonaka & Peltokorpi, 2006; Spender, 1998). This emerged in England in the seventeenth century in the Age of Enlightenment, pledging that true and accurate knowledge could be obtained through scientific methods (Crotty, 1998). Whilst this period has helped to overcome the dominant role of religion and royalty by permitting everyone to express their own voice, positivism in itself has also converted into a form of “dictatorship” (Gergen, 1999, p. 21), making supposedly scientific knowledge, unquestionable at the centre of truth, by those who are not part of the respective scientific community (Gergen, 1999). Nevertheless, as Houston (2001, p. 846) argues, “a number of

changes in society including the loss of faith in technocratic expertise, and the emerging power of new social movements to redefine the social world” have influenced the rise of diverging theories of social science, like social constructionism. A moderate version of the latter is the philosophical basis for this research project, containing epistemological and ontological assumptions. In general, epistemology and ontology have a tendency to merge together, because epistemology necessarily informs ontology (Crotty, 1998) and both cannot be understood separately (López, 2003). Ontology may be elucidated as the understanding of the way the world is assumed to be, to permit science to inquire about it (Bhaskar, 2014) as-well-as about the nature and theory of existence (Crotty, 1998; Fleetwood, 2004). Epistemology on the other hand can be described as the meta theory of knowledge (King & Horrocks, 2010). In the following, the philosophical framework and the respective implications will be discussed.

4.1.1 Social constructionism

First of all, it is worth mentioning that there is no single accepted definition of social constructionism (Gergen, 1999) and it is also thus interpreted divergently (Lock & Strong, 2010). A single definition would itself be contradictory to the pivotal prerequisite to not take any knowledge for granted (Berger & Luckmann, 1991; Burr, 2003). There are however, some criteria that are safe to advocate about social constructionism in general and that are adopted for this research. One of these is the understanding that meaning is not discovered, but constructed through social relationships and accepted in light of its utility for society (Crotty, 1998; Gergen, 1999). Meaning thus differs depending on the cultural and historical context where society is embedded (Burr, 2003). An important point is that the respective society provides the frame of reference to structure and organised meaning (Crotty, 1998). However, there is no essence within social realities, which are mutually constituting and intertwined (Cunliffe, 2008; Lock & Strong, 2010) with individuals who construct the same world that they must later respond to (Burr, 2003). Within this society, power is not equally

distributed because some groups have more influence on defining what is socially accepted meaning than others. Therefore social constructionists take a critical stance toward taken-for-granted knowledge, requesting that beliefs, even if supported by evidence, do not necessarily reflect the real nature of the world (Burr, 2003; Gergen, 1999). This is because people always observe from a specific standpoint, where categorisations have been socially constructed and lead to looking at the world from these perspectives (Burr, 2003).

Social constructionism has been subjected to an important amount of critique, as the leading scholars in the field vividly elaborate (Berger & Luckmann, 1991; Burr, 2003; Gergen, 1999). Among these, it is questioned whether the constant challenging about all knowledge claims may lead to an infinite interpretative regress, that occurs when researchers analyse their own analysis, and then the way they analysed their analysis and so forth (Burr, 2003). This critique holds true, postulating that social constructionists were in search for ultimate truth. However, this is not the aim of social constructionism. Meaning, which can be termed as truth within social constructionism (Crotty, 1998), constitutes its focal point of attention.

Another frequently outlined critique relates to the understanding of the nature of the world, particularly in terms of how social constructionists determine reality. It is important to be aware that the often mentioned phrase 'there is nothing outside the text' does not constitute an ontological, but rather an epistemological claim (Burr, 2003). Thus, as an example, illnesses are factual realities (ontological perspective) but the meaning of illness in the respective cultural and historical context is socially constructed (epistemological perspective). This may lead to the assumption that social constructionism is not concerned with ontological issues (Andrews, 2012), (what Nightingale and Cromby (2002) call ontological muteness) or that it is based upon shifting ontological propositions (Fleetwood, 2004). This may lead social constructionists to the 'epistemic fallacy', assuming that everything that cannot be captured by an epistemological perspective does not exist (Fleetwood, 2004). However, social constructionism does not necessarily embrace an "anti-

realist ontology of the social world” (Elder-Vass, 2012, p. 9), which rejects the possibility of causal explanations in the social world, the causal power of social structures and the existence of a material world beyond the knowledge that influences people.

Those social constructionists who disagree with the relativist assumptions, which basically argues that reality can only be described as a relative position, like refraining from arguing what a tree is but rather what it is not, are generally inclined to critical realism (Berger & Luckmann, 1991). There is a differentiation between assuming, a) that there is no reality and b) that knowledge about it will always be limited (Sims-Schouten, Riley, & Willig, 2007). However, the question about reality is not the focus of social constructionism. Gergen (1999) expresses the lacking focus on this, by arguing: “What is simply is” (p. 161).

Furthermore, social constructionism is suitable to innovate understanding about taken for granted aspects (Gergen, 1999) and therefore well applicable to revising the existing theoretical framework about CoPs in a socially and culturally different context.

4.1.2 Methodological implications

The described epistemological and ontological assumptions lead to methodological implications that are outlined in the following section.

4.1.2.1 Discourse and language

Discourse consists in written and spoken language or any artefact that can be ‘read’ (e.g. pictures, videos, clothes that people wear). It is at the heart of social constructionism because of its constructive nature in the meaning making process (Burr, 2003; L. Cohen, Duberley, & Mallon, 2004; Fairclough, 2005). There are different discourses for the same event, resulting in different truth claims, which are central in the context of identity, power and change (Berger & Luckmann, 1991; Burr, 2003). The most dominant form of discourse is language, because a conversation cannot occur without language and vice versa (Tusting, 2005). Language is also emphasised as a central aspect within CoP theory as was

described in the literature review (Wenger, 1998). Therefore, discourse presents a foundational aspect of this research.

Language is above all to be regarded as a social phenomenon, which is not static, but evolves over time and is context dependent (Berger & Luckmann, 1991). Descriptions of events through words are the main vehicles used to construct meaning (King & Horrocks, 2010). Maturana and Varela (1987) epitomise the presupposition that language is an integral part of human practice: "Everything said is said by someone" (p. 27). They furthermore argue that: "Every human act takes place in language. Every act in language brings forth a world created with others in the act of coexistence which gives rise to what humans are" (p. 247). Language is not merely a means of communication, but it reveals feelings, beliefs, opinions and is constituted in a shared framework of understanding (Yardley, 2000). Thoughts and language are not necessarily the same: "The things become available to us, through language, as ways of structuring our experiences" (Burr, 2003, p. 47).

Discourse also plays a central role in power asymmetries. Foucault has had a big influence on the understanding that power is omnipresent in human life, because the discourses that are used have different levels of acceptance, putting those upholding them in more powerful positions than others (Burr, 2003). Comparing for example statements of a governor of a bank about the economic outlook versus those of others – there is clearly a difference in the associated value of their discourse (Fleetwood, 2004). Also, if categorisations are made between mad and sane or women and men, then this not only reflects a material difference, but also imposes power asymmetry, by assigning certain characteristics to each group (Burr, 2003). Although the implications of these categorisations may not be visible to those affected, they do certainly have an influence on the affected groups, because of their social utility and acceptance (Burr, 2003). Research always has a political character, because "*all* our speech and actions arise from a particular social context, serve some social purpose and have some social effect" (Yardley, 2000, p. 223).

However, it is acknowledged that there is a material world beyond language, which influences the way in which people construct meaning through it, even though they may not be consciously aware of that (Fairclough, 2005; Sims-Schouten et al., 2007).

In light of these considerations the privileged role that language must take in this research becomes evident: first, because of the constitutive nature of language, emphasis must be placed on gathering the experiences of people through language. Secondly, attention must be paid to the way in which categorisations are used and structured, as these may help to understand socially established definitions that may be subject to change. Ultimately, from an ethical perspective it must be ensured that questions and dialogue are steered carefully, because language can generate harm.

4.1.2.2 Against methodological individualism

Above all in positive research it is frequently argued that society is composed of individuals and that science should strive to understand these individuals separated from their respective context, to gain knowledge about a society as a whole. This conceptualisation has been coined methodological individualism in 1909 by Schumpeter (Hodgson, 2007; Udehn, 2002) and stems from economic theory, where it is argued that individual decisions should constitute the basis of research (Arrow, 1994). In line with this Schumpeter (1909, p. 232) argued that “no reality corresponds to the concept of social values and social wants properly so called”. There are different conceptualisations of methodological individualism (Hodgson, 2007; Udehn, 2002). Within methodological individualism it is postulated that ultimately all social phenomena can be understood through the individuals that form the social entity (Elster, 1982; Schumpeter, 1909). It also claims that social properties like values do not reside within the social relations, but within individual actors (Arrow, 1994).

Whereby it is accepted that all social processes are materialised through individual action; also termed ontological truism, these are not necessarily explanatory (Jepperson & Meyer, 2011). From this standpoint it is advocated that no social phenomena can be explained

based on an individual level only, but must include the relations among individuals (Hodgson, 2007). Otherwise it is difficult to understand why individual actors behave differently depending on the socio-cultural context in which they are embedded (Burr, 2003). Methodological individualism does not pay sufficient respect to the uniqueness of social entities beyond the sum of its members, particularly considering the web of relations and interactions in their own right (Sarker & Valacich, 2010). Organizational competences do not reside within the individuals' competences, but their combination (Sarker & Valacich, 2010). However, it may indeed be regarded as a false dichotomy to differentiate between the individual and society, "a division that is an artefact of intellectual analysis by human minds and not a division that represent discrete phenomena" (Burr, 2003, p. 184). The implication of this leads to the requirement that the meaning making process of individuals must necessarily and explicitly include their understanding of the social relations and context that influences them.

4.1.2.3 Values

The role of values within research is subject to a significant amount of discussion and will never be conclusively finished, as it is based upon different underlying philosophical presuppositions that are neither testable (Popper, 1959) nor refutable (Godfrey & Hill, 1995). Whilst positivists, searching for universal truths, aim to strictly separate values from science (Crotty, 1998), advocating a rigorous distinction between positive and normative statements (May, 2011), this research paradigm assumes the existence of multiple realities that are constructed in a social context (Berger & Luckmann, 1991; Burr, 2003). The following section explains why.

The process of research can be understood as a common project between the researcher and the researched (Berger & Luckmann, 1991). Guba and Lincoln (1994) argue that study results are generated out of the interaction between the researcher and the researched rather than through objective observation. The quest for objectivity is not shared within the

research paradigm, because it is impossible to act without underlying personal assumptions that drive actions (Berger & Luckmann, 1991). Every investigator looks upon a situation from a context that is embedded cultural-historically and socially constructed, therefore it is impossible to look at the world from no position at all (Burr, 2003; Cruickshank, 2003). Each claim, even those seemingly neutral, are subject to an underlying belief system (Gergen, 1999).

The values of the researchers cannot be derived from facts and manifest themselves in each of the respective phases in a research project, as May (2011) comprehensively summarises:

- Interest leading to research.
- Aims, objectives and design of research project.
- Data collection process.
- Interpretation of the data.
- The use made (or not) of the research findings.

Acknowledging the role of values throughout the process, it must be ensured to actively pursue a critical reflection upon their impact in the respective phases. In line with this, the interest leading to the research as-well-as the aims, objectives and design have been addressed within the preceding chapter. This, together with the research paradigm outlined above and a critical assessment of different data collection methods, led to the understanding of why the adopted methods were selected. The reflections regarding the interpretation of the data will be presented in the reflective commentary further below. The contribution of the research findings will be discussed in the concluding chapter.

4.2 Data Collection and Analytical Framework

The outlined research paradigm and its implications necessarily inform the methodology – this relates to the explanation and justification of the respective methods that were adopted. Methods constitute the techniques or procedures used for the collection and analysis of data

(King & Horrocks, 2010). The overarching theoretical framework has been discussed in the literature review. The following section will illustrate why the adoption of a qualitative research approach, founded upon inductive reasoning has been selected as the preferred methodology to accomplish the objectives of this work. Then, the frequently related topics about the trustworthiness of qualitative research will be explored. Afterwards, the rationale for performing an exploratory case study, based on semi-structured in-depth interviews, will be comprehensively depicted. The last part of this chapter will outline why thematic analysis has been applied as the preferred option to analyse the generated data.

4.2.1 Qualitative research

Because of the exploratory character of this research, underpinned by the philosophical foundation, this research project will be of a qualitative nature. This calls for thick descriptions (Denzin & Lincoln, 2005; Geertz, 1973) about complex social processes, incorporating beliefs, values and motivations (Bryman, 2012; Curry, Nembhard, & Bradley, 2009) to explore the meaning individuals construct in a social context (King & Horrocks, 2010; Yardley, 2000). To provide thick descriptions is vital within qualitative researches, “because the essential task of theory building (...) is not to codify abstract regularities but to make thick descriptions possible, not to generalise across cases but to generalise within them” (Geertz, 1973, p. 27). This is not feasible within quantitative research. From the philosophical background, researchers are necessarily value-laden (Seidman, 2013) and construct meaning together with the researched (Berger & Luckmann, 1991; Guba & Lincoln, 1994). Because of this, a naïve realist view, according to which qualitative research should simply ‘give voice’ to the respondents (Braun & Clarke, 2006), is not supported.

The term qualitative research embraces a wide variety of methodologies so that its main definition is sometimes considered to be simply the opposite of quantitative methods (Yardley, 2000), which are ultimately about numbers, aiming to study specific and isolated variables (King & Horrocks, 2010); quantitative research, thus does not adequately capture

local context and the human aspects of meaning and purpose, a problem that Guba and Lincoln (1994) call 'context stripping'. A further postulation within quantitative research is the attempt to obtain objectivity in the research process, which is in stark contrast to the qualitative research approach. Values and facts are not independent (Guba & Lincoln, 1994), but always depend upon the position from which they are looked at (Burr, 2003).

Denzin and Lincoln (2005) propose the following definition for qualitative research, which is adopted for the current research:

“Qualitative research is a situated activity that locates the observer in the world. It consists in a set of interpretative, material practices that make the world visible. These practices transform the world. They turn the world into a series of interpretations, including field notes, interviews, conversations, photographs, recordings, and memos to the self. At this level, qualitative research involves an interpretative, naturalistic approach to the world. This means that qualitative researchers study things in their natural settings, attempting to make sense of, or interpret, phenomena in terms of meanings people bring to them.” (Denzin & Lincoln, 2005, p. 3)

Complementing the above, Bryman (2012) emphasises that the subjects of social sciences, namely human beings and systems, differ from those of the natural sciences because they produce meaning. Therefore he postulates that qualitative research should attempt to see “through the eyes of the people being studied” (p. 399). He furthermore distinguishes it from quantitative research because of the required flexibility and limited structure, which increases the chances to understand the frame of reference of the participants and allows them to provide accounts from their perspective.

Quantitative methods usually attempt to obtain generalisations, which are claimed to be “assertions of *enduring* value that are *context-free*” (Lincoln & Guba, 1985, p. 110 italics in original). From the derived research paradigm the concept of generalisation is a

questionable concept, because those who establish generalisation put themselves into a position of power, where all belonging to the same population are advocated to adhere to the respective generalisations. Furthermore, to accept them leads to the acceptance of determinism (Lincoln & Guba, 1985), because it can imply that those who are advocated to be members of a same group are the same, which is rejected within the adopted research paradigm. Furthermore, generalisations are ultimately attempting to “reduce all phenomena of a given class to the purview of a single (or single set of) generalisation(s)” (Lincoln & Guba, 1985, p. 117), which is impossible, because local context is always different and the meaning making process differs between people (Berger & Luckmann, 1991; Burr, 2003). While quantitative methods may assume *ceteris paribus* conditions, postulating that isolated variables remain equal or are held constant (Yin, 2009), these conditions do not exist in open social systems (Miller & Tsang, 2011). Because of this, even the attempt to obtain analytical, rather than statistical generalisations (Flyvbjerg, 2006) within social sciences is not achievable. Research is always bound to its respective social and historical context.

However, supporting qualitative research does not necessarily imply the neglect of quantitative research methods, which may be suitable for certain contexts (King & Horrocks, 2010). Though the interpretation of the obtained results should be analysed beyond simple cause and effect relations and their implications should be critically reflected upon (Burr, 2003).

Qualitative research generally builds upon inductive logic, where the generated data leads to the establishment of theories. It stands opposed to deductive logic, which is generally applied within quantitative research and that starts with a theory that is then tested through the analysis of the data (Bryman, 2012). Research always starts with a certain set of assumptions and values, even at times unconsciously, that inform the research process (Reichertz, 2010). The focus resides in the contextualisation of the research findings in the

“language, meaning, and perspectives” (Bryman, 2012, p. 401) that constitutes the worldview of the people being studied.

4.2.2 Trustworthiness

Because qualitative research is value-laden, a frequently articulated concern refers to the assessment of the value of the obtained results and the standard applied in the process of generating these. This holds true, as Morse, Barrett, Mayan, Olson, and Spiers (2008, p. 14) rightfully argue: “Without rigor, research is worthless, becomes fiction, and loses its utility”. Indeed, a research project that does not apply adequate standards to ensure quality of its execution may genuinely be categorised as useless. However, it is vital to consider that the criteria, upon which a research project is to be evaluated, do not necessarily always have to be the same. Within the context of quantitative research the concepts of validity, reliability and generalisability are widely accepted as dominant factors to evaluate the utility of a research project (Bryman, 2012; Graneheim & Lundman, 2004).

There is a tendency to also evaluate qualitative research based on these criteria. This may be because the philosophical framework underlying this usually finds less acceptance than in the case of quantitative research (Yardley, 2000). In practice, the lack of acceptance of qualitative methods may have negative implications on research funding and publications, which may have led to the increased focus on reassessing evaluation criteria for qualitative research (Bryman, 2012). Whilst some try to adapt quantitative criteria to assess qualitative research (R. B. Johnson, 1997) others reject this approach (Seidman, 2013). For this research the criteria postulated by Lincoln and Guba (1985) and Yardley (2000) have been adopted to ensure trustworthiness:

Lincoln and Guba (1985) advocate the assessment of qualitative research in terms of trustworthiness, materialised along four dimensions: credibility, transferability, dependability and confirmability. At the core of trustworthiness is the question: “How can an inquirer

persuade his or her audiences (including the self) that the findings of an inquiry are worth paying attention to, worth taking account of?" (Lincoln & Guba, 1985, p. 290).

Credibility relates predominantly to the execution of research according to what is Bryman (2012) called 'good practices'. To fulfil this criteria the rationale in selecting the respective research methodology and methods, as-well-as the research process in general, are clearly described and discussed throughout this chapter. This includes the adopted research paradigm as-well-as the inherent methodological implications in terms of discourse and language, the neglect of methodological individualism and the role of values that have been addressed in section 4.1. In section 4.4 details about the research design, encompassing the research objectives, definition of respondents, medium of communication, interview guide, engagement of respondents, the interview execution and the following data analysis are thoroughly discussed. *Transferability* is regarded as another component of trustworthy research. Because generalisations are not feasible the focus is put on transferability, which is achieved by providing thick descriptions of the process and results and if possible working hypotheses, generated through the findings (Geertz, 1973; Lincoln & Guba, 1985). In Chapter 5 a significant amount of these thick descriptions in the form of citations from the interviews are presented and extensively discussed throughout the chapter as-well-as in Chapter 6 and 7. This extensive process is testament to the rigour of the analysis. Taken together these provide others with the means to evaluate transferability of the findings to other settings (Bryman, 2012). Nevertheless, it is important to bear in mind that results cannot be detached from the specific context within which they have been generated, which in this case is shovel maintenance within Komatsu Chile.

The aspect of *dependability* refers to the proper documentation of the research process, consisting in field notes and interview scripts, which allow a third researcher to audit the findings for their quality (Bryman, 2012). For the purpose of this work, interview scripts and the documentation used for the analysis have been kept recorded so that the reconstruction

of the research process and its findings become feasible. Beyond this, the analysis of the generated data was thoroughly documented, providing an audit trail that can be used to assess the quality of the results afterwards (King & Horrocks, 2010; Lincoln & Guba, 1985). However, this does not imply that a third person would have obtained the same results, because according to social constructionism, they are always dependent upon the position from which they are constructed (Burr, 2003).

The final aspect to evaluate the trustworthiness of qualitative research is *confirmability*, which aims to prove the good faith of the researcher in conducting the research (Bryman, 2012). Rather than highlighting the objectivity of the investigator, as would be required in quantitative approaches, the aim of this aspect is to indicate in detail the process of data collection and the consequent analyses that have led to the conclusions (King & Horrocks, 2010). The results and analysis that have led to the revised theoretical framework are clearly documented in the subsequent chapter.

In addition to these, Yardley (2000) suggests four complementing criteria in assessing the value of qualitative research: *sensitivity to context* refers to the suggestion that the qualitative researcher should be adequately familiar with the theoretical context, obtained through the review of the relevant literature and other empirical data as-well-as the socio-cultural setting, which includes the perspective of the participants as-well-as potential ethical issues. Because of the extensive literature review presented in Chapter 2, the description of the research context in Chapter 3 and the ethical considerations presented in section 4.3, this requirement has been satisfied for this research. *Commitment and rigour* encompass the thorough engagement with the research project, which materialises in a clear demonstration that all required efforts have been undertaken to answer the research questions and obtain the research objectives adequately. This aspect is covered in Chapter 5, which clearly depicts the results and corresponding analysis that have emerged out of the data collection phase. It also entails the critical assessment and reflection about whether the researcher has

the required skills to conduct and document the project properly, which is further discussed in section 4.5 of this chapter. *Transparency and coherence* refers to the “clarity and cogency – and hence rhetorical power or persuasiveness – of the description and argument” (Yardley, 2000, p. 222). In spite of the results of the research, their value is not fully explored as long as they are not adequately documented for others as well. It also relates to the requirement that the argumentation and analysis remains transparent for others, outlining why decisions have been made and how criteria have been applied. This can however, be difficult (Bryman, 2012) because many of the underlying assumptions and worldviews of the researcher may be deeply rooted in personal history and difficult to reveal through written words alone. A good part of these assumptions may indeed be tacit in nature, so that even they themselves may not be fully aware of them. Because research is a value-laden process, it is also important to be reflective about the way the researcher’s participation may have influenced the process, which is discussed in the concluding sections of this chapter, particularly in section 4.5.1, where reflections about insider research are presented. Ultimately, the *impact and importance* are vital criteria in assessing the quality of a research project. While this is generally not evaluated based upon the generalisability of the project, it should still emphasise the impact on theory and practice. The concluding chapter of this dissertation addresses these aspects.

Because of the philosophical assumptions there cannot be one universally accepted criterion in differentiating good research from bad. The points described above are rather to be understood as a “tentative agreement as to the validity and utility of a piece of research for a certain purpose, in a particular situation, and for a specific community of people” (Yardley, 2000, p. 217). Each qualitative research project is different and therefore the extent to which the outlined criteria above are applied will also vary (Yardley, 2000).

The pivotal message from this assessment is reflexivity about the different criteria outlined above, which will be further discussed in section 4.5. and refers to the critical and reflective

assessment about the “methods, values, biases, and decisions for the knowledge of the social world” (Bryman, 2012, p. 393).

4.2.3 Exploratory case study

In line with the research objectives and philosophical context, three different methods have been considered for this research project. One of these is termed *action research*, which was significantly driven by Kurt Levin (Huang, 2010; Reason & Bradbury, 2006) who started to combine research with the immediate application in action. The key components are the mutual consideration of action (knowhow) and research (know that), which are not regarded as clearly separated concepts but as mutually intertwined (Winter, 1996); new knowledge emerges through the application in practice. In line with this, action research also aims to affect the potential of practitioners, regarding their professional development and learning capabilities (Zuber-Skerritt, 1996). Gelling and Munn-Giddings (2011) proclaim the end of discussions about the validity of action research. Reason and Bradbury (2006) argue that its application is generating significantly more positive change than other approaches. Nevertheless, there are still a significant amount of challenges that need to be addressed, like the paradox of participation (Arieli, Friedman, & Agbaria, 2009) and ethical components (Winter, 1996). Furthermore, there is still a significant amount of questions regarding the contribution of action research to the scientific community, beyond its application in practice (Friedman, 2006). Finally, the objective of this thesis does not consist in intervention, but understanding, which has led to a rejection of action research in this case.

Another approach described by Bryman (2012) is *ethnography*, which has certain similarities to participant observation. The essential aspect within this approach consists in the understanding of a research setting as an insider. The “ethnographer immerses him or herself in a group for an extended period of time, observing behaviour, listening to what is said in conversations both between others and with the fieldworker, and asking questions” (Bryman, 2012, p. 432). Furthermore, documents and other materials are collected, aiming

to understand the behaviour of the people in the cultural context. Throughout the process the ethnographer takes field notes and ultimately writes up the findings. Furthermore, ethnographic works can be challenged because it puts too much emphasis on the researcher rather than on the group being studied and may “end up as ‘story-telling’, where a detailed account is given at the expense of developing any analytical insights or theoretical contributions” (Oates, 2006, p. 182). Despite the benefits from its application, a further principal reason in refraining from ethnographic research is the fact that it is a very time and resource consuming endeavour (Alvesson, 2003). The interest of this study resides in CoPs that operate in shovel maintenance and are based in the copper mines in the north of Chile. Personal and professional restrictions have made the immersion for a longer time into this context unfeasible.

Therefore, an exploratory case study has been selected as the preferred means to pursue the research objectives. Tsoukas (1989) differentiates between exploratory and explanatory case study research, whilst other dominant scholars additionally associate case studies with descriptive purposes (Yin, 2009). However, it may be argued that any descriptive case study will tend to inherit either exploratory, explanatory or both characteristics. Exploratory case studies aim to provide preliminary information or generate new evidence for further investigation and to build or revise theory (Eisenhardt, 1989; Gerring, 2004; Yin, 2009).

To define a case study clearly may be a challenging task (Easton, 2010; Gerring, 2004). Yin (2009, para. 1) presents the following definition: “Empirical inquiry that investigates a contemporary phenomenon in depth and within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident.” This definition clearly suits this research project, where the social context is a fundamental part of the phenomenon under study, when generating thick descriptions about the generated data (Geertz, 1973). Easton (2010, p. 119) provides the following definitions about case study, which complements the previous and is accepted within the research context: “A research

method that involves investigating one or a small number of social entities or situations about which data is collected using multiple sources of data and developing a holistic description through an iterative research process.” This definition highlights the iterative nature of the case study, which is also important for the project.

Yin (2009), one of the most cited authors about case study research, suggests that it is an approach that contains six phases (Figure 14): The initial *planning* consists in the definition of the research objectives and the definition and justification of the adopted methods. This has been described in the Introduction Chapter and clarified further throughout the literature review. The *design* phase encompasses the definition of the case and the case study design. The definition of a case might be a challenging undertaking, which Verschuren (2003) attributes to the conceptual difficulties around the definition of research unit, in this case the shovel maintenance organization in the Calama region (see section 3.2) of Komatsu Chile, and the observation units, which are CoP members within the research context. Yin (2009) names individuals, small groups, organizations and partnerships *concrete cases*, whilst communities, relationships, decisions and projects are coined *less concrete cases*. Thus, the research unit within this exploratory case study is a concrete case, which clearly depicts the boundaries, whereas the observation units, CoP members are to be understood as less concrete cases within the clearly defined boundaries of the shovel maintenance organization within the Calama region of Komatsu Chile.

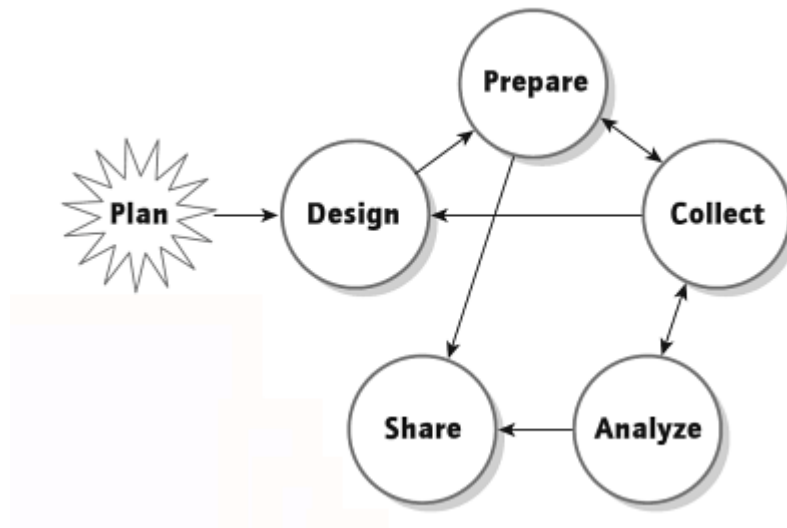


Figure 14: Phases of case study research (Yin, 2009).

In the consecutive phase the case study execution is *prepared* before the *data collection* begins. This part of the research will be elaborated upon in the following sections. Afterwards, the results are *analysed* based upon the selected analytical framework, which in this case consists of thematic analysis based upon the framework outlined in the literature review. In practice, it is difficult and also not necessarily desired to strictly separate data collection and analysis (Eisenhardt, 1989), because of the iterative process where the analysis of results leads to refinements within data collection. This will be further discussed below. Within exploratory case studies the analysis phase is pivotal for the definition or revision of the respective theory. Ultimately, the results of the case study need to be *shared* by comprehensively documenting the findings, which will be summarised in the concluding chapter.

4.2.4 Semi-structured in-depth interviews

Whilst there are multiple methods to generate data within case study research such as documents, archival records, observations and physical artefacts (Yin, 2009), qualitative interviews are among the best and most established ways of inquiring into the experiences people have had and the way they make meaning out of these (Seidman, 2013). This is a

central aspect within the adopted research paradigm. Interviews allow the researcher to understand complex social processes that cannot be expressed in quantitative measures (Bryman, 2012; Curry et al., 2009; Yin, 2009). This is probably why interviews are among the most frequently adopted methods within qualitative research (King & Horrocks, 2010), representing a basic method for interaction and inquiry (Kvale, 2007; Seidman, 2013). Nevertheless, while omnipresent, qualitative interviewing is no trivial task (King & Horrocks, 2010) – an interview is a structured conversation, with a defined purpose that goes beyond a spontaneous everyday conversation (Kvale, 2007). Kvale (2007, loc. 1928) argues that the “richness of the interviewee’s answers, the length of relevant answers and the clarification of the interviewee’s statements” present criteria according to which the qualitative standard of interviews can be assessed.

Whilst structured interviews are generally associated with quantitative research, unstructured or semi-structured interviews are the principal ones used in qualitative research (Bryman, 2012). As the name semi-structured interview indicates, this type of qualitative inquiry method is characterised by a set of previously identified open-ended but structured questions that stimulate dialogue and provide the flexibility to “*probe* beyond the answers” (May, 2011, p. 134, original emphasis); clarification and further elaboration on these answers is explicitly desired and advocated to generate “rich insights into people’s biographies, experiences, opinions, values, aspirations, attitudes and feelings” (May, 2011, p. 113). *Unstructured interviews* are characterised by their open-ended questions, where interviewees can talk about subjects in their own context and thus provide an in-depth perspective on the researched subject (May, 2011); they represent the challenge for the interviewer to maintain focus on the research topic (Dicicco-Bloom & Crabtree, 2006).

In the context of this research, semi-structured in-depth interviews were adopted as the preferred means to obtain data. This is because the aim of this research resides in obtaining insights from the interviewees in their respective contexts, without imposing possible

answers. The semi-structured nature is applied to ensure however, that the research objectives will be covered, while leaving room “to follow feedback idiosyncratically so as to explore more particular meanings within research participants” (Burck, 2005, p. 240). Within an in-depth interview the participants are incentivised to reflect on their experiences, reconstruct their details in line with the research questions and make sense of them. “At the root of in-depth interviewing is an interest in understanding the lived experience of other people and the meaning they make of that experience” (Seidman, 2013, p. 9). It is important to emphasise that the research has embraced the understanding that individuals are not separated from the context within which they are immersed, but part of the reality they socially construct together. Therefore, in-depth semi-structured interviews have been selected as the best suited method in obtaining thick descriptions (Geertz, 1973) about the meaning that the respondents construct, in line with the research objectives.

4.2.5 Thematic analysis

The analysis of case study data is one of the least developed aspects of case study research (Yin, 2009) and particularly challenging regarding qualitative data, which does not provide clear patterns like statistical tools as used in quantitative data analysis. It is linked to the richness within qualitative data, which may be hard to manage (Bryman, 2012). However, there are different methods that may be adopted to analyse qualitative data:

Grounded theory is a qualitative method that was introduced by Glaser and Strauss (1967). According to different scholars (Bryman, 2012; Burck, 2005) it embraces two fundamental aspects: first, it advocates that theory should be grounded on the generated data without the necessity to research prior theories beforehand. It is thoroughly inductive in this sense. Second, grounded theory is characterised by its iterative and recursive nature where the researcher moves back and forward between the data collection and analysis phase, through the systematic coding of the research results. The strength of grounded theory lies in the systematic approach it provides, which allows the researcher to generate new

theories. According to Burck (2005) it is particularly useful in areas that have not been sufficiently theorised about yet. However, a criticism of traditional grounded theory, questions whether a researcher can really look at data without considering existing theories, which may have been obtained through personal, professional or academic experiences before (Burck, 2005). For this particular research context grounded theory is not regarded as the preferred means of generating and analysing data, because the extensive literature review has already informed the research phase and furthermore because there already exists a broad range of research about CoP; grounded research may then lead to only revealing 'old truths'.

Discourse analysis is closely linked to social constructionism and puts a pivotal focus on the analysis of power asymmetries (Burr, 2003). Therefore, a focus within discourse analysis exists in the critical assessment of the applied language people use and the emerging consequences and limitations in the meaning making process (Burck, 2005). Discourse analysis is not built upon a coding scheme as is the case with grounded theory. Rather, those parts of discourses that seem to provide information about the research questions are selected and then analysed for the words used or omitted (Bryman, 2012), reviewed for contradictions or inconsistencies and then examined for their implications (Burck, 2005). However, the central aspect of this research does not reside in power asymmetries that are imposed through discourse.

Narrative analysis is based upon the stories provided by the interviews, not only inquiring into what happened but paying peculiar attention to the sense-making process of the people in what happened (Bryman, 2012). Narrative for this purpose is understood as "a scheme by means of which human beings give meaning to their experiences of temporality and personal actions" (Polkinghorne, 1988, p. 11 as cited in Emden, 1998). It is important to be cognisant that narratives obtained through the interviews are not a reproduction, but rather an interpretation of the past, constructed by the interviewee and influenced by imagination

and strategic interests to make their story meaningful to others (Riessman, 2003). Whilst narrative analysis could present a useful approach for this research project, it lacks a certain level of structure that is considered useful for this research project.

Thus, in the context of this research project, *thematic analysis* has been applied to analyse the data, which is one of the most frequently adopted approaches for qualitative research (Bryman, 2012). It is a flexible method that can be applied within a broad range of research paradigms and essentially serves to identify, analyse and report themes, which embraces “some level of *patterned* response or meaning within the data set” (Braun & Clarke, 2006, p. 10 italics in original). As the name suggests, the identification of themes and subthemes is the centre of this approach (Ryan & Bernard, 2003). These emerging patterns are then used for analysis (Fereday & Muir-Cochrane, 2008). It is an iterative process (Fereday & Muir-Cochrane, 2008). Within thematic analysis there exists a difference between inductive and theoretical thematic analysis, where the prior aim is either, to code the data independent of previously defined themes (similar conception as in grounded theory), or to review the data based upon topics that may have emerged from the previous literature review (Braun & Clarke, 2006; Ryan & Bernard, 2003). In practice, a clear distinction between both is difficult to obtain, because the way a researcher looks at data will always be influenced by previous experiences and knowledge, which is constructed in a social context (Burr, 2003) and depends on the researcher’s values (Braun & Clarke, 2006). However, this is not a weakness of the model because it is impossible to look at the world from no perspective at all (Burr, 2003).

A further distinction outlined by Braun and Clarke (2006) concerns the nature of the themes, which may be either semantic or latent, where the prior focus was on those themes that explicitly emerge from the data, whereas the latter encompasses the underlying meaning of what is being expressed by those interviewed. Within this research, the focus lies in the detection of the underlying meaning of the collected data. So while the themes were initially

grouped according to semantic patterns, the following analysis explored the meaning underlying the themes. The details about the application of thematic analysis will be presented in the following sections. Braun and Clarke (2006) enumerate various grounds on which thematic analysis can be challenged. Beyond the question about scientific rigour, which all qualitative methods are subject to, they furthermore put attention on the risk of decontextualising data by establishing themes that are “unable to retain a sense of continuity and contradiction through any individual account, and these contradictions and inconsistencies across individual accounts may be revealing” (p. 27). Also, the authors argue that thematic analysis pays less attention to the use of language, which is – particularly in the context of the constructionist research paradigm – of vital importance. However, this depends upon the criteria upon which themes are structured. The focus of this analysis resides in the meaning that is constructed out of the interviews (Kvale, 2007).

4.3 Ethical Considerations

Throughout the scientific process, researchers are constantly obliged to evaluate between right and wrong (May, 2011) as-well-as good and bad (Rollin, 2006); these considerations are of an ethical nature (Smith, 2000). Maturana and Varela (1987, p. 247), emphasise the constituting role of language and argue that “every human act has an ethical meaning because it is an act of constitution of the human world. This linkage of human to human is, in the final analysis, the groundwork of all ethics as a reflection on the legitimacy of the presence of others.” While this is true in general, a researcher in particular must show ethical sensitivity when researching others.

In line with this, the separation into two overarching ethical categories as outlined by the Handbook of Principles and Procedures of the University of Gloucestershire Research Degree Committee (Committee, 2008) seems to be particularly suitable for this research:

The first category refers to ethical behaviour towards the broader academic community by adhering to agreed guidelines (Groves et al., 2009; Sales & Folkman, 2000) and standards

of good research, as described (in relation to trustworthiness) above. Specifically in a context where researchers are exposed to increasing external pressure in delivering results, the proactive consideration of these guidelines and standards becomes vitally important (Israel & Hay, 2006). Beyond the adherence to the agreed guidelines (Committee, 2008) further efforts to ensure good research practices have been outlined above (section 4.2.2).

The second overarching category refers to the consideration of others, in particular the research participants. The vast field of ethical considerations belonging to this group may be distinguished into four categories (Bryman, 2012):

- Doing no harm.
- Informed consent.
- Invasion of privacy.
- Deception.

The claim to *do no harm* as put forward by various scholars (Groves et al., 2009) solicits the researcher to carefully consider the impact research activities may have on others in terms of emotions, stress, personal development, self-esteem and general discomfort (Bryman, 2012). Based upon reflections on the research project in general, and on the in-depth, semi-structured interviews, later analysis and documentation in particular, no major issues relating to the integrity of the participants were anticipated. Beyond the assumption to do no harm, (Israel & Hay, 2006, p. 2) postulate that research should aim at “doing good”. Because of the constructive nature of language and the questions asked throughout the interview, inviting respondents to reflect on what contributes to their learning experiences, this research should indeed have a positive impact on them. Advocates of appreciative inquiry, a theory very close to social constructionism, argue that “human systems grow in the direction of what they persistently ask questions about” (Cooperrider & Whitney, 2005, loc. 728). Respondents were informed that they were not obligated to participate and that they may stop the interview at any time without justification or any negative consequences for them.

Through the intimacy that was established within the interviews, the respondents could have provided information that they would have later regretted (Kvale, 2007). To counteract this issue, participants were told that they may contact the researcher at any time after the interview to withdraw statements. Nevertheless, the information that emerged from the interviews was and still will be treated confidentially and anonymously, emphasising the aim to do no harm to the respondents.

Informed consent postulates that research participants should be provided with transparency about the research project, the time requirements, potential risks and benefits, so that they can freely decide whether they want to participate or not (Kvale, 2007; Seidman, 2013). However, especially in exploratory research, the explanation about the research project implies challenges, because it may bias the respondent and influence their answers. Therefore, within this context the respondents were informed that the interviews were part of a research project aiming to understand the learning process of people who work in the area of shovel maintenance within Komatsu; this is closely in line with the overarching research objectives. It would not have been of benefit explaining the role of CoPs in this context. Furthermore, they were asked whether their comments, while remaining anonymous and confidential could be included in the final dissertation; which all participants agreed to.

Regarding the *invasion of privacy*, it must be ensured that participants may choose which information they want to share. Also, whilst the interviews were recorded (agreed by all participants) and then transcribed, all information was and will be treated as confidential and anonymous (Bryman, 2012). They were informed about the project and the fact that any personal information from the interviews would not be shared in conversations with the organizational leaders, which they also agreed to. Those people that appear in pictures throughout this thesis were aware about the fact that these were taken and agreed that they may be included within this thesis. It was not anticipated to obtain information regarding illegal behaviour that may put the life of people or property in danger. However, if information

like this had emerged from the interviews the case would have been submitted to the University Ethics Committee to agree on how to move forward.

There are however, also potential issues in terms of invasion of privacy as Kvale (2007, loc. 808) points out: "Anonymity may serve as an alibi for the researcher in retaining the privilege of controlling and disseminating the information about the study." To reduce this risk all interviews were transcribed and could be made available, after eliminating all information that may lead to an understanding about personal information, (what King and Horrocks (2010) call anonymising the data), to those who may have a legitimate academic interest in the data. Seidman (2013) describes an ethical dilemma they faced in a research project, when a participant told them that he occasionally sold drugs on campus. While they had not anticipated information like this to emerge from the interview, they were ultimately faced with it and decided to stop the interview and eliminate the material to honour their promise of confidentiality.

Ultimately, it is regarded as unethical to *deceive* participants about the purpose of their participation (Bryman, 2012). As mentioned above, all participants were informed about the purpose of the research project. This research project is deeply committed to doing good and therefore not only considers the broader society, but explicitly emphasises the importance to do no harm to those individuals that participate in the research.

It may be concluded that ethical behaviour is ultimately always driven by the values of the researchers (Smith, 2000). Kvale (2007, loc. 831) synthesises the above in the following: "In the end, however, the integrity of the researcher – his or her knowledge, experience, honesty and fairness – is the decisive factor". Therefore, it is critical to be aware of these issues (May, 2011), proactively strives to follow agreed guidelines to minimise the respective risks (Groves et al., 2009) and show reflexivity when assessing research proposals for ethical standards (Israel & Hay, 2006).

4.4 Research Design

The following section presents the research design. Initially the objectives will be described. Following this, the criteria that were adopted for the selection of the participants and the medium of communication will be depicted. Then, the reasons behind the elaborated interview guide will be described, including considerations about the types of questions that were asked. In the following section reflections about the successful engagement of the respondents and a detailed description about the interview execution will be presented. Finally, the data analysis approach will be outlined.

4.4.1 The research objectives

As outlined in the introduction section, this thesis strives to understand the forms that CoPs take and their contribution to learning and knowledge sharing within a geographically dispersed organization in an emerging economy in Latin America, namely Chile. It is of particular interest to reveal insights about other factors that impede or support knowledge sharing between CoPs in the research setting. The overarching nature of this research is exploratory, aiming to revise existing CoP theory, in this particular and unique context.

The extensive literature review has already yielded a rich amount of insight about the research questions, which will necessarily influence the data generation and analysis phase. Beyond this, a pivotal aim of this research project consists in the generation and analysis of primary data in the research setting to provide a revised theoretical framework about CoPs in Chile. In line with this, semi-structured in-depth interviews with people who work on shovel maintenance in Komatsu Chile, with focus on the Calama region, were conducted.

The first line of enquiry was concerned with understanding how people learn when situated in their respective setting, starting from a CoP framework which regards learning as a socially situated process (Lave & Wenger, 1991). The participants were invited to reflect upon their learning as-well-as their contribution to the learning of others within the research setting. This not only served to validate the existence of CoP, but to furthermore understand

the forms they take within the geographically dispersed organization in general. Furthermore, it was intended to understand the extent to which they relate to people outside of their CoP, with the purpose of learning also the factors that contribute or impede them to do so.

In general, it was not desired to test existing theories, but rather to make participants talk from their frames of reference and to thus revise the existing theories based upon the meaning they construct.

4.4.2 Respondents

An important consideration about any social research project resides in the identification of the participants (Bryman, 2012). The main challenge regarding this is balancing the need to generate the fullest amount of in-depth data, while managing resource and time constraints (Seidman, 2013).

Quantitative research usually adopts probability sampling, defining the adequate sample size on mathematical parameters and objectives such as statistical power and confidence intervals (Groves et al., 2009; Guest, Bunce, & Johnson, 2006). Qualitative research applies purposive or opportunistic sampling, searching for participants who provide a rich amount of information about the phenomena under investigation (Curry et al., 2009). In this context Kvale (2007, loc 1115) postulates that the definition of sample size is easy: "Interview as many subjects as necessary to find out what you need to know". This is a simplistic statement, but it holds true in that the interviews should not be continued once theoretical saturation is attained, which refers to the stage when no new relevant information is obtained from the data (Bryman, 2012; Curry et al., 2009). The concept of saturation does not have a single operational definition and depends on the homogeneity of the participants, the complexity of the data and the domain of inquiry (Guest et al., 2006). There are no clear guidelines in defining when theoretical saturation is obtained. Curry et al. (2009) suggest that it could happen after 20 to 30 interviews, whilst Guest et al. (2006) argue that 6 to 12

interviews can lead to theoretical saturation. (Morse, 1995, p. 147) advocates that it is reached once “patterns of themes begin to make sense”. Rather than focusing on a number of participants, Seidman (2013) argues that “‘enough’ is an interactive reflection of every step of the interview process and different for each study and each researcher” (p. 58). Furthermore, each research project and each person interviewed is different and unique, owing to which, the researcher simply has to decide at which point enough data is generated to obtain the research objectives. However, at the beginning of the field work an initial decision about the sample-size has to be made, above all to plan the research gathering. Within this context, it was initially planned to interview 25 people. However, because of the generated data theoretical saturation was obtained after 22 interviews were conducted, including one pilot interview, within a time period of two months (Table 2). The interviews lasted an average of 50 minutes with a maximum of 70 and a minimum of 30 (interview time rounded to multiples of five).

As outlined before, mining sites located in the Calama region had been determined as the focus for this research project. However, the pilot interview was conducted with a person from Collahuasi, a mining site in the Iquique region, because of the opportunity to meet in Antofagasta. Furthermore, one participant was temporarily based in in the Calama region but considered himself to belong to Los Bronces, a mining site close to Santiago. Furthermore, several participants attended several mining sites throughout Chile and were also temporarily based in Chuquicamata. Whilst they belong to different regions, their interviews were considered useful to complement the data of those participants permanently situated in the Calama region.

CoPs are characterised by a community of people that share the same domain as-well-as practice and are held together by common values and mutual engagement in a joint enterprise, as elaborated in detail above (Wenger, 2011). They are however, not necessarily bound by levels of hierarchy, nor areas of expertise, within a practice. A manager and a line

worker, as-well-as an engineer and a mechanic, could thus theoretically belong to the same CoP. Therefore, the participants in the interviews were sought to cover different functions as-well-as hierarchies within the organization. This way the research questions about the forms that CoPs may take, their contribution to learning and knowledge sharing, as-well-as the exploration of relevant aspects that contribute or impede knowledge sharing between CoPs within a geographically dispersed organization in an emerging economy in Latin America, could be assessed. Furthermore, within CoP theory, and driven by the process of legitimate peripheral participation, it is acknowledged that newcomers and those at the center of the CoP are different; therefore it was also aimed to include old and new members within the study. Therefore this exploratory case study includes people who have been with Komatsu since its establishment in Chile 18 years ago, as-well-as people who have been with Komatsu for only one year. Ultimately, efforts were made to interview people who have worked in least two different mining sites as-well-as those who have only worked in one. From the interviewed, 14 have worked in more than one and eight in one site. Among the interviewed were a further six people who support multiple mining sites within Chile. The selection of these contributors obeys the valid suggestion that participants should have different perspectives on the research topic (King & Horrocks, 2010).

Participant ID	Mining Site	Job Title	Years with Komatsu	Has worked in multiple sites?	Interview location	Interview time
P-1	Radomiro Tomic	Shovel Trainer	7	Yes	Santiago	60
P-2	Radomiro Tomic	Shovel Specialist	5	No	Santiago	70
P-3	Collahuasi	Shovel Manager	18	Yes	Antofagasta	40
P-4	Multiple Sites	PSG Engenier	1	Yes	Santiago	55
P-5	Multiple Sites	PSG Engenier	3	Yes	Calama	65
P-6	Multiple Sites	Senior Specialist Shovels	18	Yes	Chuquicamata	40
P-7	Multiple Sites	Senior Specialist Shovels	12	Yes	Chuquicamata	45
P-8	Multiple Sites	Senior Specialist Shovels	13	Yes	Chuquicamata	45
P-9	Multiple Sites	Senior Engenier	6	Yes	Chuquicamata	55
P-10	Multiple Sites	National Shovel Manager	18	Yes	Chuquicamata	60
P-11	Minstro Hales	Planner	3	No	Calama	50
P-12	Minstro Hales	Mechanic	2	No	Calama	70
P-13	Mina Sur	Mechanic	7	No	Calama	40
P-14	Mina Sur	Planner	17	No	Calama	40
P-15	Mina Sur	Supervisor	3	No	Calama	65
P-16	Los Bronces	Shovel Specialist	18	Yes	Santiago	70
P-17	Chuquicamata	PSG Mechanic	6	Yes	Chuquicamata	35
P-18	Chuquicamata	PSG Engenier	2	Yes	Chuquicamata	50
P-19	Chuquicamata	Shovel Specialist	2	Yes	Chuquicamata	40
P-20	Chuquicamata	Shovel Specialist	2	Yes	Chuquicamata	40
P-21	Chuquicamata	Head of Operations	1	No	Chuquicamata	30
P-22	Chuquicamata	Mechanic	7	No	Chuquicamata	30

Table 2: Research participants

Considering the research objectives, the ethical considerations as-well-as the adopted selection criteria, these participants were selected based upon purposive sampling. The PSG manager, the national shovel manager as-well-as the respective site managers were asked to propose suitable candidates based upon the criteria outlined above. Throughout the fieldwork other potential candidates were identified by the researcher. Their participation was then discussed with their superior before engaging them in the interviews. The interviews were conducted in the Chuquicamata mining site, in the regional Komatsu office in Calama and in the national head office in Santiago. While conducting field work in Chuquicamata, the researcher got the chance to interview several people that work for several mining sites and were temporarily based there.

4.4.3 Medium of communication

There are different possibilities to consider when conducting interviews. Face-to-face interviews are deemed the best source to generate data (Opdenakker, 2006). They provide

the required conditions to establish a positive and constructive relation between the interviewer and respondents, which are claimed to be the most important aspects for qualitative interviews (Knox & Burkard, 2009).

The definition of the interview setting constitutes more than just a technical matter, as it can have important implications on the outcomes (Herzog, 2012). King and Horrocks (2010) point out that it may have a negative impact on the interview if the researcher sits on one side of the table and the respondents on the other, as this may awaken memories of job interviews or unpleasant conversations. They rather suggest sitting around the corner of a desk or on two loosely facing chairs, which constitute a more fruitful setting for the interview. Still, while these recommendations were taken into consideration for the interview, it is important to be cognisant that these alone will not help to overcome power asymmetries (Kvale, 2007). There are also practical aspects that may make adherence to the above suggestions unfeasible or awkward. Either way, it is vital to ensure that the respondents speak freely. Therefore a private space, where the conversation cannot be overheard by others, must be selected whenever possible (King & Horrocks, 2010). Therefore the meetings in Calama and Santiago were conducted in a private office, whilst the interviews in Chuquicamata and Antofagasta were indeed conducted with two loosely facing chairs in a private space, because of significant space restrictions in the mining site.

Because of the geographic distance to many of the respondents (Harris et al., 2008; King & Horrocks, 2010), it was initially thought that face-to-face interviews may have been complemented by phone or preferably Skype interviews (Seidman, 2013). While these alternatives are considered as second choice options, they could have provided a useful approach in generating data (King & Horrocks, 2010). Musselwhite, Cuff, McGregor, and King (2007) even argue that phone interviews may help to overcome disadvantages of face-to-face interviews, reducing interviewer bias and providing personal ease, because of psychological and physical distance in the light of highly personal answers. On some

occasions, where the respondents are very shy in nature, this may indeed be a benefit, however, in most occasions face-to-face situations are better suited to establish intimacy and generate a rich amount of detailed data.

A critical aspect of telephone interviews is establishing trust and openness between the interviewer and respondent, which may influence the authenticity and richness with which the phenomena are described (Knox & Burkard, 2009; Polkinghorne, 1994). The willingness to cooperate may also be lower with phone interviews (Musselwhite et al., 2007). This is because, during them, the adoption of interpersonal skills, such as facial expression and body language to encourage participation are not feasible, but instead relies solely on the tone of voice (Harris et al., 2008). During the phone interview it may also be difficult to grasp a rich amount of information, particularly tacit knowledge and to understand it within its social context (Dicicco-Bloom & Crabtree, 2006). Whilst the overall approach in phone interviews does not significantly change from face-to-face interviews (e.g. it also required an interview guide), it should be ensured that the respondents schedule sufficient time for the call and take them in a location where the conversation can be conducted without too many interruptions and in private (King & Horrocks, 2010). Otherwise the person interviewed may not be able to pay sufficient attention to the interview.

In spite of the potential benefits of using the phone or Skype, but also considering the significant associated challenges, all interviews were conducted in a face-to-face setting, which required several trips of the researcher to Calama and the Chuquicamata mining site.

4.4.4 Interview guide

Qualitative researchers usually refrain from elaborating highly specific research questions (Bryman, 2012). Exploratory interviews are especially open-ended, providing little structure and rely on probing and follow-up questions, to find new evidence about the research topic (Kvale, 2007). They aim to encourage “interviewees to talk about the subject within their own frames of reference” (May, 2011, p. 136). This enriches the quality of the responses and

gives the respondents space to include aspects beyond the directly asked questions, manifesting values, opinions and beliefs. Flexibility within the research interview is a pivotal aspect of such research (King & Horrocks, 2010).

Because of this, some are rather reluctant about the use of an interview guide as they fear that it may impede the natural development of an interview (Seidman, 2013). Others believe that they are very important to ensure that the most relevant themes are covered throughout the interview in the given time available (Dicicco-Bloom & Crabtree, 2006; Kvale, 2007). To ensure that the research questions would be adequately touched upon within the interviews it was decided to develop an interview guide for this research project. Still, the guide must leave room for what Kvale (2007) terms qualified naïvete, which can be understood as the “openness to new and unexpected phenomena” (loc. 480), based upon deliberate curiosity and sensitivity about what is being said and not said.

Rather than just formulating the interview questions, which should always be adapted according to the respondent, the interview guide should cover those topics that emerge out of the overall research questions and objectives (Bryman, 2012). The formulated questions should strive to make the respondents tell their stories and elaborate on how they make meaning of them (King & Horrocks, 2010). Throughout the interview the researcher should adopt an ample range of further questions, requesting follow-up, probing, specifying and interpreting to generate a rich amount of information (Kvale & Brinkmann, 2009), which will be further addressed in section 4.5.2.

Dicicco-Bloom and Crabtree (2006) point out that all semi-structured interviews should include the same basic research question for all and usually include five to ten further questions, which are then inquired into in more detail during the interview. However, while the topics of the interview guide should usually be covered throughout the interview, the particular questions were not asked as in a structured interview, but merely served as a guideline (Kvale, 2007). The first question should provide the focus of the research and be

as broad and open as possible, so that the respondents start talking (Dicicco-Bloom & Crabtree, 2006). Beyond the overall research questions King and Horrocks (2010) recommend to prepare probing questions, previous to the interview, for answers that may possibly emerge.

It is important that the questions not only comply with the research topics that need to be covered, but also comply with dynamic characteristics, which refers to the fact that the questions should “promote a positive interaction, keep the flow of the conversation going, and stimulate the subjects to talk about their experiences and feeling” (Kvale, 2007, loc. 1356)

Appendix 4 contains the interview guide that was adopted for this work. However, even though the most important aspects, as outlined in the interview guide, were covered, most of the time the researcher diverted significantly from the initially formulated questions in the interview guide, because the conversations generally led to do so.

4.4.5 Engagement of respondents

Before the interviews were conducted three criteria had to be considered regarding the engagement of the respondents (May, 2011):

First, it was important to gain access to the interviewee, which was a challenging task, as employees throughout Komatsu Chile are usually very busy and tied up in their daily routines. The short-listed respondents were contacted personally and asked if they were interested and willing to participate. In line with the second criteria for the engagement of respondents, the interview candidates were made aware of the interview objectives and the expectations of their participation. They were also informed about the fact that all interview outcomes would be treated as confidential and anonymous, emphasising the aim of the project to do good (Israel & Hay, 2006). Furthermore, they were informed that their participation was completely voluntary. Their refusal to participate would have no negative

consequences and their respective managers would not be informed. In total, six people refrained from participating. Upon agreement with the other candidates, the meeting time and location were defined (King & Horrocks, 2010). Many people that work in the mining sites of Komatsu Chile work seven days and then rest for seven days and so on. The interviews in Calama and Santiago were conducted during the time that the people were not working, so their motivation, the final important criteria, to participate was a key aspect (May, 2011). Knox and Burkard (2009) suggest that the motivation to participate may be because of the expectation of gaining something from the experience, encountering the interview itself as interesting and rewarding, validation of their personal experience and altruistic attitude in general. The interviews in Chuquicamata were conducted during the working period of the participants. It was challenging to free up time for the interviews and several interviews had to be postponed at short notice because of contingencies of the shovels that the interview partners had to attend.

4.4.6 Interview execution

Before the interviews were started some small talk was conducted, which is a typical custom in Chile, and according to personal experience of the researcher significantly more important than in other countries, such as Germany. The small talk also contributed to the establishment of the right atmosphere for the interviews and may have reduced the perception of power asymmetries.

Afterwards, the researcher presented himself and reiterated the ethical considerations outlined above, informed the participants about the research objectives, the fact that their participation was voluntary and that all answers provided would be treated anonymously and confidentially.

A digital recorder was used to record the interviews; this was agreed to by all respondents. Their use implies that the conversation and its outcomes stay conserved, which may cause unease for the interviewee (Bryman, 2012). Indeed, as King and Horrocks (2010) mention

this can give the interview a 'serious' character for the participants. During the pilot interview the respondent stated, upon being questioned about whether it could be recorded, "oh, so this is something serious then?" and started laughing. Even though he explicitly agreed that the conversation could be recorded, the researcher emphasised that the recording was solely done to facilitate the later analysis and to permit focus on the conversation rather than on the note-taking. However, to reduce the discomfort of the participants, an iPhone, which was used for the recording was generally placed discreetly on the table so that it would cause minimal distraction.

According to the interview guide some contextual questions were asked at the beginning of the interview. This not only served for the later analysis, but also contributed in making the respondents feel more comfortable, so that more profound questions could be asked later on (Dilley, 2000). Active listening was an important aspect throughout the interview, complemented by different types of follow up questions, such as the ones Kvale (2007, loc. 1400) suggests:

- Follow-up questions.
- Probing questions.
- Specifying questions.
- Direct questions.
- Indirect questions.
- Structuring questions.
- Silence.
- Interpreting questions.

Kvale (2007, loc. 1423) proposed the following linguistic forms in which the questions can be formulated to obtain a rich amount of information:

- Can you describe it to me?
- What happened?

- What did you do?
- How do you remember it?
- What did you experience?
- What did you feel about it?
- How was your emotional reaction to it?
- What do you think about it?
- How do you conceive of this issue?
- What is your opinion about what happened?
- How do you judge it today?

The focus was not put on making people remember but rather on reconstructing meaning, so instead of requesting “remember a moment” they were simply asked to “tell me about a moment” (Seidman, 2013).

As suggested by Kvale (2007) and in line with the research methodology, the researcher took notes during and after the interview to reflect upon the outcomes as-well-as on personal learning in terms of conducting the interviews. These findings were documented in the field notes and also contained observations about the participants (Bryman, 2012), such as body language and voice, which may provide a rich amount of evidence on behaviour and social clues (Opdenakker, 2006). Without personal field notes these impressions may have been difficult to reconstruct afterwards (Kvale & Brinkmann, 2009). To a certain extent, the field notes were already part of the analysis (Seidman, 2013)

The final step after the interviews consists of the transcriptions. This can be very time consuming and it is important to reflect whether it is really necessary to document every word or rather focus on certain aspects of the interview, which seem to be especially interesting (King & Horrocks, 2010). Seidman (2013), while sympathising with the time consuming nature of transcribing, argues that it is a vital task and transcribing all interviews

cannot be avoided. Supporting the latter position, all interviews were transcribed to facilitate the proper analysis and provide audit trails.

4.4.7 Data analysis

The analysis of semi-structured in-depth interviews can be regarded as a challenging task owing to the significant amount of unstructured narratives and impressions that are usually generated (Bryman, 2012). As explained above, thematic analysis was conducted to make sense of the data and respond to the overarching research questions. For the purpose of this project a three-stage process proposed by King and Horrocks (2010) was adopted, because it was considered particularly suitable in the described research context (Figure 15). This approach provides a clear guideline to conduct the analysis and furthermore complies with the criteria of trustworthiness outlined above.

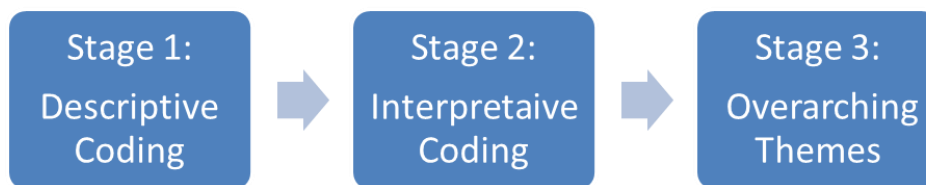


Figure 15: Thematic analysis according to (King & Horrocks, 2010)

In stage one the interview scripts were read through several times to get familiar with the data (Braun & Clarke, 2006), labelling those parts that seemed to be interesting for the research project (Seidman, 2013). Whilst a traditional approach in identifying and structuring themes may rely on highlighting the text with coloured pens, the software NVIVO was adopted to facilitate this process. The decision on what can be termed interesting depends on the researcher and is informed through the data as-well-as the existing theoretical understanding (Braun & Clarke, 2006; Ryan & Bernard, 2003). Braun and Clarke (2006) advise the researcher to create as many codes as possible, to keep some of the data close to the core of the theme to reduce the risk of 'context stripping', and to accept that codes

may be contradictory at the beginning. The nature of this research aims to understand meaning and experiences with reference to the respective context, which leads to the requirement that the themes should emerge out of the whole set of data, rather than isolated events (King & Horrocks, 2010). Passing through an iterative process between coding and reading, at the end of stage one a first level of 346 descriptive codes had emerged.

In the second stage these descriptive codes were clustered and then organised based upon the interpretation and meaning that emerged out of them. Whilst the initial stage was focused on the coding of semantic content, solely considering language, this stage embraced the data on the latent level, thus focused on underlying meaning structures (Braun & Clarke, 2006). Once this had been accomplished, the scripts and field notes were read again, to find further evidence that may feed into the interpretative codes. Ryan and Bernard (2003) propose a useful list of aspects that should be looked for to identify themes throughout the text:

- Repetitions.
- Indigenous typologies (local terminology).
- Metaphors and analogies.
- Transitions and similarities.
- Differences.
- Linguistic connectors.
- Missing data.

The outcomes of this phase may be termed sub-themes and their creation stems as much from the data as from the previous knowledge of the researcher (Ryan & Bernard, 2003). This led to a clustering into 30 interpretative codes.

In the third and final stage the interpretative codes were organised into three overarching themes, which can be understood as patterns that emerge out of the data and have relevance to the research topic (King & Horrocks, 2010).

While thematic analysis strives to structure the data, there is a tension between simplifying so that the meaning becomes clear, and oversimplifying, which may negatively influence the depth and richness of the data (King & Horrocks, 2010). Also, in spite of the proposed theoretical approach it is important to be cognisant that this was not a linear, unidirectional process, but that the analysis required constant “moving back and forward between the entire data set, the coded extracts of data (...), and the analysis of the data that you are producing” (Braun & Clarke, 2006, p. 15). However, the systematic adoption of these three stages permits the evaluation of the quality of the analysis afterwards, based upon auditable trails. It also served to provide answers to the outlined research questions and to thus elaborate a revised theoretical framework about CoPs in a geographical dispersed organization in Chile.

4.5 Reflections

Reflexivity is a vital aspect for qualitative research and requires sensitivity and understanding (King & Horrocks, 2010; Kvale, 2007). King and Horrocks (2010) differentiate between epistemological and personal reflexivity, where the prior requires reflective action about the underlying philosophical assumptions, whilst the latter refers to the critical assessment of the researcher’s “beliefs, interests, experiences and identities” (loc. 499) and how these influence the research. Because of the qualitative nature of this research, some reflections about this chapter will be described in the following sections.

4.5.1 Insider research

The research is conducted within the same organization the researcher works in, even though the focus of attention is in a different organizational and geographical setting. Whereas the researcher works in the national head office in Santiago as manager for the operational excellence unit of the company, which has been established in September 2012 and covers all areas of the organization, the research was carried out within the context of shovel maintenance in the Calama region. Nevertheless, the researcher may be attributed

with insider status, owning insights about the group in focus that others might not have (Greene, 2014). This includes the understanding of the challenges that the shovel maintenance business are subject to, because of increasing pressure from customers and competition. Brannick and Coghlan (2007) highlight the role of reflexivity particularly for insider researchers. There are multiple benefits of belonging to the organization, which is the subject of the study (Bonner & Tohurst, 2002; Breen, 2007), including a better understanding of the group's culture than outsiders, decreased inferences into the natural setting, higher intimacy between the researcher and the researched and the access to the participants. Whilst it is still necessary to gain the trust of the research participant, this is likely to happen faster than in the case of outsiders (Bonner & Tohurst, 2002; Brannick & Coghlan, 2007). Qualitative research aims to get closer to phenomena, a closeness that is pre-existing when studying the organization the researcher belongs to (Alvesson, 2003).

Some of the disadvantages include potential erroneous conclusions based on previously established knowledge and experience, as-well-as methodological and ethical issues that an outsider may not have to face (Breen, 2007). Therefore the establishment and ridged application of clear ethical guidelines as elaborated in section 4.3 has been important to overcome this potential disadvantage. As an insider the research participants may assume that the researcher already knows the answers, assuming shared knowledge and thus participates rather than observes (DeLyser, 2001). To be both a colleague and a researcher at the same time may imply personal differences and ethically difficult choices (DeLyser, 2001). Being an insider of an organization may facilitate access, but also impede access when it is, for example, attempted to research people higher up in the hierarchy (Brannick & Coghlan, 2007). For those lower down the hierarchy the researcher has to be careful in managing the inherent power asymmetries adequately, even though the researcher belongs to a corporate division, which does not have formal power within the organizational structure of shovel maintenance Throughout the interviews the objectives of the research have been highlighted to the participants, as already outlined in line with the ethical considerations in

section 4.3, to minimise this aspect. Numerous quotations throughout Chapter 5 clearly evidence that a relation of trust has been established between the researcher and interview participants, maintaining the impact of potential power asymmetries to a minimum.

Furthermore, not knowing about the culture and people may also be an advantage, because it may make the participants feel that they have to share more information than if they talked to an insider. Potentially this also makes the researcher more receptive to what actually happens with a more 'objective perspective' (Bonner & Tohurst, 2002). Being an outsider also inherits the "benefit of avoiding the imposition of meaning on any verbal or non-verbal discourse owing to an overall unknown environment" (Bonner & Tohurst, 2002, p. 13).

Breen (2007) suggests that insider and outsider positions are two opposites of a continuum and that a research moves along this band. In this research context the researcher belongs to the same organization, and is therefore an insider. However, the researcher works in a different context and is also German, thus an outsider as well. It is important to be sensitive for the tensions that may arise out of this position. Insider research in general seems to be becoming more popular, particularly in the context of part-time doctoral programs (Brannick & Coghlan, 2007; Greene, 2014) such as the DBA. However, it is difficult to find DBA dissertations that include reflections about the impact of being an insider.

For this research the partial insider and outsider status of the researcher has been enriching for the project. In general, the status of an insider, because the researcher belongs to the same organization Komatsu Chile, provided sufficient understanding of the respective context and facilitated access to the interview participants. On the other hand, the partial outsider status, because the research is German and works in a different location, incentivised the interview participants to talk about the research topic in their particular context in detail and furthermore allowed the researcher to reduce the imposition of meaning (Bonner & Tohurst, 2002), because of too much contextual knowledge.

4.5.2 Required skills

A necessary requirement to conduct good research consists in having the required skills to do so. First of all, it may be claimed that a researcher needs the skills to document and present a research project, which requires, among other things, the solid command of the academic language (Bryman, 2012). This becomes particularly important when the adopted language is different from the researcher's native tongue. Language skills are furthermore important for the execution and analysis of interviews. The researcher must be capable of grasping a rich amount of information, both tacitly and explicitly, and understand it within its social context (Dicicco-Bloom & Crabtree, 2006). Regarding the latter the researcher must be adaptive to cultural differences and be able to gain the trust and confidence of others (Arieli et al., 2009) and manage conflicts and ethical tensions (Smith, 2000). These are some of the most important skills and it is worth acknowledging that they cannot necessarily be taught, but are acquired and enhanced by performing research (May, 2011) and engaging in dialogue with other researchers in the wider academic community (Lave & Wenger, 1991), which has been done in different occasions and together with the DBA supervisors.

Another important requirement within this context is having the skills to conduct a qualitative interview. Bryman (2012, p. 475) based upon Kvale (1996) enumerates the following skills that an interviewer should acquire in order to conduct good interviews:

- **Knowledgeable:** is thoroughly familiar with the focus of the interview.
- **Structuring:** gives purpose for the interview; rounds it off; asks whether the interviewee has questions.
- **Clear:** asks simple, easy, short questions; no jargon.
- **Gentle:** lets people finish; gives them time to think; tolerates pauses.
- **Sensitive:** listens attentively to what is said and how it is said, is empathetic in dealing with the interviewee.
- **Open:** responds to what is important to the interviewee and is flexible.

- **Steering:** knows what he or she wants to find out.
- **Critical:** is prepared to challenge what is said – for example, dealing with inconsistencies in interviewees' replies.
- **Remembering:** relates what is said to what has previously been said.
- **Interpreting:** clarifies and extends meanings of interviewees' statement, but without imposing on them.
- **Balanced:** does not talk too much, which may make the interviewee passive, and does not talk too little, which may result in them feeling he or she is not talking along the right lines.
- **Ethically sensitive:** is sensitive to the ethical dimensions of interviewing, ensuring the interviewee appreciates what the research is about, its purpose, and that his or her answers will be treated confidentially.

Listening is another essential component of interviewing, consisting of an “active mental consideration of both the content (words) and context (emotions) of what is being said, and not being said” (Dilley, 2000, p. 134). To be a good listener is argued to be the most important skill in this regard, which according to Seidman (2013) needs the interviewer to consider three levels: first, the researcher must listen to what the participants says. Second, try to listen to what the respondent is really trying to say. If they talk about challenges they may actually really refer to problems. Third, but no less important, is to listen and make sure that focus is kept (King & Horrocks, 2010). A fundamental aspect of good listening is to be able to permit silence and to resist the desire to talk. Taking notes, even though the interview is recorded, can support active listening (Seidman, 2013), which has been done for all interview. There may be a latent risk that those interviewed answer questions according to culturally established norms, saying what they believe the researcher wants to hear, rather than about their genuine experiences. To mitigate this risk the researcher should be able to establish a trusting and close relationship with those interviewed (Alvesson, 2003).

In summary, conducting a research project in general, and good interviewing in particular, relies on tacit knowledge (Dilley, 2000). The researcher has conducted many interviews throughout his professional career and can therefore be considered a good interviewer.

4.5.3 Spanish language

Whilst this research is written in English, all interviews were conducted in Spanish. The researcher is German, but has lived for nearly nine years in Chile and therefore grasps the language as-well-as the cultural contexts, which is considered an important requirement for this type of research (Dilley, 2000). However, Spanish varies significantly between the different countries where it is spoken. This difference concerns not only pronunciation, but also the words and phrases used, particularly the meanings attached to them. This is owing to the fact that language is a central aspect of meaning making, a process that varies among different social and cultural contexts (Berger & Luckmann, 1991; Burr, 2003). A difficulty that has arisen out of this fact relates to the translation from Spanish into English. Because of the Chilean idiosyncrasies it is impossible to accurately translate all words into English, because the meaning attached to them is different. As an example, amongst men they frequently call each other 'huevón', a word that according to Google Translate has no direct translation to English (as of 19 February 2015). This word is contextually offensive, implying laziness, lacking intellect, cleverness and sensitivity. However, depending on the context it may well be used among friends to express a high level of trust and empathy to each other. It can also be used in a relaxed context as a generalised term for any male. Nevertheless, depending on the context it can also be highly offensive. This is just one of many cases, where text translation into English may negatively influence the understanding of the associated meanings. The comprehension of the meaning associated with this is highly tacit and depends on the understanding of the researcher. This is not a weakness however, but a pivotal aspect within the adopted research paradigm (Burr, 2003). Therefore, the emphasis of this study does not reside in the text translations but lays emphasis on the meanings that

the words and phrases carry with them. This does not imply that phrases were changed completely, but in those cases where the researcher regarded a translation as misleading, words to more adequately represent the underlying meaning structures were used. This is only possible because the researcher has been immersed for nearly nine years within Chile. He is therefore more sensitive to understanding underlying meanings that may not reveal themselves for people that do not live there.

Chapter 5. Research Findings and Analysis

This chapter summarises the research findings and corresponding analysis that have emerged out of the fieldwork described in the preceding chapter. These results support several aspects of existing CoP theory in the context of a geographically dispersed organization in Chile. In addition, they also provide new evidence about the form that CoPs can take, as-well-as about their contribution to learning and knowledge sharing, which will be discussed below. Through an iterative process of conducting interviews, reflecting and taking field notes, together with an iterative process of data coding, clustering and structuring, three predominant themes have emerged. These provide answers to the outlined research questions and constitute the basis for a revised theoretical framework for CoPs that will be presented in the final chapter of this thesis.

- Hierarchic network of CoPs.
- Boundary processes within the hierarchic network of CoPs.
- Context specific aspects of Chile.

Initially, the form that CoPs take within the research context will be presented based upon the previously elaborated theoretical framework. Afterwards, it will be discussed when and how these support knowledge sharing and learning within the research context. This is argued to depend on the quality of the boundary processes. Then, some evidence about context specific aspects of CoPs in Chile will be described.

The research findings will be underpinned by illustrative quotations that have been captured throughout the interviews. After each citation, reference is made to the ID of the person who made the statement (see Table 1 in section 4.4.2.) as-well-as the CoPs they are associated with. As aforementioned, the interviews were conducted in Spanish and the researcher made the best effort in translating these as close as possible into English, with particular emphasis on not losing any relevant parts that could compromise the understanding of the

meaning making process of those interviewed. The quotations will be depicted in italics to differentiate them from interpretations of the author.

5.1 Hierarchic Network of CoPs

The field work and analysis have led to an understanding of CoPs as sometimes consisting of a network of hierarchically interconnected CoPs, which are differentiated from each other because of *CoP Alterity*, but held together by *CoP Glue*, which is materialised in an abstraction, that is known throughout the network and reified with meaning.

This is a new conceptualisation which extends beyond current CoP theory, particularly by arguing that CoPs can take different forms within the same organization, depending on their position in the overarching network. Furthermore, it also differs from theories about networks of practice (Brown & Duguid, 2001b), which are stated to consist in “closely affiliated CoPs” (Tallman & Chacar, 2011, p. 279) held together by a common practice, because it suggests a hierarchic relationship of these CoPs bound together through *CoP Glue*.

In the following section the idea of *CoP Glue*, which holds together the network of CoPs, will be illustrated based on the conceptualisation of ‘Paleros’, which is the Spanish equivalent to ‘Shovelers’. Afterwards it will be explained why there are multiple CoPs rather than one overarching CoP. This idea has been presented as a viable alternative founded on the later work of Wenger et al. (2002), but this research takes it further, arguing that the concept *CoP Alterity* constitutes the distinction between the respective CoPs. Afterwards the four different types of CoPs identified within the research process will be presented:

- Operational CoP.
- Specialist CoP.
- Senior Specialist CoP.
- Disconnected CoP – the case of PSG.

5.1.1 'Paleros' as CoP Glue

Identity is as a vital aspect within CoP and learning theory (Wenger, 2011; Wenger et al., 2011), which is socially and locally constructed (Cox, 2005). It emerges out of the negotiation of meaning, which is based upon the interplay between reification and participation (Wenger, 1998). Learning “doesn’t just involve the acquisition of facts about the world, it also involves acquiring the ability to act in the world in socially accepted ways” (Brown & Duguid, 2001b, p. 200). In an initial conversation with a widely accepted authority within the mining industry in Chile in general, and in the context of shovel operations within Komatsu Chile in particular, the person argued the following:

“If you ask a mechanic that works with dump trucks about his job, he will tell you that he is mechanic. However, if you ask a mechanic that works with shovels he will answer the same question stating that he is a ‘Palero’.” (P-10, Senior Specialist CoP)

Whilst it has been argued that different CoPs can be tied together by interconnected practices (Gherardi & Nicolini, 2002), this statement led to the idea that CoPs can be furthermore connected through a commonly recognisable abstraction, *CoP Glue*, which materialises in the concept ‘Paleros’ and is reified with meaning. The existence of and meaning associated with the abstraction of ‘Paleros’ became evident throughout the interviews:

“Yes, yes... there are many who say: no [I am not a mechanic], I am ‘Palero.’” (P-17, Operational CoP)

“When people start working with shovels, they immediately feel part of something different, something special.” (P-16, Specialist CoP)

However, to be ‘Palero’ is not to be understood as a clearly delimited status and even less as a job description, but rather to a certain extent, an idealised conceptualisation that people are more likely to attain, the longer they have been working within the context of shovel

operations. This conceptualisation does nevertheless constitute a socially constructed reality (Burr, 2003) rather than solely an idea. Nevertheless, the principal aspects of this abstraction revolve around the overarching practice, which consists in the shovels that people work on.

“What we have in common is that we work on shovels.” (P-8, Senior Specialist CoP)

As will be addressed in the next section, the way people make meaning of the abstractions ‘Paleros’ (*CoP Glue*) varies. However, those situated in the hierarchically superior CoPs exercise their power and have more influence in associating meaning to *CoP Glue*.

5.1.1.1 Affection

Beyond the sole fact that the shovel presents the object and focus of work, ‘Paleros’ are characterised by a close personal relationship to them. When they talk about shovels they talk about the value-laden object that has a deep personal meaning to them.

“In one occasion I talked to a lad... he was like that he would die for the shovel, or let’s say, for him the shovel was everything and he identified with the shovel and that the machine was good. The shovel provides you with food to eat so they defend it a lot.” (P-17, Operational CoP)

“You must like the shovel. There are people who like the shovels and others who don’t give a damn about shovels.” (P-20, Specialist CoP)

“I believe that the affection for the shovel is one of key aspects of Guillermo [as recognised expert in shovel maintenance]. I think he is a clear example to follow for many other people.” (P-1, Specialist CoP)

As much as the affection for the shovel is an inclusion criterion, those that have no personal affect for the shovel are regarded as outsiders:

“The problem of the people is many times, I think, that they are not fascinated, not enchanted with the shovel.” (P-6, Senior Specialist CoP)

“He told us that he didn’t like the shovel, so he had a negative presupposition for working. Above all that’s it (the reason why he left the group).” (P-2, Specialist CoP)

Some, on the other hand, have a deep emotional relation to the shovel:

“I am very emotional, maybe I want more but also I don’t have the support and this frustrates me... one must be careful with the passion, one must learn to control. One must put the foot on the brake, you know, the age that I have... I must be a little bit more relaxed. My body is not the same as it was before. My body is older now.” (P-6, Senior Specialist CoP)

This emotion can also manifest itself in passion that people express when talking about those they consider ‘Paleros’:

“The other day you saw that youngster who was at the shovel with us, this kid will definitely be a ‘Palero’ one day, because of his passion. He drives with us to the shovel in his truck and is happy (...). Because he really likes to work like this, I just say... he likes it”. (P-16, Specialist CoP)

“When we start the engine of a new shovel and it starts moving it feels like an orgasm, or let’s say a delicious sensation, it feels good... like seeing the birth of a child.” (P-6, Senior Specialist CoP)

The senior specialists come to work and want to go to the shovel right away. It seems as if they were missing it during their absence. (Field Note 14th of October)

5.1.1.2 Commitment

The affect for the shovel is materialised through the commitment that ‘Paleros’ have to their work in general and the shovel in particular:

“There is nothing worse for a specialist when they cannot fix the machine.” (P-10, Senior Specialist CoP)

There are those who are always connected to the shovel, even in their free time, day or night. They always know the status of the operation:

“When I cannot answer the phone I return the call later. I never during the 24 hours of the day or even during vacation turn off my phone. I am always available for calls, even at 2 or 3 at night. I tell them, ‘You know what, give me a moment, I will go get my computer and help you with the plans’.” (P-7, Senior Specialist CoP)

“Yes, through email you know everything. We receive everything through email so one reviews one’s emails regarding flights, hotel, taxi... and therefore one never disconnects from the shovel.” (P-20, Specialist CoP)

“I receive daily reports by email and check them daily, even during my rest. So when I get back to the site I already have an idea of what has been done.” (P-12, Operational CoP entering Specialist CoP)

Commitment is in general highly valued among ‘Paleros’.

“That the people are committed, this means people do a good job when they are committed, committed with their thing.” (P-13, Operational CoP)

5.1.1.3 Hands-on

A pivotal aspect for who that are regarded as ‘Paleros’ consists in the way they work. A picture has clearly emerged of them as people who work hands-on. Unless you are willing to ‘put your hands on iron’ or ‘get your hands dirty’ you will not be accepted as a ‘Palero’. A person belonging to PSG, who was claimed by others to spend too much time in the office and only goes to the shovel when pushed, complained about the following:

“For example when there is some relevant defect and one makes a report about this defect and afterwards you receive feedback in a mail saying, I don’t know... ‘hey, thanks for the report’, then one feels that he is doing a good job, right? But many times this does not happen. One does a work, right, writes the report, sends it and

does not receive any comment, not even 'you made a mistake here'... no feedback at all." (P-18, PSG CoP)

On the other hand those that 'get their hands dirty' enjoy a better reputation and are more likely to attain the status of 'Palero'.

"You have to do it and this boy digs his head inside the machine and tries to change some parts. This lad really wants to work, but other people who don't like it say 'no, first you have to wash this part of the machine and bring me an assistant', 'I need a special tool' or maybe, 'my back hurts'. Excuses will never lack for those that do not want to do the job." (P-7, Senior Specialist CoP)

"I was mechanical assistant, actually I washed the shovel. One of my functions was to clean the oil... this is how I started." (P-16, Specialist CoP)

This understanding was reinforced when two of those interviewed made the following comments about another person from PSG:

"This lad wants to learn, he is interested to learn, he goes to the shovel (...). I feel that this lad is more motivated than the others of PSG, he gets involved with the shovel therefore this youngster is learning." (P-6, Senior Specialist CoP)

"This lad started working hands on and the perception changed right away." (P-16, Specialist CoP)



Picture 2: Komatsu facilities in the mining site of Chuquicamata.

The pivotal criterion is not however, that the people work hands-on on a daily basis, but rather that they have done so for at least a time in the past:

“(P-10, Senior Specialist CoP) is a manager now, but he used to work hands on at the shovel... he knows a lot.” (P-16, Specialist CoP)

‘Paleros’ are also recognisable based upon the clothes they wear. While PSG does not actually wear suits, an experienced shovel mechanic argued (owing to the fact that many of them do not really do the dirty work on-site) the following:

“I would give the PSG more overalls, clothes to work and less suits.” (P-16, Specialist CoP)

“They are intelligent people, study a lot... they have all my respect. But not hands-on, well there are some, but in general the truth is that even though they know a lot, regarding manual skills they are not good.” (P-16, Specialist CoP)

5.1.1.4 Pride

The conceptualisation of ‘Palero’ is also connected with a lot of pride for their profession:

“Therefore I feel proud about what I am doing.” (P-7, Senior Specialist CoP)

“Being a ‘Palero’ has to do with pride.” (P-15, Operational CoP)

This goes with the importance of the machine for the shovel operation on the one hand and the widely recognised lack of trained people on the other. Those working with experience on shovels may be regarded as a minority.

“I believe that precisely because of the shovel, for the pressure one works with day by day. If suddenly the shovel stops, then the whole production stops. Two or three dump trucks can stop, but when the shovel stops then there is no production. Therefore I believe that the shovel gives you a plus, that makes you different from the rest. It has a better reputation as I personally believe.” (P-19, Specialist CoP)

“You can have 100 dump trucks, but the shovel in a certain way is much more impressive, regarding the production, so it gives you a plus. There are also not many ‘Paleros’. You will hardly find a ‘Palero’ in the streets... so it gives you more status and importance to work with shovels.” (P-11, Operational CoP)

“A mechanic working on shovels must be better than a mechanic working on dump trucks.” (P-8, Senior Specialist CoP)

“Palero means to be proud, because it is the most critical machine in the mining site.” (P-21, Operational CoP)

When ‘Paleros’ talk with people who do not work on shovels, they may make jokes, which are however likely to hold an important amount of truth within their meaning making process.

“Your trucks are boring, really boring your trucks.” (P-8, Senior Specialist CoP)

Those that work on shovels feel special:

“As a different group, we are something special within Komatsu.” (P-16, Specialist CoP)

“The shovel is not an easy product. There are only a few people that know about shovels. So when they ask somebody ‘hey, what is it you are working on?’ they say ‘I am ‘Palero’”. They like to say that or maybe they say it because it makes you feel bigger or more special. Saying that you are a ‘Palero’ gives you more prestige within the mining industry.” (P-18, PSG CoP)

One of those interviewed told the story about a colleague who was offered to work on shovels, but he would have to move to another site and would not receive any extra money, why he had accepted the offer. The person answered:

“Because of the shovels, man.” (P-11, Operational CoP)

5.1.1.5 Toughness

Because of the size of shovels, they cannot be taken to a workshop for maintenance but have to be attended in the field. This necessarily implies dealing with diverse climatic and geographical conditions, a situation that those working on dump trucks, which are generally attended within the workshops, are not subjected to. This forces the understanding of 'Paleros' as tough.

"To be a 'Palero' means to have mental and physical strength. You must face very adverse climatic conditions to attend a shovel at 4,000 metres above sea level at temperatures below 0°C, working day and night." (P-3, Senior Specialist CoP)

"When we had to do a job or maintenance, with snow, white wind and -30°C we still did the job." (P-7, Senior Specialist CoP)

"You are in the field, very cold or often very hot. You are not close to the workshop and suffer hunger." (P-6, Senior Specialist CoP)

"You must be able, as they say everywhere and it is the truth, you must be able to work in very hostile environment, not only because of the requirements but also from a geographical perspective." (P-10, Senior Specialist CoP)

"No 'Palero' works below a roof; we don't know what it is like to work below a roof." (P-16, Specialist CoP)

"It's a totally different world. You are alone far away from your family, work at night, work during the day with strong sunshine and dust." (P-6, Senior Specialist CoP)

Those that do not manage to deal with these conditions are not regarded as 'Paleros'.

"Many people arrive and all they do is complain that we are in the field, they complain about the chemical bathroom, (...) but you have to endure (...) the dust here in Chuqui, in Los Bronces the snow and ice, but those who like the shovels overcome this." (P-16, Specialist CoP)

Therefore 'Paleros' have a feeling that they are potentially superior to others, because they manage to endure such diverse conditions:

"Those who say they are 'Paleros', I don't know, without disparaging the other lads, it's like saying: I am a man, because I work with bigger tools, I don't know, I am stronger and independent, while you are a little girl." (P-12, Operational CoP entering Specialist CoP)

"Paleros' are tough (...) a little time ago when the Chuqi [abbreviation for Chuquicamata] contract ended mechanics [who worked on dump trucks] came from there to Mina Sur (...) but the truth is that even though many came, all said no, they received their severance payments and left. Only two or three accepted." (P-11, Operational CoP)



Picture 3: The Chuquicamata mining pit illustrates the rough environment.

5.1.1.6 Experience

When a person that has been working for a relatively short time with shovels based upon conversations with others already enjoys a positive reputation within the domain of shovel maintenance was asked whether he felt like a 'Palero', he rejected the suggestion:

"No because... let's say... for me a 'Palero' must have a lot of experience." (P-17, Operational CoP)

So beyond the characterisations outlined above, experience is clearly a criterion for being considered 'Palero', which however, necessarily implies to compliance with the conditions described above for an extended amount of time.

“When I was mechanic, you regard mechanics who work on shovels as people with a lot of experience. When you work on shovels you know what’s up.” (P-11, Operational CoP)

“A person working with shovels must be more hybrid.” (P-1, Specialist CoP)

“A ‘Palero’ is a lad with many years of experience and a lot of knowledge.” (P-20, Specialist CoP)

“The first two or three years you only gather experience.” (P-4, PSG CoP)

“I think that with five years’ experience mechanics start to see the way I do. But a mechanic that has been here only two years sees things totally different, more catastrophic. When they see an oil leak they believe that the world is ending. For me it’s only an oil leak, because I am already used to seeing this.” (P-16, Specialist CoP)

Beyond these outlined characteristics ‘Paleros’ can be very diverse in terms of knowledge, profession and character:

“Many conditions in the field and also personal conditions, the people frequently don’t have the same character and mood, sometimes drawn back, more tired. Being ‘Palero’ is quite nice and simultaneously very exhausting.” (P-6, Senior Specialist CoP)

However, to be ‘Palero’ is not bound to a clearly defined practice for its own sake, nor does it clearly outline the community and domain. Thus ‘Paleros’ cannot be regarded as a CoP or NoP for its own sake, but constitutes the reified abstraction within the network of CoPs, which holds them together (CoP Glue).

The associated meaning could be summarised as falling under three headings:

- Identity with the object of work
- Perceived virtues
- Knowledge

CoP Glue is born from a strong identity and knowledge about the object of work accompanied by recognized virtues. These act as glue, because of their desirability, aspirational nature and exclusivity from others. It is special because it has to be bestowed by others, more than claimed by individuals. In spite of the fact that the characteristics of the CoPs that belong to the overarching network vary, CoP Glue is a mechanism that holds them together.

5.1.2 Boundaries informed by CoP Alterity

The preceding argument, the data generated and the subsequent analysis have revealed the existence of multiple CoPs within the research context, glued together through an overarching identity of 'Paleros' to a greater or lesser extent. In the following it will be shown that there are indeed different CoPs, which are marked by boundaries that are informed through the concept of *CoP Alterity*.

In line with the initial conceptualisation of CoPs (Lave & Wenger, 1991) those people belonging to the same profession and working in a similar context may be regarded as one CoP, united by a common domain, practice and community. However, the theory of *CoP Alterity* argues that these criteria are not sufficient to regard a group of people working in shovel maintenance within the same company in Chile solely as one CoP. "Different communities of practice have different standards, different ideas of what is significant, different priorities, and different evaluating criteria" (Brown & Duguid, 1998, p. 35). This is because the practice people engage in as-well-as the aspects of domain and community vary. To delimit one CoP from another they will be assessed according to the predominant criteria in terms of practice, community and domain, which have been established within the literature review above.

Domain	Identity as "Palero"
	Purpose
	Values
Practice	Routines
	Knowledge
	Learning Space
	Learning Outcomes
	Learning Process
Community	Membership
	Relationships

Table 3: Dimensions of *CoP Alterity* within Komatsu Chile.

The results of this assessment, which have led to the identification of four types of CoPs within the research context:

- Operational CoP.
- Specialist CoP.
- Senior Specialist CoP.
- Disconnected CoP – the case of PSG.

To a certain extent these CoPs are also supported by the respective organizational structures. However, the work area and job title are not the dominant exclusion or inclusion criteria for their own sake, because there are people, who despite their organizational context, belong to a different CoP. Generally, those people that move upwards within the

context of shovel maintenance will first join the higher CoP before they may be entitled with the respective formal job description.

5.1.2.1 Operational CoP

Founded upon the criteria of *CoP Alterity* depicted above, the predominant type of CoP that has been identified within the research context is titled Operational CoPs, which exist in each mining site and may or may not span across different shifts.

PRACTICE

In terms of learning these are most likely linked to the classic idea of learning as initially described by Lave and Wenger (1991), attributed to learning of craft work, which despite its complexity, generally constitutes familiar problems (Blackler & Regan, 2009):

“The major part of the maintenance and repair does not have much complexity to execute. I know how to do it, the old mechanic knows how to do it and maybe even the welder who has been with us four years knows how to do it. (...) Maybe with one failure a specialist would have needed thirty minutes to solve it and we needed two hours.” (P-15, Operational CoP)

This type of learning is most likely to be associated with *assimilative* learning, because people that enter these CoPs may have no, or very limited knowledge about shovel maintenance and learn their practice through legitimate peripheral participation at the shovel:

“I was observing the works being done, watched the electrician reviewing the plans and components, how he analysed the failures. I observed how the lads changed the hoses depending on the system. These are not such technical things.” (P-12, Operational CoP entering Specialist CoP)

“You learn observing what the others are doing.” (P-19, Specialist CoP)

“When I started I always observed the lads, what they were doing and how.” (P-15, Operational CoP)



Picture 4: Legitimate peripheral participation at the shovel.

These experiences are manifested in operational routines, which incorporate procedural and tacit knowledge (M. D. Cohen & Bacdayan, 1994) and present relatively stable patterns of actions (Feldman, 2000; Feldman & Pentland, 2003). The experience is embedded in practice and in repetition of tasks, which make the Operational CoPs particularly valuable for regular maintenance tasks:

“Assume that I had two options to do maintenance of a shovel, a group of only specialists or a group of good mechanics, I surely would choose the mechanics (...) because if I chose the specialists to do only the maintenance, this maybe would not make much sense to them or maybe they will not do a good job because they don’t

have the experience in doing these tasks (...).The operational groups are for these kind of things, specialists deal with the headaches.” (P-8, Senior Specialist CoP)

“Frequently there are everyday problems, which the specialist maybe does not know how to solve, but the mechanic does.” (P-2, Specialist CoP)

“There is a level of mechanics who are just involved in their routines.” (P-8, Specialist CoP)

This learning includes a lot of tacit, expert knowledge, which those that are not in the proximity of the shovels and the operation cannot attain:

“We are at the pulse of the shovel, those that are at the machine every day and moment. We manage the machine here in our hands. Therefore we know, we feel the machine.” (P-13, Operational CoP)

“The mechanics on-site know the machine. When I arrive at a site and don’t know the machine, don’t know its history... man, sometimes the mechanics give you some information.” (P-6, Senior Specialist CoP)

“Yes, I did courses and all that stuff. Within the courses they give you some tips about shovel maintenance and all that, but ultimately I believe that 80% of what you learn regarding shovel maintenance you learn at the shovel.” (P-8, Senior Specialist CoP)

Within their learning process they defer from the canonical practices which are imposed by the organization and may adopt practices that help to solve the problem but do not attend the causes of the failure. At times this happens when people bypass the points that send signals to the computer of the shovel indicating an error, which stops it from working. While this makes the shovel operate again, therefore complying with the short-term goal, it does not solve the cause and will ultimately results in a major defect.

“The lads learn the bad way... somebody told them to do things like this, they make their conclusions and do it. They think that what they are doing is good, but actually it is not. Still, they get the job done, but not according to the adequate processes.” (P-20, Specialist CoP)

There are also examples of how people cope with the lack of adequate tools by creating their own tools or work around, which are termed ‘machinas’. However, in the reviewed cases it became evident that the adequate tools actually existed, but that the Operational CoP did not know about them. This may lead to an understanding that their learning is based upon single loops, rather than in questioning underlying assumptions (Argyris, 1976, 1977; Argyris & Schön, 1996):

“We have been told that all tools that we use need to be certified, but for some work we need ‘machinas’ I am not sure if you know the concepts. It is a way to get things done but not officially accepted. How do you otherwise want to get the work done?” (P-15, Operational CoP)

“There are people who don’t do things according to the manual, but according to the Chilean way... this is to say just any way it works.” (P-5, PSG CoP)

The focus on hands-on work is what really matters to these CoPs, who privilege practical knowledge over theoretical understanding:

“If I have to read something specific, I search it and know where to find it. To learn every day and study, no, no I don’t study every day (...). There are people who study every day, really, study every day; I don’t.” (P-17, Operational CoP)

“At the shovel you really learn. Of course, when you go to courses you get knowledge about the shovel, but that knowledge is theoretical, but it needs to be applied in practice and this is where you need other concepts.” (P-13, Operational CoP)

“Theoretically you can have a lot of knowledge, but what really matters is practice, what is being done in practice, but always based upon the manuals, the theoretical step-by-step knowledge.” (P-19, Specialist CoP)

While this may not be attributed to all Operational CoPs, there remains the question, to what extent do deviations from expected outcomes truly trigger inquiry and thus the learning (Elkjaer, 2009)? This is different from other communities that are focused on finding root causes and a better understanding of the problem.

“To a certain extent they have a simple vision of a job well done. They also don’t want the same defect to happen again or that the defect lasts for a very long time. This is what they base their judgement of a good job upon.” (P-2, Specialist CoP)

As indicated above, their learning may be regarded as single-loop-learning, where repetitions improve performance without significantly deviating from the adopted operational routines (Argyris, 1976, 1977; Argyris & Schön, 1996). This constitutes a pivotal criterion of differentiation between Operational CoPs and others within the organization.

COMMUNITY

Whilst some claim that CoPs are “group(s) based on practice not locality” (Cox, 2005, p. 10), this research provides evidence that Operational CoPs are bounded by geographic proximity, which is a pivotal criteria to join these CoPs. This is reinforced because each mining sites, where shovels are maintained, hosts their own CoPs:

“Among the sites are different communities.” (P-3, Senior Specialist CoP)

“Of course, I believe there are [different communities].” (P-16, Specialist CoP)

These communities are also delimited because of the organizational proximity. It constitutes a finding that Operational CoP do not seem to embrace functions that lack organizational proximity like planning or engineering, even though, from an organizational standpoint, this would surely epitomize a desired situation.

“They are not united. You can see this in all the mining sites. Operations always criticize planning and planning criticizes operations.” (P-5, PSG CoP)

“We are more committed than the mechanics.” (P-11, Operational CoP)

“They say everywhere that there are teams, but actually everybody cares about their own interest.” (P-2, Specialist CoP)

“Well, but we don’t make them feel the difference like ‘why do you, who is all the time in the office, try to give your opinion’. Or maybe we say it sometimes, but just as a joke to bother the other a little, but not saying ‘you are from the office, I am from the field. You stay in your office and leave me in peace with the shovel here’.” (P-1, Specialist CoP)

Furthermore, even within mining sites there are different CoPs, because of the different shifts as-well-as between different functions, above all between those that actually go to the shovel, operations, and those that stay at the site, administration. Whilst a “community of practice is not necessarily friendly or harmonious” (Cox, 2005, p. 10), rivalry between different shifts could be evidence that leads to an understanding that these do not learn together unless there is geographic and organizational proximity:

“I have seen for example that in the morning meetings that are held every day, there is always a shift to which they say ‘you are the best shift we have, capable to do all kind of works, not like the other shift.’” (P-18, PSG CoP)

“There is competition between the different sites, for example I see much competition between the sites and therefore additionally there is no communication between sites.” (P-5, PSG CoP)

“I don’t want to be egocentric, but we are one of the shifts that want to do a little bit more, like repairing things that were not programmed.” (P-15, Operational CoP)

Interestingly, if geographical and organizational proximity at the shovel are given, the CoP may even incorporate people that do not belong to the organization.

“When I was a subcontractor I was focused on my job and also I acquired knowledge from the others. I looked at electric plans and got information from the guys.” (P-12, Operational CoP entering Specialist CoP)

Furthermore there is apparently no multi-membership between different Operational CoPs, as has emerged throughout the analysis:

“In each site groups are formed and when they form a group, they do not need the group of their prior site anymore. At the beginning the new person, because of personal friendships, for what they have lived together maybe calls the old colleagues, but with the time, when he emerges into the new group, he does not have to call the others anymore.” (P-5, PSG CoP)

These are tightly knit groups, who learn the execution of Operational routines together.

“When my colleague knows that for me it is, for example, hard to work on the lubrication system, then they will help me when he sees that I am struggling, and I will give him feedback if something is too hard for him.” (P-2, Specialist CoP)

“A couple of months ago they split up our group (...). I would say that since around a month we are almost exactly the same group again. This is because I know the group and know how to treat every one of them.” (P-15, Operational CoP)

DOMAIN

The shared interest resides fundamentally in keeping the shovels operating, because this way they meet their operational targets and obtain the associated bonus, as became evident in various informal discussions on-site. This also derives from their focus of practice which resides in executing operational, non-canonical routines, to keep the shovels working. Out of

the different interviews and conversations it emerged that their affection and commitment to their profession may be limited to doing their job:

“On site are many mechanics working who their week (...) do the jobs they are asked to do and that’s it. They are dedicated to do their job only.” (P-8, Senior Specialist CoP)

“They only solve problems.” (P-20, Specialist CoP)

“Many people don’t want to learn more than the mechanic... they are not interested in causes.” (P-17, Operational CoP)

And while there are some who feel an emotional connection to the shovel, the conversation indicated that this is not always the case:

“Therefore we know, we feel the machine.” (P-13, Operational CoP)

Furthermore, while there may be a lot of experience in executing operational routines among some, in general there are only a few at the centre of these CoP, with many years of experience that may be considered as ‘Paleros’ according to the reified meaning to it.

In summary, Operational CoP play a vital role within the process of shovel maintenance, as there are those who do the major parts of the work required to maintain the shovel operations. Because of the need of organizational and geographic proximity there are multiple Operational CoPs throughout the different mining sites in Chile. Because of this, it is likely that they significantly differ in terms of the way they work and learn together, because the meaning they construct is always dependent on the respective social context.

5.1.2.2 Specialist CoP

Beyond the previously described Operational CoP, the next group, hierarchically situated above, constitutes in the Specialist CoP. While the role as Specialist also presents a formal job description within Komatsu Chile, this CoP is not exclusive to those that inherit this title, but is rather reflected in the shared domain, practice and community that members form part

of. This postulation can be underpinned by a declaration of a nationally acknowledged authority within shovel maintenance:

“For me there are no specialists. I believe that we are all only mechanics, mechanics with the title of specialist, but a specialist does not assume to know everything.” (P-7, Senior Specialist CoP)

These communities of practice shift in terms of practice and are additionally more restrictive regarding membership, which is beyond geographical and organizational proximity, as will be further elaborated and described below.

PRACTICE

Beyond the learning of craft work through legitimate peripheral participation (Lave & Wenger, 1991) (the framework within which CoPs were introduced), Brown and Duguid (1998) postulated in favour of CoPs in that they actually improve practices. This type of CoP is present in the case of Specialist CoPs, which are also founded upon legitimate peripheral participation among its peers, but furthermore regard the improvement of practices as a focal point of practice. Those that join this CoP must get engaged into more complex tasks, which is likely to provide them with access to more knowledge and makes them participate:

“A mechanic who is climbing up the ladder must do more complex works, like changing a valve, check pressure and current... many more things, which are more complex, then I start giving him more information.” (P-8, Senior Specialist CoP)

This leads a differently focused practice that members of the Specialist CoP are involved in, which shifts from the execution of operational routines in maintenance and the solving of simple problems, to a more in-depth causal and functional analysis.

“They can make it to the root cause or the origin of the failure or the different sources of the failure because they understand the different systems of the machine in an integral fashion.” (P-8, Specialist CoP)

“I diagnose failures that maybe for other people may be overly complicated and which for me, because of the experience and knowledge I have, I can analyse them and find the failure faster.” (P-2, Specialist CoP)

A pivotal focus within their practice is studying and learning, for which the members are willing to take personal sacrifices and study in their free time

“Specialists really start learning once they are specialists.” (P-8, Senior Specialist CoP)

“The lads need to study, they need to prepare themselves and dedicate time to this in their free time, like when they are travelling here.” (P-6, Senior Specialist CoP)

“Well, as a matter of fact I study at home the manuals for one hour a day, because they are very extensive and there are many of them. Now that I am in a different site with different shovels, not the PC800 but the PC5500, well, I have to read a lot.” (P-20, Specialist CoP)

“I study and sacrifice my free time.” (P-1, Specialist CoP)

“I am always reading and all that, if there is a failure I look what may be the reasons and search for plans in the manuals.” (P-2, Specialist CoP)

Two interviewed even used their free time to write their own manuals. In other conversations senior specialists expressed that they had also written when they were starting to work on shovel maintenance.

“I try to study for example when I come in the morning or eventually in the afternoon; I make some time to review. I had everything summarised what was the manual for the PC5500, but that was the MDC system. Now with these shovels that are with the PLC system I have to change everything (...) I do this to differentiate myself from the rest.” – (P-19, Specialist CoP who wrote his own shovel manual)

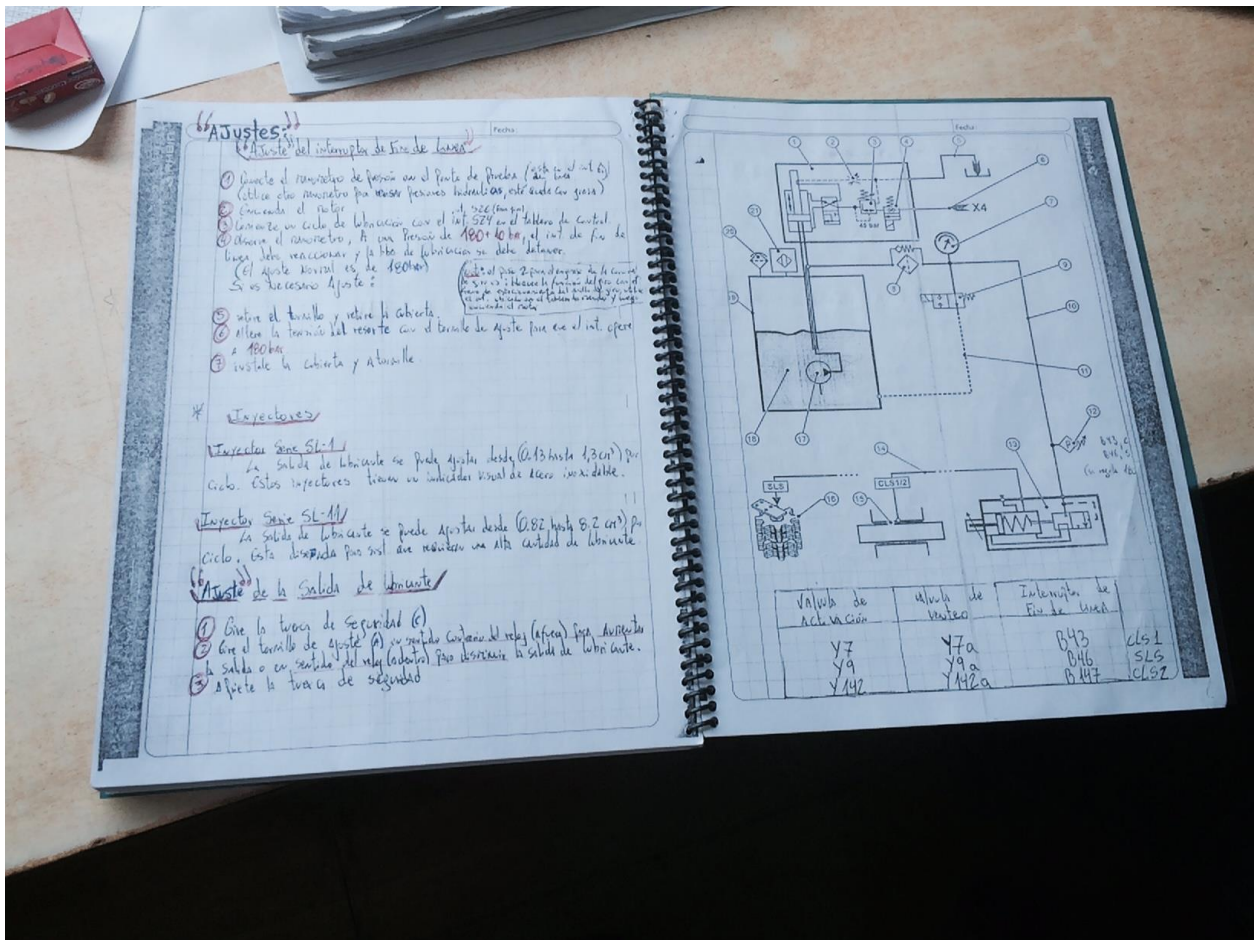
“I write my own manual.” (P-22, Specialist CoP)

Those that do not show this extra effort may have problems being accepted within this CoP.

“To study in your free time is complicated, because in your free time you are with your family and this complicates things unless one wants to surpass oneself and makes time to study.” (P-18, PSG CoP)

However, the sole theoretical knowledge is not what this CoP is based upon, but it serves for enacting the obtained knowledge at the shovel, where they discuss this with their peers or give advice to the Operational CoPs.

“In each shift there is also one person that knows, who really masters the shovel.” (P-11, Operational CoP)



Picture 5: A self-made shovel manual.

This happens primarily at the locking stations, which are placed in front of the shovel whenever maintenance or repair work is executed. All those who approach the shovel must put their personal (and non-transferable) locks in the station, which contains the keys to start it. This way it is impossible to start the shovel as long as people are still working on it. However, this locking station not only serves a safety purpose, but is also the place where the operational maintenance and repair works are discussed.



Picture 6: The locking station in front of the fence that delimits the working area.

Specialists are also willing to take responsibility and make decisions, which exposes them to a lot of pressure owing to the importance of the shovel for the mining operations.

“To be a specialist implies to be responsible, but if a lad doesn’t assume responsibility he cannot be a specialist.” (P-8, Specialist CoP)

“The other day I saw a failure that included 34 electronic components and 10 of them were bad. Then I took the decision, besides changing those 10, to change them all.”
(P-20, Specialist CoP)

“You must take decisions, be capable to take them and sound them from a technical perspective. Not necessarily only a decision to repair and deliver the machine, but also to decide ‘you know what, as it is we cannot deliver the machine’.” (P-10, Senior Specialist CoP)

Specialists may challenge supervisors if they are convinced they have a better understanding of a problem that needs to be solved, as emerged from an observation that was documented within the field notes:

“There was a discussion between all to solve a problem about the change of a cylinder. They couldn't do what the procedure said and had to solve the problem in a different way. Initially, the proposal presented by two specialists was rejected by the supervisor, who argued to follow the procedure. However, the specialists, who had more experience than the supervisor, brought up arguments based on personal experience in the past against standard procedure. They discussed for a while until finally the operations manager arrived and agreed to the solution proposed by the Specialists. Most of the other people attending this discussion only listened and didn't seem to care much about the outcome.” (Field Note, October 17th 2014)

Because of their efforts to study, the experience they gain by taking responsibility and the fact that they generally also belong to an Operational CoP makes them have locally embedded expert knowledge.

However, their learning is not restricted to technical forms of knowledge, but also embraces aspects like communication and management of stress. In one occasion Specialist candidates were invited to a role play, where they had to present a failure report to a customer. While the reports and presentations were generally satisfying, they made a little

mistake at the end of the presentation and the customer started putting them under immense emotional pressure:

“We were so tough we almost made them cry, ‘no this report is bad, very bad (...) we are paying you for this shit and we get such a service?’ Afterwards we went to talk to them and told them that this is how some customers treat us. Those guys aren’t scared of anybody today.” (P-10, Senior Specialist CoP)

There is further evidence that this knowledge indeed constitutes an important factor for the work of the specialists:

“One thing is to know and the other is to have communication skills with the customer [name of customer], because there are two or three people of hierarchy at [name of customer] and they are pushing you a lot. Many people get nervous then, but one must be able to manage this.” (P-22, Specialist CoP)

COMMUNITY

Whilst the Operational CoPs arise naturally owing to the geographic and organizational proximity, those entering the Specialist CoP must take a personal effort to enter.

“Demonstrating interest, showing the drive to learn, asking the guys, observing what they are doing, being proactive and telling them ‘I’ll help you’.” (P-19, Specialist CoP)

“I think that the growth goes hand in hand first of all to want to. When people don’t want to learn they will not learn independently of what we do.” (P-16, Specialist CoP)

“If there is no interest the specialist will not search for him and will do the job alone. But if the other shows interest and is present, then the lads are capable to teach them everything.” (P-10, Senior Specialist CoP)

“I learnt about shovel maintenance above all because I wanted to learn.” (P-3, Senior Specialist CoP)



Picture 7: A newcomer observing an experienced mechanic reading plans.

The principal requirement to join the Specialist CoP resides in the interest and drive to learn and grow in the context of shovel maintenance.

“There are some people who want to climb up the scale and others don’t, they are happy where they are.” (P-3, Senior Specialist CoP)

“Those that want to learn must show the interest.” (P-21, Operational CoP)

Those belonging to the Specialist CoP generally enjoy a good reputation within their proper mining sites as-well-as among its peers in some geographically distant sites.

“I didn’t know anybody here, nobody, but the truth is that my name, because I have written stuff in many areas surely and things like that, I have a little bit of fame.” (P-16, Specialist CoP)

"[Member of Specialist CoP] started with us. He is a person who is well known within the company for the knowledge he has about shovels and he has been doing well, he is of tremendous value." (P-1, Specialist CoP)

"You can clearly tell who the specialists are, because they have the personality and the leadership... beyond their technical skills." (P-11, Operational CoP)

There is evidence that only a few of the people belonging to the Operational CoP and thus working on the shovel maintenance on a daily basis can join the Specialists CoP, as numerous people stated in the interviews.

"I guess that two or three out of ten could make it to become specialists one day." (P-20, Specialist CoP)

"Two I think." (P-1, Specialist CoP)

"Well, how many could become specialists... maybe 20% with a lot of luck." (P-10, Senior Specialist CoP)

There is also evidence that those working their way up to Specialist CoP are at the centre of the Operational CoP, as the example of a member from the Specialist CoP illustrates:

"In my case, I am the one who has more technical skills than the others, above all because I have been with the shovel for a long time." (P-2, Specialist CoP)

Geographical distance does still constitute a challenge, but to a lesser extent than for the Operational CoP, as the Specialist CoP already spans across multiple sites. They come from a certain level of experience and knowledge and heavily depend on interest:

"I believe that from a certain point down, there is a level of mechanics who are just involved in their routines, they may form networks, but those are not there to be asked for information and things like that, because ultimately at the sites there are many mechanics working who only do their time and job in the site. For them their

work is, I don't know, changing parts and components, and do what they are asked to do (...) and that's it, they are only about execution.” (P-8, Specialist CoP)

“I believe that these networks form from a certain level upwards. For example, at the level of the mechanics that are immersed in the operation, I don't believe that there exists these types of networks to ask for information and do things, because finally in the site are many mechanics working who do their week (...) do the jobs they are asked to do and that's it. They don't have the need for a network. They are dedicated to do their job only.” (P-18, Senior Specialist CoP)

Specialists CoPs spans across shifts and geographic locations and are not prone to the same level of competition as the Operational CoPs are.

“The times I have seen how the specialists work it seems more like teamwork. There is no rivalry between the specialists (...). They approach problems in a cooperative manner rather than as a discussion.” (P-8, Specialist CoP)

“Everything that is being done in terms of improvements and pending tasks, the bosses and supervisors inform the counter shift. But personally I also deliver the information to the person I trust most in.” (P-22, Specialist CoP)

“Among the specialists is no competition.” (P-18, PSG CoP)

“I am in my rest period right now. But between the shift that is working right now and I (...) we talk to each other to know more about failure they found.” (P-2, Specialist CoP)

Members of the Specialist CoP can function as vertical boundary spanners, because they may also take a central position within an Operational CoP. However, depending on the CoP they are engaged with they behave differently, because of the different visions both types of CoPs are argued to have.

“With my colleagues that I see and work together with half of the year, with them a lot of trust unites us, but with the people that are higher up, like (P-10, Senior Specialist CoP) or (P-7, Senior Specialist CoP) for example, with them I share a vision beyond what we project in our regular working place. When I am together with them I share ideas that I have to improve the whole project of improvement that can be executed... with them I look further ahead.” (P-2, Specialist CoP)

There is evidence that the qualities of the personal relations between people, which can be understood as social proximity, are of vital importance. While only loosely connected owing to the geographic distances, they constitute in groups of friends which became evident in various interviews. In line with existing theory the argument is supported that CoPs require, at least at one point in time, geographic proximity (Hakanson, 2010).

“We talk personally about things that happen to us, we are like a little group.” (P-19, Specialist CoP)

“I made friends and afterward we keep the ties and share information via Facebook, WhatsApp and with some I talk over the phone.” (P-20, Specialist CoP)

There exists a virtual network, consisting of multiple sites that people can access, to search for, and share, information and there are people from various CoPs using it:

“I get really involved with the library of the groups that have been created by email and groups applications. There are various people who have groups like PSG and GSP where I go to see problems they have solved in some of the mining sites.” (P-12, Operational CoP entering Specialist CoP)

However, it is not that easy to gain access to this virtual site and some do only have limited interest, thus stressing the importance of the social proximity, which may be difficult to attain in a virtual site:

“Up to today I cannot enter. You need a key and there is like a whole procedure around this.” (P-20, Specialist CoP)

“There is a virtual site where they publish information, but I don’t use it enough I think. I should use it more.” (P-2, Specialist CoP)

Those that do not belong to the Specialist CoP and want to join may not be accepted, like one person who seems to be entering:

“I found (the defect) but between one joke and another they didn’t believe me that much. Not the people from PSG nor the Senior Specialists who were trying to solve the problem, they didn’t believe me.” (P-12, Operational CoP entering Specialist CoP)

Whilst the Operational CoPs are all about practical knowledge, within the Specialist CoP studying is highly valued and represents an acceptance criterion within the CoP:

“When you study you can project yourself.” (P-2, Specialist CoP)

“It is valued when people study and want to grow.” (P-1, Specialist CoP)

“I still need to learn a lot.” (P-22, Specialist CoP)

“To be a specialist implies to study.” (P-10, Senior Specialist CoP)

Those that want to join this community are tested for their capacity by the more experienced:

“Well, sometimes I ask the kids questions, like rather tricky questions and sometimes they answer right and sometimes they don’t even care. This is then the proof that the kid is not interested in the work and not motivated.” (P-6, Senior Specialist CoP)

“I talk with him (new member of Specialist CoP) every day and give him jobs. He likes that but I also measure him and make observations. This way he improves.” (P-10, Senior Specialist CoP)

DOMAIN

Whilst failures and suchlike are not desirable from an organizational standpoint, members of the Specialist CoP seem to enjoy these disruptions, because they contribute to the learning process of the members

“When a failure occurs I dedicate myself to it, search in manuals and do not give up, until I find it. I don’t accept stories, to say it like that, or try to execute an action that does not really correspond. I try to find the root cause and this is what makes it enjoyable.” (P-20, Specialist CoP)

“It is good that the machines fail because this is how you learn.” (P-22, Specialist CoP)

“It may sound funny, because what Komatsu offers is lacking knowledge of the people to fix the machines. The machines have many failures and bypasses.” (P-20, Specialist CoP)

“It is nice to not know something, because this is how you finally learn.” (P-1, Specialist CoP)

“Defects of a machine, when you are faced with a good challenge... this is when you learn. How do we move on from here? How do we solve this problem?” (P-13, Operational CoP)

There is furthermore evidence that those belonging to this CoP have a lot of respect for those that have more experience than them. Whilst studying can increase their knowledge base, time and effort are required to gain more experience.

“Not because of the fact that I am one with the most time in the contract, something is done because I say so (...). There are lads with a lot of experience, who have changed chains of a shovel 10 times and I have only done it two times. If this lad tells me ‘hey, you know, we do it like this, we have changed chains many times like this’,

ok, then some experience and learning those lads have had and we see if we do it like this.” (P-12, Operational CoP entering Specialist CoP)

“Those of the new school respect the old school a lot for their experience.” (P-8, Specialist CoP)

Beyond the financial compensation, their purpose consists fundamentally in learning, growing and being recognised for their knowledge.

“It is nice, for example, for me to gain knowledge. It is much better than money. Maybe what they offered to me in [different company] was 200,000 CLP (~200 GBP) more and many benefits, but the aspect of knowledge is fundamental for me. I want to be recognised, that people say ‘this lad knows, he is a good guy’.” (P-20, Specialist CoP)

These people that form part of the Specialists CoP can already be regarded as having attained a closer affiliation to the outline characteristics of ‘Paleros’. The dimension where they are still lacking behind is mainly experience, which many may not yet have obtained.

“Those lads will be much better, but they don’t have that much experience yet. When I tell them ‘look, this and that will happen’, and afterwards it actually happens, they say ‘wow, you are very capable’. Then I tell them ‘no, I have only seen this so many times that I am certain about what will happen. I don’t have a crystal ball, it’s all experience’.” (P-10, Senior Specialist CoP)

In summary, whilst the boundaries within the Operational CoP are rather clearly drawn and manifested in tightly knit relations, the boundaries within the Specialist CoP are more difficult to circumscribe and consist in rather loosely coupled relationships, primarily manifested in networks of friends.

5.1.2.3 Senior Specialist CoP

The hierarchal CoP that is situated at the top is known as the Senior Specialist CoP and revolves those people who have the full right to be termed 'Paleros'. Most of the people belonging to this CoP have started together in the first mining site (Mina Sur) where Komatsu shovels were sold and carried out the associated maintenance work. Starting as an Operational CoP those that are members of the Senior Specialist CoP learnt together with the help of the factory:

"We had help in those early years from the factory, from some service engineers. They helped us a lot and they really facilitated a lot of information." (P-7, Senior Specialist CoP)

"We asked the Germans [from the shovel factory] when they came here." (P-6, Senior Specialist CoP)

When more shovels arrived in Chile they were spread throughout the different mining sites to help the launch of the shovel operation.

"We share experiences, experiences that we have lived together in all those years". (P-6, Senior Specialist CoP)

"Our conversations are all about shovels, so there are many shared histories about shovels." (P-7, Senior Specialist CoP)

PRACTICE

Within the Senior Specialist CoP the knowledge is very advanced, but among them they embraced the new expertise, which is beneficial because they are well connected.

"When they have an electronic issue they call right away (P-8, Senior Specialist CoP). When they have to change a component, a mechanical or hydraulic failure they call (P-6 and P-7, Senior Specialist CoP). Even though they know how to do the

job, the call to ask 'look, I have this topic to work on' and get answers like 'be careful with this and that'. They share information." (P-10, Senior Specialist CoP)

"The old-school may be disadvantaged versus the new school when it comes to the use of software, which is normally incorporated into improvement right now. With these things they may be a little behind." (P-8, Specialist CoP)

They have expert knowledge, but may lack local knowledge about the shovel (Yanow, 2004).

"Many times, even though one wouldn't believe it, the failures of the machine have a history of something that has happened before and at the end, one with this type of information manages to catch the failure." (P-6, Senior Specialist CoP)

Because of their experience they have a different perspective on the shovels than Specialists, because they have a holistic view that has emerged throughout the years.

"They manage the machine from a functional perspective". (P-8, Specialist CoP)

"When I have a problem with the cylinder I close my eyes and there it is in my mind. I even see the grease points, know how they work, how to lubricate them internally. So it is all within my mind." (P-6, Senior Specialist CoP)

Within their practice they embrace the task to teach those that are interested to learn more.

"When I see interest and see the will to execute some tasks." (P-7, Senior Specialist CoP)

"There are people who want to teach, but you must show drive and interest, be proactive. This is what is being valued." (P-17, Operational CoP)

"I believe demonstrating interest and the drive to learn, consulting the lads, what they are doing and being proactive and offering your help, being constantly looking what they are doing." (P-19, Specialist CoP)



Picture 8: Senior Specialists assessing a difficult problem.

In a way different from others they do not teach by solely providing answers, but above all they challenge the members of the Specialist CoP, and incentivise double-loop-learning, a skill that they have already well developed.

“At the end I said the solution; for example, when I ask them a question they don’t give me the answer but rather various options that I have to analyse. And then I figure out ‘of course, it can be this or that.” (P-20, Specialist CoP)

“What he did was the following. He put a plan on the table and said that the machine was presenting such failure and that I should deliver a solution tomorrow.” (P-22, Specialist CoP who was tested by P-6, Senior Specialist CoP)

“Well, sometimes I ask the boys questions and like a tricky question as well. Sometimes they answer well, sometimes they don’t. Then there you can see whether they are interested or not.” (P-6, Senior Specialist CoP)

On the other hand, they don’t waste time with those that do not show interest.

“They don’t waste time with the lads that show no interest. Well, they give them the opportunity and try to make them part, but when they figure out... you can tell if a lad wants to learn, those that want to will continue asking questions.” (P-10, Senior Specialist CoP)

“Currently we have to deal with many contingencies so there is no time to teach as if they were little school kids, we only deliver the information.” (P-6, Senior Specialist CoP)

They show a degree of reflexivity that seems to be beyond that of those who do not form part of their CoP. Because of this reflexivity their learning may be categorised as double-loop-learning, because they have learnt to challenge taken for granted knowledge and practices:

“I think it’s the worst for a mechanic if they lack the capacity to acknowledge to not know something, even though it’s nothing bad because nobody was born knowing. There are also many who think they know everything... I talk to specialist boys who say that they know the shovel inside out.” (P-7, Senior Specialist CoP)

“Frequently things don’t match, things that always matched, which were always done like that. Then you try to find another way to do it, to improve it, to make it more practical. I believe that this has given me the experience, to not be so squared minds, to be flexible.” (P-6, Senior Specialist CoP)

This is also depicted in a humility they advocate to have, which permits them to learn reflectively, a practice that members of the Specialists CoP are less likely to have attained

because they are still in a stage of accumulative learning, whilst Senior Specialists already do accommodative learning, which challenges the existing schemes to gain further understanding in different contexts.

“There are lads who think they know everything. I talk with young specialists who say they know the shovel inside out.” (P-7, Senior Specialist CoP)

“I always accept opinions, positive or negative ones, I always accept them. I believe that even though you have a lot of experience you are always learning.” (P-6, Senior Specialist CoP)

“I am humble, but I also think that there are many people come to me, but not because I am superior, but I am older and have been around for more years than them.” (P-16, Specialist CoP)

Their practice extends beyond the one of the Specialist CoP because they even connect with the factory to enforce mechanical improvements of the shovels.

“Those lads for a while now do not only raise problems to the factory but they propose solutions to the factory. The factory has never liked that and as a matter of fact, at the beginning they were annoyed (...). Those German engineers felt offended (...). Today, one of the solutions they are implementing globally was proposed by (P-7, Senior Specialist CoP).” (P-10, Senior Specialist CoP)

“They are really interested to develop the product and they have sent many suggestions to the factory.” (P-10, Senior Specialist CoP)

“I present ideas because I am interested in improvements of the product above all.”
(P-7, Senior Specialist CoP)

COMMUNITY

In practice they depict the ultimate source of consulting on behalf of the Specialist CoP and are believed to know the most.

“If we have exhausted all our possible opportunities (...) we maybe request help from the senior specialists.” (P-2, Specialist CoP)

“The team from (P-10, Senior Specialist CoP).” (P-20, Specialist CoP asked about who knows most about shovels)

“The group of (P-10, Senior Specialist CoP).” (P-4, PSG CoP asked about who knows most about shovels)

They are the renowned experts, literally everybody interviewed made reference to at least one of them, above all about (P-7, Senior Specialist CoP):

“I had the luck to work with (P-7, Senior Specialist CoP) and (P-6, Senior Specialist CoP) and with (P-8, Senior Specialist CoP). Those are the three that are here right now. (P-7, Senior Specialist CoP) has like 15 or 16 years of experience and (P-6, Senior Specialist CoP) also somewhere around 15 years. For me, they are references. And also (P-16, Specialist CoP) who also has years working with shovels.” (P-17, Operational CoP)

“I have worked with (P-7, Senior Specialist CoP) who is eminent. I will not believe that I know more than him.” (P-5, PSG CoP)

“We have people like (P-7, Senior Specialist CoP), a person with a lot of experience or (P-10, Senior Specialist CoP), who even though he is now a manger, formerly he worked hands on at the shovel and knows a lot.” (P-16, Specialist CoP)

“Actually I think that the strongest here are (P-7, Senior Specialist CoP) and (P-6, Senior Specialist CoP), they have a lot of experience.” (P-8, Senior Specialist CoP)

“I know that they admire (P-7, Senior Specialist CoP) for the work he does and his experience.” (P-19, Specialist CoP)

Among themselves they have a self-understanding of being those that know most about shovels, even though they do not explicitly say that and even have a certain degree of

humbleness that characterises them. When asked if there are people that know more than them they affirm, but asked to provide names they argue to not know anybody personally.

“At least I don’t know anybody, well, maybe there should be or maybe not, but not in the context that they know more than us.” (P-8, Senior Specialist CoP)

“No, I don’t know anybody but I believe there should be some in some places, maybe with a very good position as manager or similar.” (P-7, Senior Specialist CoP)

They have a reputation beyond their geographical presence at site.

“I didn’t know anybody here, nobody, but the truth is that my name, because I have written stuff in many areas surely, and things like that. I have a little bit of fame.” (P-16, Specialist CoP)

“Sometimes people come who don’t know me, but when they hear my name ‘ah, you are (P-6, Senior Specialist CoP)’. That is good.” (P-6, Senior Specialist CoP)

These personal relations are among others manifested in histories and conversations:

“I believe that the years we know each other and the shovels have formed us, because actually our conversations are only about shovels. Therefore there are many histories with the subject shovel.” (P-7, Senior Specialist CoP)

Members of this CoP usually work in different mining sites and are thus geographically dispersed. Nevertheless, this does not influence the effectiveness of their CoP and they argue to learn and solve problems together.

“They have a community, a group that communicates with each other.” (P-10, Senior Specialist CoP)

“I think that together with (P-6, Senior Specialist CoP) we do things quite similarly.” (P-7, Senior Specialist CoP)

The Senior Specialists all have their own network, which they can use to ask questions and spread knowledge:

“Just as I have people in my contact list in the phone, whom I can contact and communicate with, I believe that (P-7, Senior Specialist CoP), (P-6, Senior Specialist CoP) or even (P-10, Senior Specialist CoP), everybody has people to contact at different sites with whom they can share information or ask for help.” (P-8, Senior Specialist CoP)

“I call (P-7, Senior Specialist CoP) and maybe he has the information or maybe he does not and tells me ‘hey, I call you in half hour’ and then he searches within his group. This way we manage information and it works very well, but it is not something formal.” (P-8, Senior Specialist CoP)

“Of course, there are people that one gets to know with the time. As I have been in many mining sites here in Chile I have met many people and we share information, phone numbers and they know that when they have a problem or need help they can call me.” (P-8, Senior Specialist CoP)

Their affect and commitment to the shovel is more important than personal relationships, therefore the principal requirement to join this CoP is cognitive proximity:

“The relationship we have is very good; there is a lot of trust between us. But we are not like friends. But the relationship as colleagues is very good.” (P-8, Senior Specialist CoP)

DOMAIN

Another aspect of difference emerges out of variances in age, as those with a lot of experience and belonging to the Senior Specialist CoP are united by stories about the way they used to do things in the past.

“When we did not have a boom truck to lift up our stuff, we lifted them up with our hands. You don’t do those things today. If I tell a youngster to lift up a battery of 200 amperes, a big battery, up to the shovel, he would not do it. However, that used to be a daily routine before. We lifted up the tool box of batteries. We changed oil with a bucket and a string. I alone would load a 200 litre drum of oil up a truck all by myself.”
(P-7, Senior Specialist CoP)

“We are from the so-called old school where one had fewer resources, but we still did the job. With more effort, I believe with much more personal effort.” (P-6, Senior Specialist CoP)

“Look, when we started we had fewer resources than they have here now, but ultimately we were more united. Today there is no union between the young people. The young people now are more instantaneous, they want everything fast and now.”
(P-6, Senior Specialist CoP)

Senior Specialists regard those that show the interest, independent of their academic or technical knowledge as people with potential:

“When I see interest and when I see the wish to execute jobs.” (P-7, Senior Specialist CoP)

“When the lad want to learn he goes to the shovel and does not just stay there chatting with others.” (P-6, Senior Specialist CoP)

Their overarching purpose is to have the shovel working adequately. This interest is so embedded that they will reject requests from the customers or even Operational CoP management to finish a maintenance job or repair work for the sake of continuing the operation, if they feel that not all required tasks have been fulfilled.

5.1.2.4 Disconnected CoP: The case of PSG

The research also provides evidence about a CoP that seems to be detached from the overarching hierarchy. This is the case of the PSG CoP, which consists in engineers that work in the Product Support Group (PSG). This detachment is reinforced, if not even based upon an organizational separation, which one of those interviewed summarised as follows:

“The group of (P-10, Senior Specialist CoP) reports to Komatsu, we report to the factory.” (P-4, PSG CoP)

“PSG provides support to the factory; we provide support to the mining sites.” (P-8, Senior Specialist CoP)

PRACTICE

Whilst the practice of the other CoPs has a strong hands-on focus that is materialised either in routine maintenance work or problem solving of different magnitudes, the focus of PSG seems to reside in the provision of information, which can either serve the purpose of solving problems:

“The lads from PSG know a lot about manuals.” (P-1, Specialist CoP)

Or on the other hand they can also be keen on enforcing the implementation of factory campaigns that are launched to improve the availability and reliability of the shovels. They are regarded by the members of the other CoPs as people with a lot of theoretical knowledge but lacking focus on practice:

“There are people from PSG, who have a lot of theoretical knowledge, but they don’t assume responsibility in practice, they only observe and make reports.” (P-10, Senior Specialist CoP)

They are recognised for their technical knowledge, but do not seem to be regarded as an embedded structure within the CoP hierarchy.

“When PSG arrives it is because we have already given up (...). They come with fresh eyes.” (P-15, Operational CoP)

“At least in my case up to now I have not had much communication with them. When I was in Andina I had a few cases where suddenly we didn’t have the required knowledge of the machine and it failed from an unknown symptom. There PSG approached us and helped solving the issue.” (P-19, Specialist CoP)

Their focal point of attention does not seem to reside in installing technical competences through teaching within the organization.

“The lads from PSG don’t spend much time talking with the others in the mining site. From our shift they talk to me, because I am not shy and just ask them questions like what have you done and why, did you analyse this and that? But they don’t spend time with the rest.” (P-1, Specialist CoP)

“With my direct colleagues with whom I work on a daily basis, with your colleague or partner, your mechanic, with your electrician, with your specialist and in some occasions also with PSG, who provide more advanced technical support.” (P-13, Operational CoP)

Their predominant working space is away from the shovel; usually in the regular meetings where they discuss situations they have to cope with.

“They are more office-based and less in the field. I see PSG more in the office than in the field.” (P-6, Senior Specialist CoP)

Their learning may be best described as assimilative and accommodative learning in interpreting theoretical information in a practical context.

COMMUNITY

Those working within Komatsu do not seem to regard PSG as part of their communities of practice.

“What I told you before, Komatsu Chile regard PSG like if they were another group. I am not sure if there is rivalry between the managers or supervisors, I don’t know, but it’s always as if they see PSG as higher up and as if PSG felt superior towards them.”
(P-18, PSG CoP)

“Our customer is Komatsu Chile (...). In the PSG group we are well connected. When I have a doubt or anything I call a colleague and they answer me, no problem. However, when you go to the mining sites you find yourself with Komatsu Chile, you feel as if you were not part of the group, but as if you are PSG.” (P-18, PSG CoP)

“To start with PSG are young fellows that do not have a lot of experience. When you need some material you can ask them because they have a lot of contact with the factory. But as I tell you, they are not there yet, those fellows.” (P-6, Senior Specialist CoP)

“I think they see PSG as another Komatsu, they believe certainly that we are OEM and have nothing to do with Komatsu Chile, and they are right in this sense.” (P-18, PSG CoP)

PSG are regarded as outsiders and people within the mining sites may have concern regarding transparency of issues to them.

“Regarding specific confidentiality of information there must be clarity first, before I can communicate on a different level, beyond the mining site, for example with PSG.”
(P-2, Specialist CoP)

Their community is defined as those involved in the same practice and based upon relational proximity, enacted in monthly meetings and regular communications via phone and emails with their counterparts, where they share experiences in the respective mining sites where they work.

“In the PSG group we are well connected. When I have a doubt or anything I call a colleague and they answer me, no problem.” (P-18, PSG CoP)

“We are around 12 or 14 people, so this helps a lot. We have bi-monthly meetings (...) where we all meet, the whole group and where we share experiences from the different mining sites. In these meetings we make friendships, which makes you feel like a great group.” (P-18, PSG CoP)

They are to be seen as a tightly knit group of engineers bound together by their practice and their particular situation in the mining sites where they spend most of their time:

“When I come to the mining site I don’t have a boss, I don’t have a partner... anybody, PSG is always alone (...). Of course, they don’t regard you as one of their group.” (P-5, PSG CoP)

“However, when you go to the mining sites you find yourself with Komatsu Chile you feel as if you were not part of the group, but as if you are PSG.” (P-18, PSG CoP)

DOMAIN

A theme emerged from the interviews, which indicated that the PSG CoP sees its purpose as providing assistance to the mining sites and ensuring that the shovels work and comply with their targets. However, rather than hands-on, this is achieved by providing quality assessment of problems that are fed into the organization, so that they can implement the solution.

They seem to value the situation when their considerations are taken into account and get feedback about this.

“For example when there is some relevant defect and one makes a report and afterwards you receive feedback in a mail saying, I don’t know... ‘hey, thanks for the report’, then one feels that he is doing a good job, right? But many times this does not happen. One does a work, right, writes the report, sends it and does not receive

any comment, not even 'you made a mistake here'... no feedback at all." (P-18, PSG CoP)

Mostly because of their limited practical experience and the fact that they are not characterised by a hands-on working style, they may be regarded as outsiders in terms of the 'Paleros' abstraction. This does, however, not diminish their overall value and importance within the organizational context, particularly in terms of facilitating knowledge sharing between Komatsu Chile and the shovel factory.

5.2 Boundary Processes within the Hierarchic Network of CoP

The previous section has shed light on the forms that CoPs take within the research context. This section will provide insights about the extent to which they contribute to knowledge sharing and learning within the research setting. The focus is thereby not on the learning and knowledge sharing within CoP, a field that has already been extensively researched, but above all between them, embedded within the hierarchically structured network. Where learning within CoPs happens through legitimate peripheral participation, the learning and knowledge sharing between CoPs is subject to boundaries, which as outlined above, constitute a fundamental aspect of CoPs (Wenger, 2000). Boundary interactions in general are important to ensure the continuity of learning by providing new stimuli (Wenger, 2000). Particularly in the research context this is very important because the adequate learning across boundaries presents a potential answer to the one of the biggest organizational challenges, which is knowledge sharing in general and "the endless problem" (Duguid, 2005, p. 114) about best-practice sharing in particular (Szulanski, 1996).

The research has revealed a hierarchic structure of CoP, which is in nature subject to power differences between the affected CoPs (Ramsten & Säljö, 2012; Tusting, 2005), what Kerosuo and Engeström (2003) term institutional boundaries. Research has shed light on the role of power differences within CoPs, where those at the centre are more powerful than those at the periphery (Contu & Willmott, 2003; Roberts, 2006; Thompson, 2005). However,

the findings about the hierarchic structure of CoP exacerbate the need to investigate power relations between CoPs (Oborn & Dawson, 2010; Tagliaventi & Mattarelli, 2006) in terms of cross boundary processes (Erden et al., 2014). In the following, insights about the quality of boundary processes within the research context and evaluation of the quality of boundary interaction based on the three dimensions as proposed by Wenger (2000), will be assessed:

- Coordination.
- Transparency.
- Negotiability.

Afterwards, light will be shed on those mechanisms that may support or impede cross boundary processes, namely in terms of boundary spanners and boundary objects. “This inter-relationship between ‘boundary objects in use’ and ‘boundary spanners in practice’ has shown to be crucial in the emergence and development of joint fields of practice” (Swan et al., 2007, p. 1821). Throughout this assessment, the role of power will be carefully considered.

5.2.1 Coordination

This first dimension upon which the quality of boundary processes can be assessed is manifested in the coordination between different CoP, which revolves around the extent to which they share interest in a common practice as-well-as being able to understand each other (Wenger, 2000). The latter encompasses the ability to overcome the *syntactic boundary*, which exists owing to difference in language and inadequate communication channels and well as the *semantic boundary* that, beyond language, embraces meaning (Carlile, 2004), as described above (see section 2.3.2.2).

Within the research context the overarching conceptualisation of ‘Paleros’ provides the glue that facilitates the coordination between the different CoP, at least in terms of the objects they work on:

“What we have in common is that we work on the shovels.” (P-8, Senior Specialist CoP)

“People that start working with shovels already feel part of something special.” (P-16, Specialist CoP)

Whilst there is evidence that the way people talk within the respective CoP is different, there do not seem to be major challenges in coordination associated with this aspect. But successful communication of information across boundaries does not imply understanding and the meaning is likely to be constructed differently in the respective contexts (Bechky, 2003). These differences can also stem from the fact that the objectives of the different groups are different. They may understand what the other is saying, but make meaning of it in another way, which can be associated with the semantic boundary (Carlile, 2002):

“One has to take a different personality and mode of talking (...). The two sides are very different. If you talk the technical part very much like the way you would talk to management, you make them feel uncomfortable. The lads are a little fussy so you have to try to accommodate to them.” (P-20, Specialist CoP)

For the Operational CoP the result matters in terms of having the machine running, which is different from what the Specialist CoP focuses on. This difference makes the interaction between both difficult, because the Specialist CoP may feel that while they are working on the same shovel, their practice fundamentally differs and this may negatively influence the relation of joint learning.

“Maybe they get the machine working again, but they don’t really know how they did it... they didn’t clearly identify the root cause of the problem. So then they prefer to not share information because they are scared of being asked or of lacking the knowledge.” (P-20, Specialist CoP)

Because of the dispersed nature of the organization, coordination between different Operational CoP hardly happens:

“There are very little instances to share knowledge between sites.” (P-14, Specialist CoP)

The primary means through which this can be overcome are boundary spanners, who may be members of the Specialist CoP who also belong to the Operational CoP (vertical boundary spanners) or people moving from one site to another (horizontal boundary spanners) as will be discussed further down.

Another reason may be because there are apparently political issues between different sites, manifested in little collaboration:

“I see a lot of competition between the different mining sites. Therefore there is also little communication among them.” (P-5, PSG CoP)

“Between the different sites they don’t share any information. There is not a link between mining sites. Each site worries about their own interests only. With friendships it’s different, there you generate ties and share information... between friends yes, between mining sites no.” (P-20, Specialist CoP)

While there is evidence that the overcoming of practice boundaries may not be required to generate collaboration (Swan et al., 2007), this study indicates that the differences in practice do have an impact on learning in the researched setting. Because organizational leaders of the sites have significantly more power than those that work within the site, there is little interest in collaborating, which negatively influences coordination.

There is also a challenge regarding the learning spaces between the different CoP, which can impede adequate learning and knowledge sharing. The locus of practice is important in the context of knowledge sharing (Bechky, 2003). Meaning that is constructed away from the shovel does not attain validity of those working there. Throughout the interviews the

predominant role of trust became evident, which may be context specific for Chile. Most people interviewed feel comfortable at the shovel, rather than in an office space:

“If they put me in an office I die.” (P-16, Specialist CoP)

“I have to be in the field. If you put me into an office I get bored, I fall asleep... I simply don't like it (...). My life is being in the field. I mean, if I am in the office I can give you an idea about this and that... but that I am not able to work in the office is one of my big deficits.” (P-6, Senior Specialist CoP)

An obstacle to foster coordination consists in the fact that people do not know each other personally:

“People don't share knowledge because they don't even know each other.” (P-12, Operational CoP entering Specialist CoP)

“[Knowledge is only shared] if people have worked together. If I am mechanic from Ministro Hales and have worked in Radomiro Tomic, thus know the people, I will ask them and ask questions.” (P-5, PSG CoP)

“We share knowledge because of personal contacts we have with people from other mining sites, but only then... there are no alternatives.” (P-15, Operational CoP)

Coordination may be restricted because of power asymmetries, where those in charge impede others from communicating freely with other sites:

“There is information that can be shared freely, like ‘we left the trucks in such place’ (...). But information that is a little bit more delicate, like adjustments we made to the plan and such, this communication corresponds to me or the specialist from the other shift.” (P-2, Specialist CoP)

There is also evidence that leads to the understanding that especially in the context of Operational CoP they do not regard knowledge sharing as relevant for their own purpose:

“I think there is no interest to know how things work at other sites.” (P-11, Operational CoP)

“Well, I believe things should be done very similarly, but I believe that things are done better and in less time in Mina Sur.” (P-13, Operational CoP)

5.2.2 Transparency

Transparency postulates that intentions and purpose are clearly described to the other (Wenger, 2000). The shared intention and purpose may be simply attributed to having the shovels operating within the required parameters. Nevertheless, the real intentions spread beyond this, as becomes evident in the assessment presented above. Ramsten and Säljö (2012) argue that “perfect harmony toward a common goal (...) willingness to share knowledge, and invest the time and organise the activity for such purpose, may be optimal” are the conditions for collaboration across boundaries between CoPs. Whilst there is little ground to challenge this assumption, it is questionable whether this would still constitute activity between different CoPs or rather to be seen as within one CoP.

As has been described above, beyond the differences in practice and community, there are differences between the purposes and values of the different CoPs as-well-as the degree to which they identify with ‘Paleros’. Unless there is transparency of these to others, mutual learning will be negatively influenced. Williams (2002) identifies trust as the most important factor in facilitating boundary spanning activities citing Sydow (1998, p. 31): “trust is thought to be a more appropriate mechanism for controlling organizational life than hierarchical power”. Whilst this statement has its stand-alone validity, it becomes even more relevant in the context of CoP structures, which are defined by their more or less autonomous characters (Roberts, 2006; Thompson, 2005). Providing transparency about the purposes and values of different CoPs, potentially resulting in increased levels of trust, may facilitate knowledge sharing among them.

Missing trust between the different CoPs may, particularly at the level of Operational CoP, generate defensive routines (Argyris, 1976, 1977; Argyris & Schön, 1996), which then again may lead to double-binds, where the CoP is captured in a situation where the adherence to one norm implies ignoring another truth (Argyris, 1977). Within the fieldwork a situation was detected where a night shift attended a shovel that had suffered an operational accident and therefore did not comply with the plan for the programmed maintenance of another shovel that night. The customer had asked the Operational CoP people for help with the shovel that had suffered the accident and they adhered to the request. However, operational time deviations of shovels, because of accidents do not impact Komatsu financially, whilst deviations in programmed maintenance do. The night shift was yelled at the next morning for this behaviour, which from their context may have made perfect sense.

All of the above factors also exacerbate the role of honesty as an aspect valued by those associated to 'Paleros'.

"I have always been transparent; I have always said the truth. If I don't know something I say: 'I don't know' or 'let's search'. This is something that is really appreciated a lot." (P-20, Specialist CoP)

In terms of transparency there seems to be an issue because the CoPs make value judgement about others, maybe because of not fully understanding their values and purposes as has been revealed throughout the research process.

5.2.3 Negotiability

Negotiability requires providing a space where those involved open up to discuss their practice and underlying assumptions (Wenger, 2000). These negotiations cannot be neutral because of evident organizational asymmetries of power. However, implying solutions and expecting compliance as-well-as conformity, understood as 'frozen negotiation' (Bowker & Star, 1994 as cited in Brown & Duguid, 1998) are in sharp contrast to the concept of

negotiability, and negatively influence boundary processes. In line with this, negotiability is not present in a context where unidirectional knowledge transfer (as described in section 2.2.5.) is forced as the means for learning.

Operational CoPs are formally associated with less power. However, it may be argued that the way they execute non-canonical routines around shovel maintenance has a very significant impact on the performance of the shovel. Therefore, in practice they are in a more powerful position because they can reject doing work or do it according to inadequate standards, thus countering against imposed learning.

“At site the lads won’t do the work we agreed in the morning (...). Some will do it, those that have potential. But in general there is no leadership at mining sites. Probably I don’t have leadership either, but if I had or was provided with the power to take decisions I would do it.” (P-7, Senior Specialist CoP)

“There is a group of lads who stop doing the work (...), when they do not have all the things that are explicitly mentioned in the manual and they have the right to do so.” (P-12, Operational CoP entering Specialist CoP)

Negotiability is not solely achieved, even through support by joint encounters into shared learning spaces, such as at the shovel in the research context, but implies genuine engagement into the negotiation of joint meaning (Ramsten & Säljö, 2012).

Another pivotal aspect of negotiation demands that members of the different CoPs dare to ask questions, aiming to initiate a process of learning and meaning making (Ramsten & Säljö, 2012). There are several potential issues around this. One is regarding trust, which is required to be able to negotiate. Evidence shows that trust is frequently missing and thus leads to people not asking questions. This is probably reinforced by a cultural context characterised by low levels of trust.

“One is because they are ashamed, because they believe that they will not be valued when they don’t know something.” (P-7, Senior Specialist CoP)

“People may be ashamed to ask others, because it implies not knowing something.” (P-14, Specialist CoP)

“When they don’t know the cause of the problem, then they prefer not to share information because of fear and the fact that they don’t know.” (P-20, Specialist CoP)

“If you have trust in yourself you will not fear to ask questions.” (P-19, Specialist CoP)

As has been outlined above, there are practices adopted that are against company policies, but arise from the desire to get the job done and keep the shovel working.

“The other reason [why people do not ask question] is represented in colleagues who may discriminate [against] them when they ask questions.” (P-7, Senior Specialist CoP)

Negotiability encompasses the question whether those involved in the boundary processes see “themselves as members of an overarching community, in which they have common interests and needs” (Wenger, 2000, p. 235). From this perspective *CoP Glue* facilitates the negotiation between different CoPs, because it represents an abstraction associated with meaning that all CoPs can more or less relate with.

5.2.4 Boundary spanner

One means of fostering learning and knowledge sharing across multiple CoPs are boundary spanners (Oborn & Dawson, 2010; Wenger, 1998). A successful boundary spanner, in the research context, should on the one hand understand the social constructions of meaning within different CoPs (Williams, 2002), which are highly context specific, and on the other hand have the capability to mediate the “sharing and integration of knowledge across semantic boundaries” (Swan et al., 2007, p. 1829). There may be a tendency to regard the

role of boundary spanners as unidirectional in transferring knowledge to a receiving unit (Bresman et al., 1999), which already implies a power asymmetry between those that have already had experiences (Easterby-Smith et al., 2008) or work with superior work practices, and the others, who have not (Teece et al., 1997). Therefore, in this particular case, where the practices, primarily those between the Operational CoPs are very similar, a boundary spanner that aims to foster knowledge sharing of superior practices from one site to another is likely to encounter power conflicts. Whilst higher up CoPs have the political power, Operational CoPs can enact their Operational CoPs power according to the way they carry out their work practices. A boundary spanner must be sensitive to the cultural context to manage it (Kellogg, Orlikowski, & Yates, 2006).

Boundary spanners can take the role of translators if they are able to “frame the interests of one community in terms of another community’s perspective” (Brown & Duguid, 1998, p. 36). A boundary spanner can potentially close the difference between different CoPs and thus facilitate mutual learning and knowledge sharing, by facilitating coordination and transparency of the different groups, overcoming issues around trust and shame. Trust is only an issue as far as the boundary spanners are not truly part of the communities between which they aim to cross boundaries (Brown & Duguid, 1998). A particular challenge is around the group’s tacit knowledge, which they need to manage (Erden et al., 2008; Spender & Grant, 1996).

Boundary spanners within the research context, have at least temporarily, multi-membership in two different CoP, which can be permanent (Wenger, 2000) or be transitional in nature (Akkerman & Bakker, 2011), because of which they have a superior understanding of local context and social constructions of meaning:

Horizontal boundary spanners cross sites

Horizontal boundary spanners are those characterised by the same level of power and who move from one Operational CoP to another. They have acquired knowledge within their

initial working place, which they can potentially adopt within the new setting. Those people have a deep tacit understanding of the way Operational routines are executed in the previous site and if they gain legitimacy in the other site are capable of replicating practices. These boundary spanners however, also have to deal with the phenomenon of power asymmetries, because they may be requested to simply adjust to the new local context:

“I reject it right away.” (P-2, Specialist CoP; initial response when asked what he does when outsiders suggest altering ways of doing the maintenance)

The gaining of legitimacy is thus a central aspect for successful boundary spanner:

“People share knowledge when they know each other. When I am a mechanic in Ministro Hales and have worked as a mechanic in RT before and know the people there, then I will call them. But with time they lose contact.” (P-5, PSG CoP)

The idea of vertical boundary spanning has been proposed by various interviewees to foster knowledge sharing and learning across different CoPs.

“Bring people from other sites to observe how we do things here or send people from here to other mining sites, so that they can teach their knowledge and lessons learnt to other sites.” (P-13, Operational CoP)

“The other day I was thinking about this. A lad could be sent to another mining site, so that he could talk to the people there, but not with the manager, that doesn't help. That maybe a specialist goes to talk to the people and, I don't know, maybe stays there for a month. This lad evaluates the knowledge and learning of the people and like... this moves it from one site to another.” (P-20, Specialist CoP)

“All the specialists of the mining sites, for example from the Calama region (...) should have a meeting. I don't know if this is possible, but they should meet.” (P-12, Operational CoP entering Specialist CoP)

Vertical boundary spanners

Vertical boundary spanners are those that foster learning and knowledge sharing across hierarchically different CoPs. This generally implies permanent multi-membership of people that belong to an Operational CoP and the Specialist CoP, or Senior Specialist CoP.

“Of course, there are many people one gets to know over time. Because I have been at many sites here in Chile, there are many people I know and with whom I share contact details and information.” (P-8, Senior Specialist CoP)

Just as in the case of horizontal boundary spanners, these need to gain legitimacy of the Operational CoP. However, because of their superior position in the hierarchic network of CoPs they are associated with more power, which they can use to enforce legitimacy.

The PSG CoP could facilitate boundary spanning, because within their group they are well connected and also clearly have a lot of theoretical knowledge. However, because of their somewhat disconnected status, as outlined above, they have difficulties in gaining legitimacy from the Operational as-well-as Specialist CoPs.

Courses

Furthermore boundary interactions can serve as mechanisms to move knowledge across boundaries (Wenger, 1998, 2000), which happen when outsiders temporarily immerse into the CoP or when several members of each CoP participate in a joint encounter. These encounters can happen because of joint projects or also if the two respective CoPs have an overlapping practice.

“For me, practice is everything, because you can learn things in courses but practice is different. Unless you have first the practice and then participate in a course.” (P-2, Specialist CoP)

“When you work at Komatsu you have the guarantee that they send you to many courses. I have also gone to many and I get to know other people from other sites

(...) where you can discuss things and make friends, or let's say colleagues.” (P-15, Operational CoP)

Whilst courses are usually designed as unilateral encounters, where some experts who know a topic teach the participant how to apply them, these courses fulfil another purpose in fostering dialogue and engaging in joint learning and knowledge sharing activities.

“All the specialists of the mining sites, for example from the Calama region (...) should have a meeting. I don't know if this is possible, but they should meet.” (P-12, Operational CoP entering Specialist CoP)

Online platforms

Within Komatsu there are online platforms that are used to publish information about defects and other relevant information with the wider group of people who are members of these virtual platforms. Several people have referred to online platforms that contribute to learning and knowledge sharing. However, whilst they provide a means for boundary spanning, they are regarded as of little help unless the people who communicate through these trust in each other, as has emerged throughout the research.

5.2.5 Boundary objects

Within each CoP members negotiate and construct meaning, which is particular to their respective practice, domain and community. As outlined above, this happens through participation and reification, where reification relates to the processes and products that are associated with meaning, which is constructed through the process of participation (Wenger, 1998). Boundary objects are not static but have a “(potential) performative nature in crafting social-material relations around work practices” (Erden et al., 2014, p. 4)

Throughout the research and analysis phase different boundary objects have been identified:

The shovel

The shovel itself presents probably the most important boundary object in terms of reification, because it presents a “common ground for communication and knowledge sharing by invoking a shared locus of practice” (Swan et al., 2007, p. 1814). However, the meaning making process around it which happens through participation diverges. Arguably, learning is driven at the shovel:

“I don’t study so much in books, I learn at the shovel.” (P-17, Operational CoP)

“One learns at the shovel, of course. Well, from courses you take away knowledge of the shovel, but that is only theoretical knowledge... but it’s about application in practice.” (P-13, Operational CoP)

“You learn in the field.” (P-1, Specialist CoP)

“80% of what you learn, you learn at the shovel.” (P-8, Senior Specialist CoP)



Picture 9: A shovel that has suffered a defect and is reviewed by mechanics.

All these indications emphasise the important role that the shovel takes in terms of learning. Meaning that is produced in absence of the shovel will suffer difficulties in finding acceptance within the respective communities, unless those talking have a wealth of experience working with the shovel in the respective contexts. However, it is not only the presence of the shovel but the way people get involved with it, the way they enact participation. As long as they do not put “hands-on-iron” they will have a different contextual meaning of the shovel than those who actively work on it. The different forms of participation become evident in the different practice focuses as-well-as diverging values and purposes. So while it constitutes to be a boundary object, it does for itself not ensure the bridging of different CoP.

Technical manuals

Boundary objects are defined by somebody, who is in a more powerful position than those not participating in the definition of the object (Swan et al., 2007). Throughout the research and analysis phase the importance of codified knowledge in the form of manuals became apparent. In terms of shovel maintenance there appears to be so much required knowledge that it cannot be all tacit, but requires codification. Within shovel maintenance these manuals seem to have provided something generally accepted and useful. While there are differences in the degree to which people engage in reading manuals, nobody among those interviewed obviated its importance in terms of learning. This refers to those that already have a lot of experience:

“I am always reading the manual. If there is any defect I read the manual and look for plans to find the source of the defect in the manuals.” (P-20, Specialist CoP)

“When I can’t resolve a problem with my knowledge I consult technical manuals.” (P-2, Specialist CoP)

“They call me and tell me to come to Mina Sur (...) because they have a problem with the temperature of a machine I don’t know. So what do I do? I grab the manual and read, read and read.” (P-5, PSG CoP)

“When we have a problem where we don’t know the solution we search in manuals and books.” (P-13, Operational CoP)

“I learnt by getting involved with the machine, studying the machine and reading the manuals.” (P-7, Senior Specialist CoP)

“When I started there were no courses, so we learnt with the manuals and by asking the Germans.” (P-6, Senior Specialist CoP)

On the other hand even those that are just starting to participate in shovel maintenance get engaged with the manuals to foster their learning:

“There were moments where I had nothing to do (...) so I just grabbed the manuals that were in the office and started reading a little bit.” (P-12, Operational CoP entering Specialist CoP)

“I read the manual and even wrote my own little one. Then I started to read and then discussed it with others... this way I solved doubts I had.” (P-22, Specialist CoP)

“Because they have taught me to ask questions and study at the same time, I explained to them (newcomers) how to do things and ask them to study. If they get more doubts then they will ask me making reference to the manual.” (P-2, Specialist CoP)

“They told me: if you don’t verify something in the manual, it may be pure lies.” (P-2, Specialist CoP)

The degree to which they get engaged is different, though, and some associate more importance to it than others:

“I hardly study (...). If I have to read something specifically I know where to find it, but I don't read every day.” (P-17, Operational CoP)

Whilst they are without a doubt boundary objects, they are restricted to the extent that they will always require tacit knowledge in interpreting it. As boundary objects people learn to read and understand the manual as part of their practice.

“The manuals cannot tell you everything you need to know.” (P-12, Operational CoP entering Specialist CoP)

“When the manual is not specific enough or I don't know how to interpret it I discuss it with another specialist.” (P-2, Specialist CoP)

“Not everything is in the manuals and sometimes it is not well explained. Then you need to call somebody and ask.” (P-8, Senior Specialist CoP)

The manual without participation in the form of active application in practice is considered to be of little value:

“We have the plans hanging on the wall in one office and together with the manuals we meet and talk about them with some lads.” (P-12, Operational CoP entering Specialist CoP)

“I read the manual, but then I have to check it out at the shovel, if it really works. Then you don't forget the learning anymore.” (P-22, Specialist CoP)

Procedures and work sheets

More boundary objects are the procedures and work sheets that should be applied within the different mining sites. In a recent effort to enhance the quality of the maintenance and repair work, the Senior Specialist CoP have developed a set of new guidelines and check lists, which include various improvements. They are based on the expert knowledge from the Senior Specialist and are believed to provide the mechanics from the Operational CoPs with a better framework to do their job. Throughout the interviews there were hardly any

references to these. There is evidence that they are not uniformly used, but rather filled out to comply with the documentation requirement, however, the way the respective items are understood and interpreted varies as well.

While these serve as boundary objects, there is no evidence that they are continually improved by the feedback from those that apply them. Since their implementation in September there has been no feedback from the Operational CoPs in terms of how they may improve. From this perspective these worksheets are rather uni-directionally adopted in boundary crossings, even though the way they are enacted from site to site may vary.

5.3 Context Specific Aspects in Chile

It is very difficult to accentuate context specific aspects of CoPs in Chile as part of the research project, because the findings above cannot be regarded as separated from the social-cultural context in which they are immersed. Nevertheless, there are some aspects that were recurrent throughout the research and which may be associated with the social-cultural context of Chile. Among these, the quality of the personal relationships between the people involved in learning and knowledge sharing seems to be very important.

Roberts (2006) raises the question whether societies characterised by strong social ties also host more effective CoPs. First of all it may be safe to argue that the role of familiar ties in Chile has a very high relevance within society, as also emerged throughout the interviews:

“As Latinos and Chileans, we are very attached to our family.” (P-3, Senior Specialist CoP)

“We all work for the same purpose: our family.” (P-19, Specialist CoP)

“Mina Sur is a family. As a little mining site, we say it like that, it’s like a family. Everybody knows each other. There are many ties and affections.” (P-13, Operational CoP)

This may also support the fact that particularly the Operational CoPs are characterised as tightly knit groups, who engage jointly in their respective practices. A pivotal factor is the trust that is generated within this group:

“We have a relation of companionship and mutual help.” (P-15, Operational CoP)

“The trust that exists is between the people, you have to give them trust, treat them like ‘hey, my friend’.” (P-13, Operational CoP)

“With my group we are more than colleagues, we are friends.” (P-8, Senior Specialist CoP)

“For difficult problems I talk with specialists friends of mine.” (P-20, Specialist CoP)

“When I have a problem that is not very common I call my friends.” (P-7, Senior Specialist CoP)

However, while this is positive for learning on the inside of the CoP, the cultural-social context is likely to present a challenge in terms of learning and knowledge sharing across its boundaries. It seems that close personal relationships are most likely to ensure quality within boundary crossings. Those that indicate that they share knowledge or learn with people outside their community usually refer to relations of friendship:

“I was talking on the phone and asked ‘how do you do this? We always do it like this’. My friend told me that they work in function of man-hours available and I felt that this was something we should also do.” (P-11, Operational CoP)

“While you shouldn’t confuse friends with colleagues, we have generated a lot of personal instances where we spend time together.” (P-2, Specialist CoP)

“There are no ties between mining sites. Each mining sites worries about their own only. Between friends it’s different. There you can generate ties and share information with your friends.” (P-20, Specialist CoP)

In line with this more than half of the interview participants made reference to the importance of trust in the context of knowledge sharing in learning.

“The truth is that I trust that person and therefore ask questions.” (P-11, Operational CoP)

“If you trust them you will also dare to ask questions.” (P-19, Specialist CoP)

“I need to have trust to ask somebody.” (P-22, Specialist CoP)

As outlined above in section 3.1.2.1, Chile is characterised by *paternalistic authoritarianism*, which manifests itself in a powerful elite which dominates the rest of society under the umbrella of protection and wise decision making (Gomez & Rodriguez, 2006). Throughout the research the tightly knit ties among the members of the Operational CoPs have been indicated, which may be influenced through this cultural trait. In line with Granovetter (1973) the strength of ties may contribute towards learning inside the community, but makes it possible that they reject knowledge that comes from outside from different CoPs. While this is not enacted in direct rejection, it is materialised in the way work practices are accepted or not.

“I believe that we Chileans are not very collaborative in a sense that we never give all information but always keep some to ourselves.” (P-12, Operational CoP entering Specialist CoP)

Beyond differences in social class, some evidence has also been gathered that different origins within Chile may influence the trust and collaboration among and between different CoPs:

“People from the south move a lot and they like to work. They don’t like to sit around and do nothing. The people from the north are a little bit more relaxed and work slower... you can really tell.” (P-18, PSG CoP)

In a lunch conversation two workers from the north claimed that there were many people from the south now, who would be so ambitious and take away the jobs from the people in the north. Within this research there was not sufficient evidence to ascertain the extent to which these cultural boundaries could negatively influence the performance of CoPs or to what extent in general this could undermine efforts in fostering knowledge sharing and learning.

One of those interviewed referred to the “Chilean way” of doing things. This is associated with the presupposition that people always find a solution to any problem, even though it may be paradoxical and not comply with standards, in order to get things done. This may highlight the role of non-canonical practices, in contrast to other countries and negatively influence efforts to increase knowledge sharing and learning, because these non-canonical practices may not be shared openly with others or contain so much tacit knowledge that its sharing may be very difficult.

In general it has been evidenced that CoPs operate in the context of a geographically dispersed organization in Chile. Beyond the findings outlined before, it can be stated that the quality of the personal relationships, particularly friendship and trust, are vital aspects to ensure knowledge sharing and learning within and across multiple, hierarchically networked CoPs in Chile.

Chapter 6 Discussion

The preceding chapter presented and discussed the research findings and analysis for the case of shovel maintenance within Komatsu Chile. This chapter is a reflective commentary on the overarching research questions. Whereby research is always highly context dependent, this should provide new insights that can be further pursued within the academic as-well-as practitioner fields.

6.1 CoP within a Geographically Dispersed Organization in Chile

The first research question was stated as follows:

- What forms do CoPs take within a geographically dispersed organization in an emerging economy in Latin America?

In response to this question the research has generated several key findings. Some of these support existing theories and others extend the current base of knowledge. One of the most elementary, yet very relevant findings, consists in the confirmation that CoPs do exist within a geographically dispersed organization in an emerging economy in Latin America. This is supported by the fact that those interviewed have made explicit references about the way they learn through observing, asking and participating, thus underpinning social learning theories through general and legitimate peripheral participation in particular. It has been furthermore confirmed that these groups of people are held together by shared common values, shared social context, mutual engagement and commitment to a joint enterprise (Wenger, 2000, 2011; Wenger et al., 2002; Wenger & Snyder, 2000). There is also evidence that newcomers need to gain legitimacy to be regarded as full members. The learning is not only concerned with technical tacit knowledge, manifested in know-how for the execution of psychometric skills, but also embraces the cognitive dimension of being part of the CoP (Nonaka & Konno, 1998; Wenger, 1998). The latter embraces participating in the meaning

making of manuals and procedures. People also learn how to talk to each other, behave in front of a customer, and adhere to security standards.

Whilst the above supports existing CoP theory, this research provides evidence that CoPs are not only differentiated according to the way they engage in their practice, but also present fundamental differences in terms of their domain and community. There are CoPs that highly depend on geographic and organizational proximity (Operational CoPs), whilst others are reliant on cognitive and social proximity (Specialists CoPs). In terms of practice, CoPs vary greatly regarding their learning space, outcomes and associated processes as will be discussed in the next section. Furthermore, the routines they adopt and the quality of the knowledge they base these upon, can be of a very conceptually different nature between different CoPs. Intuitively it may be argued that people who engage in similar practices also share a common domain, in this case the shovel. However, evidence from the research indicated that while the object of work (the shovel) may be the same, the purposes and the valued endeavours can differ significantly. It should thus not be assumed that people who geographically work together (e.g. at the shovel) necessarily belong to the same CoP.

Supporting the understanding that CoPs have different natures, Amin and Roberts (2008) have proposed the interesting conceptualisation of four types of CoP: They regard CoPs as *craft and task based* when their central concern relates to the “development of kinaesthetic and aesthetic senses through repeated practice of certain tasks” (p. 356). *Professional CoPs*, they argue, are characterised by academic study and the development of intellectual capabilities. They furthermore refer to *epistemic CoPs* as those that “tend to be structured around common projects and problem-driven cooperation” (p. 356). Finally, they term a CoP as *virtual* when its members share cognitive proximity and are thus uncoupled from the needs of geographic proximity.

The proposition of Amin and Roberts (2008) to categorise CoPs into four groups according to their activity focus, type of knowledge, social interaction, innovation and organizational

dynamic steers academic conversations about CoPs in the right direction. However, this research provides evidence that they can take further forms, which finds support in the declaration that “it cannot be assumed that knowledge dynamics in situated practice are homogenous” (Amin & Roberts, 2008, p. 356). Therefore, it is argued that *CoP Alterity* constitutes the framework upon which CoPs should be assessed. According to this CoPs need to be defined based upon the three overarching CoP dimensions, namely in terms of their practice, domain and community (Wenger, 2004, 2011) as proposed in section 5.1.2.. This pays due respect to the dynamic and situated nature of CoPs without omitting its fundamental building blocks of practice, community and domain. Based upon this, four types of CoPs have been identified within this research project. However, applying *CoP Alterity* may also lead to the categorisation of further different types of CoPs, like those postulated by Amin and Roberts (2008).

Based upon the literature review, it is regarded as unlikely that there is a single CoP, spanning this geographically dispersed organization within Chile. Instead it has been argued in line with Brown and Duguid (2001b) that large distributed communities constitute a network of practice, which are composed of multiple, interconnected CoPs (Roberts, 2006). Supporting this, CoPs and NoPs do not exist on their own and separately, but on the contrary, they develop jointly together (Wenger et al., 2011). The research findings support this postulation, having identified multiple and heterogeneous CoPs, according to *CoP Alterity*, throughout the research context. However, a further interesting finding that has emerged from this research refers to the structure and quality of relationships among the CoPs that form part of this overarching NoP. The field work and analysis has led to the understanding of a *hierarchic network of CoPs*. This hierarchy is enacted through power asymmetries between the different CoPs. The ones situated in a hierarchically superior position, are credited with a further developed body of expert knowledge about the subject matter, in this particular case about the shovels. Meanwhile, the subordinated CoPs are rather categorised by local knowledge (Yanow, 2004), and the power of the superior CoPs is

manifested in superior experience, which imbues their opinions and suggestions with more legitimacy than that of others. Beyond this, they have the authority to enforce their superior knowledge on subordinated CoPs. This authority is formal to the extent that members of superior CoPs usually have the corresponding job title that certifies their knowledge. However, the authority can also be of an informal character, when the members lack the adequate job title, but earn the respect of the subordinated CoPs based upon the results they obtain from shovel maintenance activities. Furthermore, superior CoPs are more powerful because their geographical reach is wider than that of subordinated CoPs. Ultimately, because of the above, they are usually closer to the organizational decision makers, which also reinforces their position of power. However, this hierarchy does not imply a situation of command and control from the top to the bottom. As a matter of fact, the relations between the different CoPs can well be marked by latent conflicts, which make knowledge sharing and learning more difficult. Beyond the differences in practice and community, it is proposed that in particular, differences regarding the domain, embracing purpose and values, are sources for inter-community conflicts. This became evident because of value judgements CoPs make about each other, postulating similarity in terms of purpose and values, which however does not exist.

Whether the CoPs within the NoP contribute or impede knowledge sharing and learning throughout the hierarchic network depends fundamentally on the quality of the boundary processes, as will be discussed in relation to the second research question. Within the hierarchic structure of CoPs members can ascend to a superior CoP if they gain their legitimacy. It is likely that people move first within their hierarchy, before they are formally ascended within the organizational structure. However, if the company fails to recognise the participation of someone in a superior CoP, the person may tend to suffer from this lack of recognition and potentially leave the organization.

NoPs are usually claimed to exist because of a similar, overlapping or interconnected practice (Brown & Duguid, 2001b; Gherardi & Nicolini, 2002). Whilst it is argued that shared practice facilitates collaboration across boundaries, it is not necessarily the only prerequisite, as Swan et al. (2007) have indicated in recent work. This research complements NoP theory in that it has revealed that different CoPs are actually connected by an overarching nexus beyond practice, which I have termed *CoP Glue*. This can be seen as the overarching, with meaning associated abstraction (reification) within the NoP that holds the different CoPs together. It is continuously negotiated and influenced (participation) through the world that the CoPs are embedded in (Wenger, 1998). Some aspects associated to it are rather stable, though, like the hands-on way of working amongst others, as outlined in Section 5.1.1. The way people make meaning out of this overarching abstraction through participation is different, but it constitutes a shared point of reference. Understanding the existence of *CoP Glue* leads to focus more on the shaping of collective identities (Wenger et al., 2011), which facilitate cross boundary knowledge sharing and learning. Indeed, there has been research that associates the failure to share knowledge across community boundaries with the lack of a shared identity (Kimble & Hildreth, 2004). Wenger et al. (2011) emphasised the importance of purpose in the cultivation of CoPs. The research supports the understanding that purpose, manifested in *CoP Glue* is highly relevant within the hierarchic network of CoPs as well. Because of the nature of *CoP Glue*, which is constructed in a social context by members of hierarchically connected CoPs, it cannot be determined by an overarching authority, but needs to be negotiated by those who make meaning out of it. *CoP Glue* should present a focus of attention from organizations to facilitate cross boundary knowledge sharing and learning.

In conclusion, it can be added that the cultural context does indeed influence the functioning of CoPs. The consequences that go along with a hierarchic network of CoPs may be more relevant in a country like Chile, which is characterised by paternalistic authoritarianism (Gomez & Rodriguez, 2006). Knowledge sharing and learning between CoPs is likely to

work better in cultures that are not as clearly separated according to hierarchical structures. However, the cultural influence principally refers to the quality of the social dynamics within and between CoPs. In general the understanding of CoPs as “groups of people who share a concern or passion for something they do and learn how to do it better as they interact regularly” (Wenger, 2011, p. 1), characterised by a common domain, practice and community is also supported in Chile. Throughout the geographically dispersed organizations these CoPs are structured as a hierarchic network, differentiated because of *CoP Alterity* and held together by *CoP Glue*.

6.2 Contribution of CoP to Knowledge Sharing and Learning

Based upon the understanding of the forms that CoPs take within the research context, the second question that has determined the research process was the following:

- What is the contribution of CoPs for learning and knowledge sharing within a geographically dispersed organization in an emerging economy in Latin America?

As outlined in the preceding section, social learning in general and legitimate peripheral participation in particular in the context of CoPs, have been identified as the vehicles for learning within the research context. Literally all of the research participants stressed that their learning occurs within the context of practice, which is always social (Reckwitz, 2002), rather than in classroom settings. A central role within this context takes experience, supporting the conceptualisation of legitimate peripheral participation, where those at the centre of CoP are characterised by having more experience. Experience emerges through participation in a CoP for a prolonged amount of time and cannot be obtained by the means of abstract knowledge alone. Experience is clearly more valued than abstract knowledge as several of the research interviews have revealed. In line with this, CoPs contribute to learning because they provide a space in which people build up experience in a social context. Thus, stability of CoPs facilitates the learning within them. However, too much stability may make them resistant to external stimuli. The importance of experience is

underpinned by stressing that several Operational CoPs get the maintenance work done, even though they lack any type of formal training.

To understand the contribution of CoPs for learning and knowledge sharing, it is vital to differentiate between the multiple and heterogeneous CoPs, according to the postulated *CoP Alterity*.

The research in the context of *CoP Alterity* has provided evidence that the learning space varies between different CoPs. While learning is always enacted in practice at the shovel for those CoPs that form part of the overarching hierarchic network, some may be more likely to absorb knowledge in the absence of the shovels as well. This is emphasised in the fact that Operational CoPs are more reliant and founded upon locally embedded, tacit knowledge generated at the shovels than other CoPs within the research context. Operational CoPs may be reluctant to participate in courses conducted in the format of classroom training sessions. This is supported by the fact that a large proportion of people who undertake tests after courses in classroom settings fail. Unless participants of formal class courses already possess a significant amount of knowledge, training sessions on-site are likely to yield better results. It is also questionable whether classroom based courses help to foster constructive knowledge sharing between participants from different CoPs. The principal contribution could consist in the fostering of trust between the participants, if the courses provide space for this. Increased levels of trust could make the members of the Operational CoPs more open for knowledge from other sites afterwards and thus facilitate learning. In spite of this, classroom settings are likely to generate value if conducted with members of the Specialist CoPs, who value the increase of their abstract knowledge base. The latter remains useless though, unless the people get the chance to enact it in practice afterwards. Furthermore, members of Specialist CoPs are likely to benefit from formal class training by widening their social relations with Specialist colleagues from other sites. The Senior Specialist CoP, on the other hand, seems to be generally reluctant to office environments, because of class settings

may not be suitable for them. In general it is worth stressing that the critical assessment of the learning space (in line with *CoP Alterity* theory) is likely to provide evidence about the spaces that should be chosen to foster learning and knowledge sharing within and between CoPs.

Furthermore, it has been detected that learning differs as much in terms of outcomes as much as it does in terms of processes. Operational CoPs may be best associated with single-loop-learning that results in assimilative outcomes, manifested in reinforced operating routines, which contemplate non-canonical practices. Senior Specialist CoPs however, are characterised by an advanced level of reflexivity that indicates double-loop-learning and results in accommodative learning, which is manifested in search routines or dynamic capabilities (Katkalo et al., 2010; Teece, 2007), aiming to improve operating routines. In the case where the learning is related to operational routines, it may potentially be assessed according to learning curves (Argote et al., 1990; Darr et al., 1995; Epple et al., 1991; Reagans et al., 2005). This is manifested in the repeated execution of tasks, where people do their work better every time. Within the research there has been no evidence about the occurrence of transformative learning. This may be associated with the cultural trait of Chile, characterised by little critical assessment of underlying assumptions and conditions (Perez Arrau et al., 2012). Whilst the learning is different between CoPs, it is always enacted through them based upon social learning in general and legitimate peripheral participation in particular, as the research has clearly demonstrated. This also refers to those people who study a lot individually in their free time (members of Specialist CoPs), because they afterwards enact it in practice. The fact that they study is also a requirement to obtain legitimacy to belong to the Specialist CoP.

This research furthermore provides evidence that interruptions constitute mechanisms for learning and knowledge sharing across CoPs. Analysing the CoP according to *CoP Alterity* revealed that Specialist CoPs actually welcome defects and unknown problems, as they

constitute mechanisms for learning. For others however, such as Operational CoPs, disruptions may cause dysfunctional behaviour such as bypassing the error rather than solving it.

Fundamentally, because of the social dynamics CoPs are autonomous and thus difficult to control directly. This leads to the “unavoidable risk of dysfunctional behaviours” (Wenger et al., 2002, p. 159). In support of this, the learning activities they engage in may be contrary to the interest of the organization (Kimble & Hildreth, 2004). While the organization can aim to impose learning outcomes, these are unlikely to deliver the expected results, because learning is clearly a social endeavour, manifested in mutual meaning making, rather than the internalisation of knowledge (Lave & Wenger, 1991). In the research context it has been confirmed that specifically the Operational CoPs, adopt non-canonical practices to get their job done. This is manifested in workarounds (*‘machinas’*), like the inadequate usage of tools, or practices to install bypasses that block the sending of error signals to the computer of the shovels. While they may apparently solve adverse problems this way, they do not deal with their root cause. Beyond the direct negative consequences of some of the non-canonical practices, they negatively influence knowledge sharing. Because of their existence authorities within the CoPs may aim to control the communication with others to hide the adoption of non-canonical practices. This may cause defensive behaviour for the members of these CoPs and reduce their openness for communication with people who are not part of their group significantly. Potentially, this may be reinforced by the Chilean cultural trait of paternalistic authoritarianism where an authority takes control, assuming that the subordinated are not capable to manage their freedom wisely (Gomez & Rodriguez, 2006; Rodríguez & Ríos, 2009), which in this case is manifested in terms of how they communicate with others.

The research has evidenced that a CoP may be reluctant to knowledge sharing in general and learning in particular, when its members do not dare to ask questions of others.

Members belonging to a hierarchically superior CoP have argued that they are not asked questions when they are on-site with Operational CoPs. They argue that people do not ask because the rules of their CoP impede them from doing so. Within their world of socially constructed meaning, asking questions can be understood as a sign of weakness. However, this may also be reinforced by a culture where, particularly in boy's schools, students who ask questions are made fun of, as several personal conversations revealed. Students who are really interested are likely to ask the teacher after class in private to avoid the laughter of their fellow students. This may also cause members of CoPs to be reluctant to ask questions.

Concluding, it is argued that CoPs take a central role for learning and knowledge sharing within a geographically dispersed organization in Chile. This is because the research underpins social learning theories in general and legitimate peripheral participation in particular. Knowledge sharing implies adoption in practice, for which CoPs are the vehicle of learning. The extent to which they contribute depends on the type of CoP according to *CoP Alterity*. Some CoPs may be more open for external knowledge than others. Therefore, the central concern for organizations resides in the cultivation of CoPs, situated within a hierarchic network. The aspects that contribute to or impede learning and knowledge sharing in line with this, will be reflected upon within the next section.

6.3 Contribution to Learning and Knowledge Sharing Between CoP

Based upon an understanding about the form that CoPs can take, as-well-as their contribution to knowledge sharing and learning, the third research question relates to the aspects that contribute to or impede learning and knowledge sharing between CoPs:

- What are other relevant aspects that contribute to or impede learning and knowledge sharing between CoPs within a geographically dispersed organization in an emerging economy in Latin America?

Beyond the understanding of the aspects that contribute to or impede learning and knowledge sharing between CoPs, it is worth reflecting upon the ways in which the organization can deliberately use this understanding to cultivate CoPs accordingly.

First of all, it is important to bear in mind that the steering of CoPs presents a significant challenge as described above (Thompson, 2005; Wenger et al., 2002). Nevertheless, this research has provided evidence that organizations can, to a certain extent, indeed facilitate and cultivate CoPs to foster learning and knowledge sharing (Wenger et al., 2002). The pivotal criteria that drives these efforts revolves around the understanding of the characteristics of the CoP according to *CoP Alterity*.

A fundamental aspect resides within the dimension of **community** and related to the proximity out of which the respective CoPs are born. Proximity in this case is not to be understood as a definite and separated aspect, but rather as a tendency, which is mutually influencing with other types of proximity. If the CoP is strongly influenced by geographic and organizational proximity as is the Operational CoP described in the preceding Chapter, the organization can steer them by collocating people who have the characteristics that they would like to flourish within the respective CoP. Because of the required proximity, the chances are good that they will become members of this CoP and can make their influence in the shaping of the CoP matter. This is particularly the case if this member already counts on a relevant body of knowledge about the practice, which increases the likelihood of earning legitimacy. In the case that the behaviour of these CoPs do not align with the interests of the organization (Kimble & Hildreth, 2004), the organization may split up the group that forms the CoP and then insert newcomers with sufficient leadership and knowledge to shape it towards more favourable behaviour. It is regarded as a difficult task to fundamentally change the course of these CoPs unless the organization intervenes in terms of rotating people. This goes in hand with the suggestion that CoPs pass through a “natural cycle of birth, growth and death” (Wenger et al., 2002, p. 68). The organization may

accelerate or slow down this process within the CoPs, which are dependent on geographic and organizational proximity. Even so, the risk remains that the people anticipated to shape the construction of the CoP do not do so. This may be owing to the social dynamics that occur within the respective context, which cannot be controlled and steered purposefully. Those CoPs that depend on geographic and organizational proximity are unlikely to share knowledge with similar CoPs in other parts of the dispersed organization. Moving people with these characteristics between different CoPs (horizontal boundary spanning) may be a mechanism to facilitate knowledge sharing and learning throughout the organization.

Nevertheless, the outlined strategy is unlikely to work for CoPs that are not founded upon geographic and organizational, but rather on cognitive or social proximity. The steering of these renders different challenges. The organization can influence their creation by providing shared spaces in which the (potential) members can meet to foster their social relationships. The research results have indicated that the members of these CoPs (Specialist and Senior Specialist CoP) are strongly nurtured by occasions where they could build up personal relationships. Even though they establish mechanisms to communicate and operate as a distributed CoP (Wenger et al., 2002) afterwards (e.g. through instant messaging, phone calls and virtual sites), they explicitly expressed their desire to have more occasions of personal interaction. It is believed that this is strongly related to the requirement of trust. Particularly, in the Chilean culture, where levels of trust are very low (Perez Arrau et al., 2012; Valenzuela & Cousiño, 2000), this constitutes a difficult task. CoPs in the country are unlikely to establish if they do not have personal interaction, which increases trust among its members. Similarly in other cultural contexts, the importance of personal contact for the establishment of CoPs has been advocated as vital (Hakanson, 2010; Vaast & Walsham, 2009). Nevertheless, this may be different in the case of CoPs that are constituted because of cognitive proximity alone. As an example PSG engineers from around the world may constitute a global CoP that does not need require increased levels of trust. In these cases they may solely rely on a virtual space to establish themselves. However, in the case of this

research virtual sites are more suitable once personal connections have been established and people dare to contact those people publishing something, as was evidenced throughout the research. Whilst the organization can foster the existence of these CoPs that depend on social and cognitive proximity, the chances to dismantle and reconstruct them according to a desired state are low.

Particularly those CoPs that depend on cognitive proximity are not restricted in terms of spatial distance and are therefore enacted as entities that share knowledge and learn throughout a broader region (e.g. country). The cognition presents the principal boundary of these CoP. However, cognition does not constitute in abstract, explicit, individual and static knowledge but is multifaceted, thus situated, implicit, distributed and developing (Blackler, 1995). This can be embraced within the **practice** of the CoP. Because of this, it may be difficult to think of a CoP of senior experts in a field founded upon cognitive proximity, whose respective context is fundamentally different. In the research context this is evidenced by the Senior Specialists CoP which is credited with an extended body of knowledge about shovels. However, they do not conform to a joint CoP with the engineers in the factory, who are also characterised by significant knowledge. This is fundamentally because their practices as-well-as their domains differ significantly. In the case of CoPs bound together by geographic as-well-as organizational proximity and who share a similar domain, the practice emerges rather naturally. This has been evidenced by the fact that the people who work as welders also learn other tasks, such as mechanics, and thus engage in further activities and shape the practice together.

Beyond the establishment of the CoP, which because of the autonomous and uncontrollable nature CoPs embodies an “unavoidable risk of dysfunctional behaviours” (Wenger et al., 2002, p. 159), there is evidence that the organization should emphasise on the **domain**, particularly its values and purposes. If CoPs align in this respect, the likelihood of successful and beneficial learning and knowledge sharing significantly increases. This supports the

postulation of Wenger et al. (2011, p. 12) who stress the importance of the domain regarding the cultivation of CoP: “Sharpen the understanding of what are the common issues or domain, what value people get from participating, and what they are trying to achieve.” An example is safety, which has been characterised as an important aspect throughout the different CoPs in the research context, even those that are disconnected. Because everybody within the research was clearly interested in safety, information about accidents are generally shared rather rapidly throughout the organization, based on informal mechanisms to reduce the risk of its reoccurrence in other parts. In this particular case the ‘why’ is rather intuitively clear to everyone, even though it may move out of consciousness of the respective people when they ‘forget’ about the negative consequences. Supporting this, an aspect that facilitates knowledge sharing and learning across CoPs is argued to consist in aligning purpose and values. These cannot be enforced as a “frozen negotiation” (Bowker & Star, 1994, p. 104 as cited in Brown & Duguid, 1998) but need to be constructed in the respective social context.

CoP Glue consists of an abstraction in this research project. It is symbolised by the ‘Paleros’ (“Shoveler”) construct. This is reified and imbued with deep meaning that is continuously emerging and negotiated. The way people participate in making meaning out of this abstraction varies. However, it acts as glue, because of their desirability, aspirational nature and exclusivity from others, presenting an important mechanism to foster boundary spanning and thus facilitating learning and knowledge sharing across CoPs.

In continuation with the above it can be stated that the extent to which CoPs contribute to learning and knowledge sharing throughout the geographically dispersed organization is fundamentally dependent on the quality of the boundary processes. This quality is manifested in ‘boundary objects in use’ and ‘boundary spanners in practice’ (Swan et al., 2007, p. 1821). The research has revealed that boundary objects, in terms of procedures, manuals and checklists have been the focus of the organization. However, these boundary

objects for themselves generate little value, unless the respective CoP engages in a meaning making process (Wenger, 1998). This can be facilitated through boundary spanners. Based upon the postulation of a hierarchic structure of CoPs, these can either be horizontal or vertical. Horizontal boundary spanning occurs when people move within the same hierarchy from one CoP to another and bring along new stimuli that may improve practice. These boundary spanners leave one CoP and move to another; they have only transitional multi-membership (Akkerman & Bakker, 2011). Vertical boundary spanners are those that belong to a hierarchically superior CoP and engage in the meaning making process with the subordinated CoP as well. These can potentially belong to two separate CoPs, thus they may be characterised by permanent multi-membership. Within the research some specialists belong to an Operational CoP as well as Specialist CoP. In both cases, they have to earn legitimacy within the CoPs to which they belong. Depending on the type of CoP, they may be so resistant to new stimuli that the boundary spanner is not accepted or has to adapt to the existing practices. This highlights the influence that power asymmetries have on learning within CoPs (Handley et al., 2006) as-well-as between them (Swan et al., 2002). Understanding the characteristics of CoPs according to *CoP Alterity* may help in managing the power asymmetries. As an example, various interviewees have expressed their aversion towards the office space environment, preferring to be close to the shovel in the field. If boundary interactions happen in an office, those that feel uncomfortable may inherit less power in the meaning making process. Cognisant of the fact that people within the research context are potentially reluctant to ask questions in public, boundary spanning activities may be constructed on several dyadic encounters in the most adequate learning space. This would be close to the shovel with members of Operational CoPs, whereas classroom settings may be adequate for members of Specialist CoPs.

Another culturally embedded aspect that influences knowledge sharing with other sites in Chile resides in the quality of personal relationships. Within the CoP context, it has become

evident that friendship and trust, within and across the CoPs constitute a pivotal factor for learning and knowledge sharing. Roberts (2006) argues the following:

“The presence of a relationship of trust between individuals indicates an ability to share a high degree of mutual understanding, built upon a common appreciation of a shared social and cultural context. Trust, familiarity and mutual understanding, developed in their social and cultural contexts, are prerequisites for the successful transfer of tacit knowledge” (p. 628).

This is particularly so within Chile which is characterised by its low levels of trust, a dominant theme to consider (Perez Arrau et al., 2012; Valenzuela & Cousiño, 2000). This deeply embedded cultural trait makes cross boundary interactions particularly difficult and an aspect the organization needs to consider, so that CoPs contribute to learning and knowledge sharing across boundaries.

In summary it can be stated that organizations can steer CoPs if they understand them well enough, in line with the understanding arising from the newly formulated construct of *CoP Alterity*. Beyond the practice, it should primarily focus on the fostering of *CoP Glue*, which constitutes the basis for successful boundary processes. To manage knowledge sharing across the geographically dispersed organization successfully depends ultimately on the quality of these boundary processes, manifested in ‘boundary objects in use’ and ‘boundary spanner in practice’ (Swan et al., 2007, p. 1821).

Chapter 7 Conclusions

In the previous Chapter reflections about the overarching research questions have been provided. In this final chapter the outcomes of the research process will be synthesised and depicted in the form of a revised theoretical framework of CoP, as postulated in the research title – the implications for practice and theory will be discussed here. This will provide practitioners, above all decision makers within Komatsu Chile, with recommendations to foster learning and knowledge sharing within the company. However, the implications for this theory open up interesting new fields of inquiry that required further investigation. This research has been of an exploratory nature and has been based upon the research paradigm of social constructionism. Because of this, the results obtained cannot be detached from the particular social and cultural context of shovel maintenance within Komatsu Chile. In line with this, the chapter includes a section that highlights the limitations of this research. Afterwards, suggestions for further research that have been revealed throughout this thesis, but were not sufficiently addressed, will be described to provide academics with suggestions about future research endeavours. The final section consists in concluding reflective remarks.

7.1 A Revised Theoretical Framework of CoP

The major outcomes of this thesis consist in the revised theoretical framework for the role of CoPs in learning and knowledge sharing within a geographically dispersed organization in an emerging economy in Latin America, Chile.

First of all it is worth mentioning that this framework supports and builds upon the initial conceptualisations about CoPs. Newcomers join communities of practice and learn from those with more experience. This way they move from the periphery to the centre of the community, through legitimate peripheral participation (Lave & Wenger, 1991). Learning is not detached from practice, but includes knowledge and actions enacted within the CoP

(Lave, 2009; Wenger, 2009). In line with this, CoPs create knowledge and become better at what they do (Brown & Duguid, 1991). A central aspect within this theory consists in the construction of meaning, which occurs through the processes of reification and participation (Wenger, 1998). Reification in this context embraces the process of associating meaning to abstractions (i.e. processes, tools, terms), which then constitute the reality for the respective CoP. However, these realities are not predefined, but emerge through participation of the members, who construct the social realities that they must later respond to (Burr, 2003). This is understood as a fundamental aspect for the members of a CoP, defining their sense of belonging and the forms of participation (Wenger, 1998). In support of this, boundaries and peripheries take a vital role for CoPs. Peripheries within the CoP represent continuity, whereby boundaries are manifested as discontinuities (Akkerman & Bakker, 2011; Wenger, 1998; Wenger et al., 2002). While the distinctions between boundaries and peripheries are not clearly marked, as a matter of fact they may be considered as fluid (Wenger, 2000) – criteria have been suggested to identify boundaries.

In summary the following definition epitomises the principal characteristics of a CoP:

“Communities of practice are groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly” (Wenger, 2011, p. 1).

Based upon this research, the inconsistencies in the usage of the “elusive term” (Rock, 2005, p. 77) CoPs can be attributed to two overarching reasons. As argued by Duguid (2008), several scholars and practitioners use the concept of CoP diverging from its most fundamental characteristics as outlined above. However, it is unlikely that CoPs are homogenous with regards to the social dynamics they are subject to (Amin & Roberts, 2008) and can therefore significantly diverge in terms of domain, practice and community. Because of this, the assessment of two different CoPs may lead to a belief that they are not only different with regard of what they do, how and why they do it, but furthermore questions

whether they can be consolidated under the same umbrella term, namely communities of practice. However, the reason for this may be caused by the missing theoretical framework to evaluate them, which is discussed further in this section.

This revised theoretical framework is clearly in line with the conceptual foundation of CoP theory (Brown & Duguid, 1991; Lave & Wenger, 1991; Wenger, 1998). Furthermore, it postulates the assessment of the nature of CoPs by using the new framework of *CoP Alterity*. This supports the conceptualisation of CoP theory and permits capturing the diverging social dynamics that differentiate one from another. Another topic of interest that this framework addresses relates to the size of CoPs, particularly regarding a geographically dispersed organization, arguing that they are embedded within a wider NoP according to a *hierarchic CoP structure*. The newly developed theoretical framework furthermore postulates that *CoP Glue* acts as the mechanism, beyond practice, that hold these NoPs together. Finally, the extent according to which learning and knowledge sharing occurs within the hierarchic CoP structures is dependent on the quality of the *boundary processes*. Within the following sections more light will be shed on each of the mentioned aspects that compose the revised theoretical framework.

7.1.1 CoP Alterity

CoP Alterity is a central proposition within the revised theoretical framework developed from this research, because it provides the basis upon which the differences between CoPs can be assessed and understood. It supports the presupposition that they are characterised by the three pivotal dimensions of domain, practice, and community, which are interconnected and mutually depended (Wenger, 2011; Wenger et al., 2002). Therefore it goes in line with the overall understanding of CoPs as described in the previous section. However, it also entails a framework according to which structural differences between CoPs along the three dimensions can be evaluated. Whereas CoPs have initially been distinguished above all according to the practice they engage in, *CoP Alterity* implies that they can furthermore be

differentiated according to their domain and community, as will be outlined in the following section. CoP Alterity thus serves to understand the forms of the respective CoPs and their learning and knowledge sharing dynamics.

The **domain** of a CoP consists in the collective intention (Wenger et al., 2011), which is manifested in a shared concern or passion about something and revolves around a common identity, purpose and values (Wenger, 2011). It holds them together and encourages participation (Wenger, 2011; Wenger et al., 2002).

Domain	Identity
	Purpose
	Values

Table 4: CoP Alterity in terms of domain.

CoPs negotiate meaning in the social context they are embedded in, which is continuously emerging out of the processes of reification and participation (Wenger, 1998). Those that feel they participate in this process of a particular CoP can be attributed with a collective identity, which defines what they belong to and what they do (Wenger, 1998). Thus, a shared identity constitutes a pivotal aspect for them. Whilst the negotiation of meaning, and thus identity is unique for each person, the collective identity consists in the fact that individuals can reconcile their identity with the one of the CoP (Wenger, 1998). This may happen by adjusting their use of language in the respective context (Gherardi & Nicolini, 2002). Identity in this sense is neither “abstractly collective” nor “narrowly individual” (Wenger, 1998, p. 148). In line with *CoP Alterity* it shall thus be assessed what identity, materialised in reified abstractions like language and the associated meanings (e.g. ‘Paleros’), the members inherit. Significant differences may lead to an understanding of different CoPs.

Additionally, it is required to assess the purpose that drives the CoP. Even though multiple people may engage in a similar practice (e.g. shovel maintenance), the purpose that unites their endeavour may greatly vary. The purpose is closely aligned to what the members of the CoP value. The assessment of these aspects may be challenging, because CoPs may not be consciously aware of their identity, purposes and values. However, the assessment of these facilitates the understanding about the social dynamics they are subjected to and may permit organizations to cultivate and steer them.

The dimension of **practice** embraces the doing, knowledge and learning the CoPs engage in to become better at what they do (Brown & Duguid, 1991; Lave, 2009; Wenger, 2009). Within the context of *CoP Alterity* this is materialised in the routines, which embody the tasks they execute, the type of knowledge they are based upon and finally their learning dynamics, which are mutually dependent on the learning space, learning outcomes and learning processes.

Practice	Routines
	Knowledge
	Learning Space
	Learning Outcomes
	Learning Process

Table 5: CoP Alterity in terms of practice.

Routines embrace the enacted knowledge of CoPs (Cohendet & Llerena, 2003; Feldman, 2000; Feldman & Pentland, 2003; Teece et al., 1997) and emerge in the context of learning (Zollo & Winter, 2002). They constitute the foundation for the coordinated action among its members in the form of moderately stable and identifiable patterns of mutually dependent actions (Feldman, 2000; Feldman & Pentland, 2003). In line with the postulated social theory

of learning, they are not only about doing, but also embrace learning (Feldman & Pentland, 2003). During the evaluation of a CoP, according to the framework of *CoP Alterity*, the emphasis resides in the understanding of the routines that the respective CoP engages in. Operational routines on the one hand, embrace procedural knowledge, characterised by its tacit and situated nature (M. D. Cohen & Bacdayan, 1994). Search routines, on the other hand, are characterised as those that aim to improve capabilities of the organization (Katkalo et al., 2010; Teece, 2007). Whereby, each routine in the context of social learning is subject to constant change, the theoretical framework postulates that the types of routines that CoPs engage in can be differentiated into operational and search routines. Additionally, the description of the particular routines that the CoPs get involved in is regarded as beneficial. There may be some CoPs focused on innovation while others may aim to reduce uncertainty.

Within this framework knowledge is understood as “multi-faceted and complex, being both situated and abstract, implicit and explicit, distributed and individual, physical and mental, developing and static, verbal and encoded” (Blackler, 1995, p. 1032). However, within this definition a CoP can be evaluated according to the degree to which it consists in expert and locally embedded knowledge, which is likely to influence the possibility of adoption of new knowledge within the wider organizational context (Yanow, 2004). It is important to be cognisant though, that the differentiation between local and expert always depends upon the standpoint from which it is observed (Burr, 2003).

The learning space constitutes a central aspect within learning theory (A. Y. Kolb & Kolb, 2005; Nonaka & Konno, 1998) and becomes particularly relevant in the context of a geographically dispersed organization. Whilst learning is always enacted in a social context (Lave, 2009; Wenger, 2009), the space where this occurs can vary greatly as the research evidenced. Space in this case is not restricted to physical locations, but can include virtual as-well-as mental spaces (Nonaka & Konno, 1998). This also connects with the type of

routines the respective CoPs are involved in and the stock of knowledge they hold. Highly tacit, procedural knowledge is less likely to reside in a virtual space than abstract, expert knowledge.

The learning outcomes can be categorised into *assimilative*, *accommodative* and *transformative learning* (Illeris, 2009). Assimilative learning occurs when the learner builds upon an existent body of knowledge and personal meaning, but does not challenge existing underlying schemes, which happens when the outcomes of learning are accommodative. Transformative learning is “characterised by simultaneous restructuring of a whole cluster of schemes and patterns in all of the three learning dimensions” (Illeris, 2009, p. 13).

Ultimately, the practice in which the CoPs are engaged, varies according to the type of learning processes they adopt, of which different scholars have proposed different types (Mezirow, 2009; Nonaka, 1994; Weick et al., 2005). Within the proposed theoretical framework it is suggested that CoPs should be evaluated to ascertain whether CoPs adopt single-loop or double-loop-learning (Argyris & Schön, 1996). Single-loop-learning is solely focused on the correction of errors, whilst double-loop-learning is characterised through the challenging of underlying values and assumptions

Finally, the dimension **community** contains the aspects of membership, which refers to the boundaries, informed through proximity, which delimit the community from outsiders. The characteristics of relationship emphasises the way people inside the CoP are connected across peripheries. Particularly this dimension has been subject to a significant amount of discussion. Assessing CoPs according to the outlined parameters is likely to give a valuable structure to the current debates.

Community	Membership
	Relationships

Table 6: CoP Alterity in terms of community.

A central theme within CoP is membership, which people attain when they gain the legitimacy from the CoP to join (Lave & Wenger, 1991). This leads to the understanding that boundaries, which separates members from non-members, is a central aspect within CoP theory (Wenger, 2000). To overcome these boundaries and join the community, initially requires proximity. Proximity in this sense is, however, not restricted to geographical, “as a catch-all phrase” (Mattes, 2012, p. 1088), but can be manifested in cognitive, social and organizational proximity (Boschma, 2005; Knobem & Oerlemans, 2006; Mattes, 2012). *Geographic proximity* is related to the spatial dimension, thus given when people work together in the same physical location. The initial conceptualisations about CoPs strongly emphasised, but were not restricted to this type (Lave & Wenger, 1991). *Organizational proximity* exists when the organizational structures provide a space for shared relations. As an example this type is given when two people, located in different and distant locations interact on the telephone or by email, because of organizational structures. *Social proximity* depends on the strength of ties, which depends on “the amount of time, emotional intensity, intimacy (mutual confiding), and reciprocal service which characterise the tie” (Granovetter, 1973, p. 1361). *Cognitive proximity* is given when people share a common stock of expert knowledge. These types of proximity are not clearly separated and to a greater or lesser extent must all exist to overcome a CoP boundary, however, their importance across CoPs varies. In the case of high-energy particle physicists, cognitive proximity may constitute the predominant boundary (example based on Wenger (2000)), whilst in the case of photocopier technicians social proximity may be more relevant (example based on (Brown & Duguid, 1991)). However, if physicists would never communicate with each other, the cognitive

proximity would do little to help in overcoming the boundary. Yet if the photocopier technicians were characterised by different knowledge stocks, their social proximity may not serve to overcome the boundaries. Nevertheless, proximity does not ensure but rather facilitates the overcoming of them. A member may not be interested in joining a community, even though the required proximity is given. Yet it may also happen that the community would not legitimise the participation of an outsider. The social dynamics that lead to participation can vary widely. In the research context one CoP (Operational CoP) evidenced hardly any requirement, beyond organizational and geographic proximity, for members to join. The sole fact that they work together on the same object (the shovel), in the same time and space, engaging into similar tasks constitutes their basis. The other CoPs restricted newcomers based upon their willingness to grow and learn based upon their years of experience, as the case of Specialist and Senior Specialist CoPs. This aspect is also strongly influenced by power dynamics that vary among different CoPs.

The relationships on the inside of CoPs are mainly characterised by the strength of ties among its members. Some CoPs may be constituted as in tightly knit groups, whilst others are loosely coupled. The relevance of this becomes evident when referring to the important work of Granovetter (1973). Strong ties may foster learning on the inside of the respective CoP, but may impede its capacity to absorb new external stimuli. Because of strong ties they may be reluctant to challenge underlying tacit assumptions they are built upon (Wenger et al., 2002), thus suffer the potential “limitations of their world view” (Brown & Duguid, 1998, p. 97). Weak ties on the other hand are advocated to contribute to the absorbing of new stimuli and knowledge sharing across the organization. However, they may also be characterised by low levels of trust, which has been evidenced in this research to constitute a fundamental aspect of learning and knowledge sharing within the context of Komatsu Chile. Trust is not restricted to the conceptualisation of idealist connotations like harmony and friendship (Lindkvist, 2005). It is understood as “the willingness to accept vulnerability based on positive expectations about another’s intentions or behaviours” (Li, 2005, p. 80). Missing

trust may generate defensive behaviour and lead to double-binds (Argyris & Schön, 1996; Bateson, 1972). Beyond the strength of ties, the quality of relationships within CoPs varies according to the way they interact among each other. There may be CoPs with very strong ties who communicate through a virtual platform, as-well-as CoPs with weak ties of people who work together every day.

Based upon the outlined dimensions and respective aspects that CoPs are to be evaluated upon, it can be stated that bigger companies are unlikely to consist of one single CoP, but rather in a network of dispersed CoPs. The structure of this network will be depicted in the next section.

7.1.2 Hierarchic CoP network

The theoretical framework incorporates an alternative to the critique that the theory of CoPs has “occasionally been stretched well beyond its capacity” (Duguid, 2005, p. 115). The concept of *CoP Alterity* supports the postulation that CoPs are unlikely to include thousands of members, which are rather understood as networks of people (Wenger et al., 2011), but are more likely to be understood as relatively small groups. If these CoPs are linked by practice and *CoP Glue*, which will be further explained within the next section, they are part of network of CoPs (Brown & Duguid, 2001b), consisting in “closely affiliated CoPs” (Tallman & Chacar, 2011, p. 279). This is what Wenger et al. (2002) refer to as ‘distributed’ CoPs. This network does not develop separately from the respective CoPs nor do the latter exist on their own. They develop jointly together (Wenger et al., 2011).

This revised theoretical framework extends beyond the initial theorising about NoPs (Brown & Duguid, 2001b) by postulating a hierarchic structure among the CoPs that make up the network. Those CoPs that are situated higher up are characterised by a superior body of expert knowledge on the one hand and likely to be reinforced through a superior position of its members within the formal organizational structure on the other. However, because of the informal character of a CoP, knowledge outweighs the organizational position, because the

CoPs will not include members because of their job title alone. The subordinated CoPs are characterised by their local knowledge (Yanow, 2004). The hierarchic structure can facilitate learning and knowledge sharing across the network, but depends fundamentally on the quality of the boundary process, which will be described in section 7.1.3.

The conceptualisation of a hierarchy between CoPs necessarily implies power asymmetries that influence learning and knowledge sharing. Power in this case is defined as “the ability or capacity to achieve something, whether by influence, force, or control” (Roberts, 2006, p. 626). Furthermore, power is dynamic and resides within relationships between CoPs (Marshall & Rollinson, 2004). Within hierarchical structures differences between those that think and those that do are common (Brown & Duguid, 1998).

7.1.3 CoP Glue

NoPs are generally held to exist, and are bound together, because of a shared practice (Brown & Duguid, 2001b; Gherardi & Nicolini, 2002). Within this theoretical framework, however, it is postulated from this Komatsu research, that their existence is furthermore founded on *CoP Glue*, which holds the different CoPs together. *CoP Glue* emerges out of the interplay between reification and participation, and can be constituted in terminologies, stories, objects or tools that people share throughout the network. The underlying meaning can be structured into three categories:

- Identity with the object of work
- Perceived virtues
- Knowledge

It embraces a collective identity that is required at an individual CoP level to ensure its existence and well-functioning (Wenger, 1998). In the research the identity with the object of work, the shovel, revolves around personal commitment, pride and affection for the shovel. It furthermore includes a set of virtues that are associated with CoP Glue. For the case of

'Paleros' these include toughness and a hands-on way of working. In terms of knowledge, the accumulated experience of the people who work with shovel maintenance is strongly associated to CoP Glue. Because of the associated desirability, aspirational nature and exclusivity from others, it creates a sense of belonging, which makes the network 'stick' together. What makes CoP Glue special is the fact that it has to be bestowed by others, rather than claimed by the respective individuals. Within the research the PSG CoP has been determined as a disconnected CoP because it does not count with sufficient CoP Glue. This is because the identity with the object of work, in terms of commitment, pride and affection, the virtues (above all the lacking hands-on way of working) and the theoretical expert knowledge it is based upon, do not comply with the Paleros CoP Glue. In determining the specific characteristics associated to *CoP Glue*, those CoPs higher up the within the hierarchic network exercise their power in assigning meaning to it. It is argued that all networks are held together by *CoP Glue* even though they may not be consciously aware of it. Unless the CoPs that belong to the network can reconcile their identities within the context of an overarching reified abstraction (like 'Paleros') of *CoP Glue*, learning and knowledge sharing across the hierarchic network is unlikely to flourish. The more *CoP Glue* is present, the stronger the ties between the different CoPs, which facilitates knowledge sharing and learning between them. To identify CoP Glue within a network of CoPs it should be assessed to which extent a shared identity with the object of work, common virtues and knowledge are present, which are of desirable and aspirational nature and provide exclusivity from others.

7.1.4 Boundary processes

So far, this revised theoretical framework has been epitomised by the fact the CoPs vary according to *CoP Alterity* and are embedded within a *hierarchically organised network*, and are held together by a shared practice and *CoP Glue*. The extent to which the CoPs that form part of the overarching network contribute or impede learning and knowledge sharing

depends upon the quality of the boundary processes as-well-as the general characteristics of each one. Based upon the conceptualisation of *CoP Alterity*, it can be assessed to what extent they are capable to absorb external stimulus for internal learning and communicate with the broader network of CoPs. The stronger the ties within the CoP the less likely it may be to absorb external stimuli (Granovetter, 1973). The quality of the boundary processes between CoPs, can be assessed according to three dimensions as proposed by Wenger (2000):

Coordination embraces the degree according to which the different CoPs share interest in a common practice and are capable of communicating. *Transparency* about the purposes and values of the different CoPs is also required so that the boundary processes are fruitful. The final criteria, *negotiability* rejects the conceptualisation of “frozen negotiation” (Bowker & Star, 1994, p. 104 as cited in Brown & Duguid, 1998), where no space for meaning making is allowed, but ideas are enforced. Cultivating *CoP Glue* throughout the network is likely to significantly enhance the quality of boundary processes. Furthermore, ‘boundary objects in use’ and ‘boundary spanners in practice’ (Swan et al., 2007, p. 1821) contribute to the quality of boundary processes.

7.2 Contributions to Practice

There are several implications for practice and theory that emerged from this research. Among these the identification of four emerging CoPs, based upon the concept of *CoP Alterity* (see Table 7) constitutes a major contribution to practice, because it provides practical explanations about learning and knowledge sharing within the shovel maintenance operation in Komatsu Chile:

- Operational CoP
- Specialist CoP
- Senior Specialist CoP
- PSG CoP

		Operational CoP	Specialist CoP	Senior Specialist CoP	PSG CoP
Domain	Identity as "Palero"	Limited, only few with many years of experience	Lacking experience	Full identification and general recognition within organization	Outsiders
	Purpose	Get the job done and paid; very few with drive to grow.	Learn and grow; differentiate from others	Quality of shovel operation	Provide quality assessment of problems
	Values	Keep the shovel working; safety	The existense of disruptions to learn Experience; safety	Emotional connection to the shovel; personal efforts and sacrifice; safety	To be taken into consideration; safety
Practice	Routines	Operational, noncanoical routines obtained through experience in maintaining shovels	Learning routines to solve complex problems based on root cause analysis and taking responsibility in implemeting	Solve complex problems from a holisitic perspective; teach and challenge others; propose improvements to factory	Provide information to solve problems; establish canoical routines and enforce factory campaigns
	Knowledge	Locally embedded knowledge	Locally embedded expert knowledge	Expert knowledge	Espoused - Practice detached, theoretical expert knowledge
	Learning Space	At the shovel	Individually in free time and enacted at shovel through personal conversations	Above all at the shovel	In the office
	Learning Outcomes	Assimilitive	Assimilative and accomodative learning	Accomodiative learning and cummulative learning, regarding to the use of omputers	Assimilative and accomodative learning
	Learning Process	Single-loop-learning of a a craft	Single- and double-loop learning; in depth and cause analysis and other interpersonal skills	Double-loop-learning with a reflexive and holisitic perspective on the shovel	Sinlge- and double-loop-learning; in depth technical analysis of the shovel
Community	Membership	Geographic and organizational proximity; no multi-membership	Restricted to those interested and with drive to learn and grow; cognitive and social proximity (virtual sites); multi-membership	Restricted to those with a very significant amount of hands-on experience and legitimiatiion; cognitive proximity	Organizational and social proximity
	Relationships	Tightly knit groups of mechanics	Loosely coupled groups of friends	Tightly knit groups of senior experts	Tightly knit group of engeniers

Table 7: The four CoPs identified within Komatsu Chile

First of all it is worth mentioning that this thesis provides evidence that CoPs are an important vehicle to drive learning and knowledge sharing within a geographically dispersed organization. The explanations in **Error! Reference source not found.** about the four identified CoPs provides the specific source of information based upon which Komatsu Chile can reassess the mechanisms in place to foster learning and knowledge sharing within the organization. Acknowledging the existence and importance of CoPs presents a challenge because of their, to a certain extent, autonomous and uncontrollable nature, which leads to an “unavoidable risk of dysfunctional behaviours” (Wenger et al., 2002, p. 159). However, the thesis emphasises the importance for the organization to actively include these into its learning and knowledge sharing efforts.

Whilst the current emphasis has been put on the implementation of boundary objects, such as procedures and checklists, more emphasis should be put on the way people make meaning out of these in the context of CoPs. Because of this understanding a number of workshops to make meaning out of procedures and checklists have been carried out within the Calama region, taking into consideration the differences between the respective CoPs, according to the elaborated framework of *CoP Alterity*. Therefore, particularly the sessions with the members of the Operational CoPs have been conducted within the mining sites, as close to the shovel as possible, without generating potential safety issues. In general, this assessment provides evidence that the training activities for Operational CoPs should be taken closer to the shovels. Based upon a first pilot within two mining sites in Calama this practice is now implemented on a national level. It also suggests that more instances should be pursued to bring members of the Specialist CoPs together, to enhance knowledge sharing and learning. Being cognisant of the current differences between those CoPs that form part of the hierarchically structured network of CoPs and the PSG CoP, should lead to efforts to bring these closer together. In line with the findings of this thesis attempts to do so have been started.

In terms of cultivating CoPs, even though not necessarily consciously pursued, the efforts that have been undertaken in forming specialists and senior specialists into identifiable groups has worked well and should be reinforced. The research also suggests that Operational CoPs may be purposefully steered, based on changes in the formal organizational structures. Operational CoPs, which above all depend on geographic and organizational proximity, could be split up and reconfigured with people who have the characteristics that the organization would like to flourish. However, difficulties are likely to arise during the time of reconfiguration of the respective Operational CoP and people may furthermore not be willing to move between the different mining sites. The temporal placement of people in a different mining site is also likely to positively influence boundary spanning activities, a suggestions that based upon this work has already been implemented in several sites.

Furthermore, the existence of the 'Paleros' abstraction, the *CoP Glue* that holds the network together, should be built upon to foster learning and knowledge sharing among those that are related to maintenance of the shovels. The importance that trust has on learning and knowledge sharing has been identified and should be actively considered in fostering future learning activities.

Whilst the results of this research are not fully generalizable, they have wider practical implications and may well be relevant for other dispersed organizations in Chile and Latin America, which are faced with similar challenges as Komatsu. The embraces in particular the assessment of CoP according to CoP Alterity and the identification of CoP Glue, which can help organizations to emphasise learning and knowledge sharing.

7.3 Contributions to Theory

This research has made an important academic contribution by presenting a revised theoretical framework, which extends beyond current communities of practice theory and its role in learning and knowledge sharing within a geographically dispersed organization.

Another particular contribution consists in the fact that research has been conducted in a new and particular type of organization in the mining industry in Chile, which has not been researched in the context of CoPs before. So far, the cultural impact on CoPs has above all been theorized (Handley et al., 2006; Kasper et al., 2008; Roberts, 2006). As part of this research the influence of cultural aspects (such as the importance of trust and friendship) on CoPs has been evidenced. Chile is characterised by paternalistic authoritarianism, manifested in powerful elites that dominate the rest of society under the umbrella of protection and better decision making (Gomez & Rodriguez, 2006). Depending on the nature of the respective CoP according to CoP Alterity, this can cause very strong ties within some CoPs (in this research Operational CoPs). This facilitates learning on the inside of the respective CoP, but negatively influences its capability to share knowledge with other CoPs. There has also been evidence that Chileans are generally cautious to share knowledge with people they do not know well. Furthermore evidence suggests that latent conflicts between people from the north and south within Chile may negatively influence knowledge sharing and learning across boundaries. The fact that various CoPs, located within different geographic locations, have been researched comprehensively within one project depicts another valuable contribution of this work.

With regard to the proposed theoretical framework, interesting new insights about the understanding of a *hierarchically structured network of CoPs*, which are differentiated according to *CoP Alterity* and held together by *CoP Glue* have emerged out of this exploratory study. The postulation of a hierarchically structured network of CoPs has several implications for theory. On the one hand it supports those scholars who think of CoPs as relatively small groups of people that are configured as networks of practice (Brown & Duguid, 2001b), consisting in “closely affiliated CoPs” (Tallman & Chacar, 2011, p. 279). However, on the other hand, it extends beyond existing theory by advocating a hierarchic structure among the CoPs that are part of this network. This understanding provides a valuable basis for further research about knowledge sharing and learning dynamics in the

context of interconnected CoPs. *CoP Alterity* constitutes another significant contribution to theory. It addresses the challenges that have emerged in light of the diverging conceptualizations about CoPs. *CoP Alterity* provides a systematic framework to identify and assess the fundamental characteristics of different CoPs and to conduct research based upon this understanding. The conceptualization of *CoP Glue* presents an answer to the articulated claim that a shared practice it is not necessarily the only prerequisite for knowledge sharing and learning across boundaries (Swan et al., 2007). *CoP Glue* is characterized as a strong identity and knowledge about the respective work object complemented by recognized virtues. It holds the network of CoPs together, because it is something desirable, of aspirational nature and with exclusive access for some. The meaning associated with it emerges out of the interplay between participation and reification (Wenger, 1998), where those in the hierarchically superior CoPs exercise their power in associating meaning to *CoP Glue*.

Furthermore, this thesis supports those scholars who highlight the importance of boundary processes to foster learning and knowledge sharing across CoP boundaries (Brown & Duguid, 1998; Star & Griesemer, 1989; Swan et al., 2007; Wenger, 2000). It supports Wenger (2000) who advocates the assessment of boundary processes according to the dimension of coordination, transparency and negotiability.

7.4 Research Limitations

As with any research project, this one is also subject to some limitations. This research has been carried out within the geographically dispersed organization Komatsu in Chile, with particular focus on shovel maintenance in the Calama region. It could therefore be claimed that the findings are limited to this context. The research project could have covered more areas (e.g. dump trucks) or similar companies (e.g. Caterpillar), which was not possible because of commercial rivalry. Furthermore, because of the aim to thoroughly research shovel maintenance, it was decided to restrict the scope to this area. However, there is a

strong likelihood that the analytical framework developed and concepts discovered are of relevance for similar organizations within Chile and Latin America at the very least, and probably in dispersed organizations in general. The data collected throughout the research was wholly adequate in supporting the postulated conclusions, which open up the possibility of further research to advance the understanding of CoPs as discussed in the previous section.

7.5 Suggestions for Future Research

The research supports the postulations that the cultural context has a significant impact on the way CoPs learn and share knowledge within and between each other (Handley et al., 2006; Roberts, 2006). The central themes that are advocated to influence CoP theory in Chile relate to the quality of social relationships, in terms of friendship and trust, as-well-as about the established paternalistic authoritarianism. It also provided evidence about the role of CoPs in the context of a Japanese mining equipment manufacturer in Chile. Future research should assess the extent to which the advanced theoretical framework about CoPs for learning and knowledge sharing is applicable in different cultural and organizational contexts and if it can improve it.

CoP Alterity is considered to be a much needed framework to bring clarity and consistency to the field of CoP theory. Future researchers should evaluate CoPs based upon the postulated criteria and elaborate on the implications of the emerging configurations for learning and knowledge sharing. This will significantly increase the understanding about CoPs and thus provide means by which organizations can steer them more adequately.

Current Networks of Practice theory has emphasised the importance of practice (Brown & Duguid, 2001b). However, this research has provided evidence about the importance of *CoP Glue*, a reified abstraction with significant meaning that holds the network of CoPs together and constitutes the basis for collective meaning making. This conceptualisation requires

further theorising, to improve the quality of boundary processes within the context of hierarchically networked CoPs.

Finally, the proposal that multiple and heterogeneous CoPs are embedded within a hierarchically structured network, as-well-as the consequences that this carries along should be further assessed and theorised upon, particularly regarding to the impact on learning and knowledge sharing within a geographically dispersed organization.

7.6 Concluding Reflective Remarks

This exploratory research was initiated based upon three overarching research questions. These revolved around the forms that CoPs take within a geographically dispersed organization in Latin America as-well-as their contribution to learning and knowledge sharing. Starting with the literature review and a critical assessment of the research context, the first ideas about these questions emerged. Throughout the data collection and analysis phase further insights about the research questions became visible. In the subsequent reflective commentary, the revised theoretical framework started to take form and was materialised within the first part of this concluding chapter.

The proposed theoretical framework supports the fundamental aspects that CoPs have been built upon (Brown & Duguid, 1991; Lave & Wenger, 1991; Wenger, 1998), but extends it by postulating for an understanding of a *hierarchically structured network of CoPs*, which are different because of *CoP Alterity* and bound together by *CoP Glue*. This revised theory opens up interesting fields of future academic inquiry. From a practitioner perspective the research has generated interesting findings and suggestions, which ought to be considered to enhance learning and knowledge sharing within geographically dispersed organizations in an emerging economy in Latin America, Chile.

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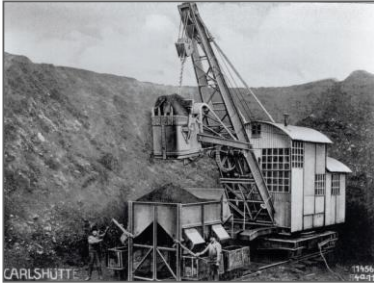
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Appendix 1 – Map of Latin America



Source: Google Maps (retrieved 21-02-2015).

Appendix 2 – Shovel History in Komatsu



1907 Carlshütte builds first electric driven rope shovel in Duisburg and Demag finally gains full control of Carlshütte in 1925



1954 Manufactures world's first fully hydraulic excavator – B 504



1972 Demag's first 100 t hydraulic shovel – H 101



1978 Introduction of the 270 t hydraulic mining shovel – H 241



1986 Worldwide largest hydraulic mining shovel (500 t) – H 485



2004 PC 8000 with 42 cum front shovel (752 t)



2005 Introduction of the PC 3000



2006 PC 5500 28 cum bucket



2008 PC 5500 28 cum bucket

Compiled from an unpublished company presentation (Komatsu, 2013).

Appendix 3 – Shovel MARC Contracts in Chile



Adopted from an unpublished internal presentation (Komatsu, 2015b).

Appendix 4 – Interview Guide

RESEARCH QUESTIONS:

1. What forms do CoPs take within a geographically dispersed organization in an emerging economy in Latin America?
2. What is the contribution of CoPs for learning and knowledge sharing within a geographically dispersed organization in an emerging economy in Latin America?
3. What are other relevant aspects that contribute or impede to learning and knowledge sharing between CoPs within a geographically dispersed organization in an emerging economy in Latin America?

CONTEXTUAL QUESTIONS:

- Position in company
- Years with company
- Mining sites worked at

COMMUNITIES OF PRACTICE AND LEARNING

- How would you describe your work is organised and gets carried out in your area?
 - How do you evaluate this organization of the work?
 - Are there deviations in practice? If so which are the principal ones?
 - How do you judge these deviations? How do you feel about these?
- When do you feel that you have done a good job?
 - Describe the feelings this generates for you and your colleagues?
 - What do your colleagues feel? How about people that work in other areas?

- Do you feel that you have the same interests with colleagues from other areas?
- Beyond the official management structure, describe the “unofficial” structure in your organization.
 - Who is part of it?
 - Describe the relation between the people that are part of this community?
 - What do they value?
 - How do you relate to other areas? Local management? Central management?
 - How do those, outside your community (e.g. central and local management) differ from you?
 - Do they face the same job and challenges as you?
- How do you solve problems?
 - How do people know who to ask for advice?
 - What are the characteristics of experts that help you to solve problems?
 - What do you do when you don't find a solution?
 - Does the fact that you belong to a big organization help learning/problem solving?
 - Does the fact that you belong to a big organization hinder learning/problem solving?
- What happens when new people join?
 - How do they become part of the community?
 - Are there any joining rituals?
 - Talk to me about a situation where a newcomer never really fitted in? What were the reasons?

- Do you think people have left the organization because the community did not accept them? If so, explain what may be the reason?
- What happens if the newcomer has a different understanding of how to do the job?
- Given the answers to the above questions how do people learn how to do the job in your area?
 - Describe the most important aspects how people learn?
 - What is your sensation about the way people learn?
 - What kind of things do you learn?
 - Do you also learn to do things the way you are not supposed to (work arounds)?
 - What happens if a newcomer joins, who already has more knowledge/experience about shovel maintenance than you (maybe from another company).
- Please describe in detail a situation in which you have learnt something new about shovel maintenance.
 - Who instructed you? What were the characteristics of that person?
 - Where did this happen?
 - How did you feel?
- Describe the relation you have to the colleagues with whom you share a common interest, practice and domain.
 - What makes this group special?
 - Tell me about the aspects that make you feel bound together.
 - What are differences between those colleagues?
 - Do you feel that you belong to more than one community within your working environment?

- A colleague of yours told me the following: If you ask a mechanic who works on dump trucks about their job they answer: Mechanics. If you ask a mechanic who works on shovels they will answer: “Shovelers”. What are your thoughts on that?
 - Do you feel that you are a “shoveler”?
 - What are criteria of a “shoveler”?

KNOWLEDGE SHARING

- Tell me about a moment that you learnt about a work practice that was executed differently in another mining site.
 - How did you feel when you heard about it?
 - What was your reaction?
 - Tell me about a conversation you had with your colleagues about this.
 - What did you do?
- The organizational leaders argue that there is not sufficient knowledge sharing between the different sub-units. Please elaborate your perspective on this topic.
 - What do you feel about this?
 - Is it necessary to share knowledge between different sites?
 - What are the reasons that knowledge sharing does not work sufficiently?
 - How would you solve this topic?
 - What would help you to share your knowledge (a) locally, (b) between locations (c) with Headquarters?
- Please describe the impact central functions or other mining sites have on knowledge sharing and learning in your area?
 - How do you describe your relation to these groups?
 - How do they make you feel?

- What could they do better?
- What is the role of power (e.g. hierarchical structures) on knowledge sharing and learning?
 - How would you solve this topic?
 - What would help you to share your knowledge (a) locally, (b) between locations (c) with Headquarters?
- What could be done to improve knowledge sharing between different sites?
- Considering the questions above, what makes Chileans special?
- Are there any aspects of the geographical dispersion of the organization which get in the way of knowledge sharing?
- Is there anything else which prevents knowledge sharing?