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The impact of organisational, cognitive and cultural proximities on innovation culture

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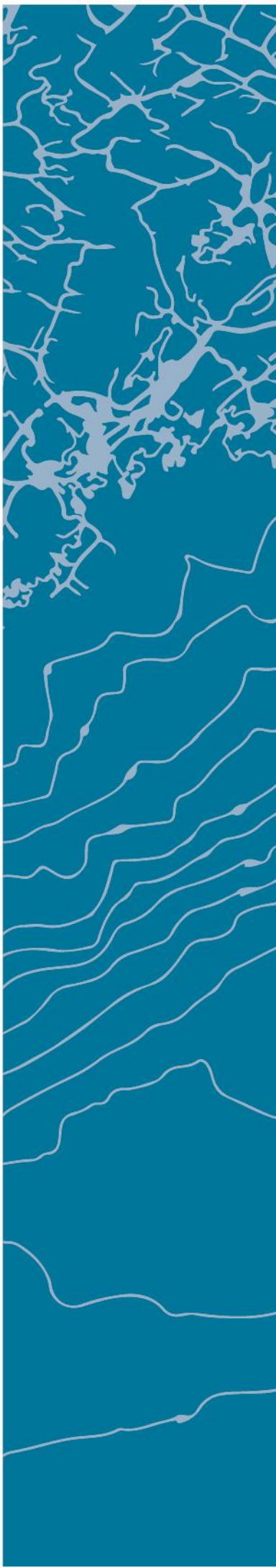

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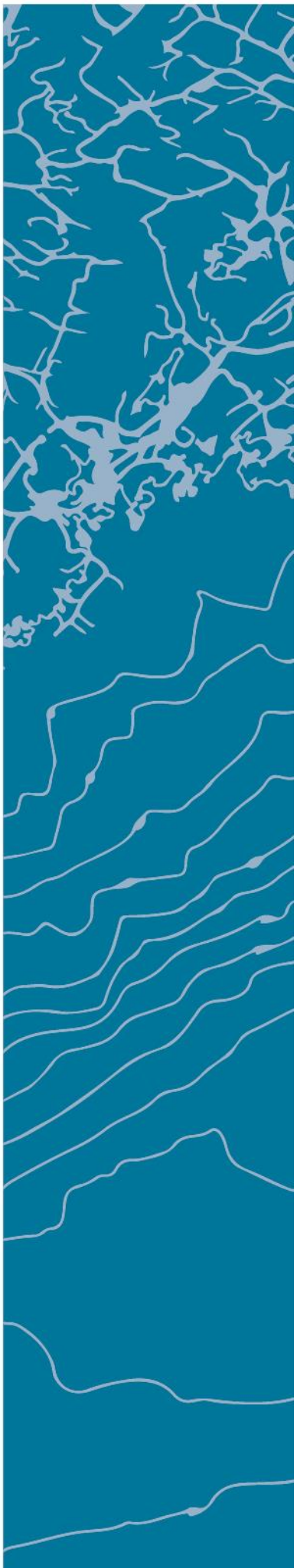

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Arendal, 13th of December 2018

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Forewords

This thesis is the original, independent work of the authors Tonje Forøy Breivik, Jannike Rognøy Olsson and Ove Jarl Andersen. The authors share a common interest in innovation management. Through our positions as leaders, we can facilitate and contribute to innovation. It was a natural choice for us to focus on what drives and impacts innovation culture. It has been very inspiring to study innovation culture at close hand.

Abstract

Literature on innovation is vast and there seems to be consensus that innovativeness is imperative for a company's continued success in a world where the speed of change is ever increasing. Within management literature, several studies and articles have focused on the determinants of innovation culture. Within the discipline of economic geography, the impact of proximities on innovation has been a central issue. Further, optimizing for innovation will typically be extra difficult for machine bureaucracies. However, we have not found any empirical studies with a cross-disciplinary micro-level focus investigating how different proximities within a company impact innovation culture. The purpose of our dissertation is to fill this gap in the literature by exploring how different proximities within a global machine bureaucracy impact innovation culture.

Our research question is: *How do organisational, cognitive and cultural proximities within a global medium-sized company, categorised as a machine bureaucracy, influence the innovation culture for different groups* o*f employees in the company?*

Our study focused on different groups of employees, grouped by their position in an organisational hierarchy, by their belonging to a cross-functional and co-operative team and by their different national cultures. We chose a quantitative case-study for our research and three hypotheses were developed. We distributed a survey for measuring innovation culture to a global insurance company. The survey was developed by Dobni (2008). We used the quantitative data collected through the survey to test hypotheses on how position in hierarchy, cross-functional teams and cultural differences affect innovation culture in a global company categorised as a machine bureaucracy. We found that leaders experience a stronger innovation culture than non-leaders. We found that differences in national culture has an impact on the perception of innovation culture. We did not find a statistical difference in innovation culture between cross-functional, co-operative teams and specialised teams. The study contributes with insight on how organizational, cognitive and cultural proximities may impact a company's innovation culture.

In our study we collected and studied data from one single company. It would be beneficial to replicate the survey on several global companies to see if our findings are generalizable.

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1 Introduction

In the era of globalization and digitalization we are witnessing increasingly integrated markets and constant innovation with giant leaps in technological development. Technological innovations broaden the scope of what is possible both with respect to type of products and services offered to customers and how products and services are delivered to customers. Technological advances also have an impact on internal processes, how innovation is performed for instance with increased sharing and use of data and analytical capabilities (Ringel, Zablit, Manly & Grassl, 2018, p. 8).

Research proposes that to survive over time, a company needs to master both exploitation and exploration, i.e. master ambidexterity (O'Reilly & Tushman, 2013, p. 325). For uncertain times, research indicates that organisational ambidexterity is positively associated with increased firm innovation, better financial performance, and higher survival rates (O'Reilly & Tushman, 2013, p. 326). In other words, in the era of constant and rapid change, which brings with it a considerable amount of uncertainty, a company must strive to master exploration in addition to exploitation. A company must optimize its potential for innovativeness, and thereby its chances of continued success and survival.

Optimizing for innovation is presumably extra difficult for machine bureaucracies. They typically focus on optimizing exploitation and succeed through developing effective processes and systems and through routinizing tasks and behaviour (Tidd & Bessant, 2018, p. 98). When attempting to become ambidextrous, to meet an unstable and changing environment, the machine bureaucracy can experience difficulties. Its' inherent rigidity, inflexibility and non-specialists will make it difficult to become explorative (Tidd & Bessant, 2018, p. 98). In other words, what made the machine bureaucracy successful will not suffice for future success when faced with a changing environment. Motivated by this paradox, we focus our research on global machine bureaucracies and internal factors influencing their innovation capability.

As organisations are becoming acutely aware of the importance of fostering innovation, researchers are working on understanding the factors influencing the innovation capability, how innovation potential can be strengthened and how it should be managed.

There is extensive literature on the determinants of an organisation's innovation capability and on managerial aspects. A meta-analysis of the relationship between organisational innovation and 13 of its potential determinants revealed statistically significant associations for 9 of them, indicating that a broad conceptualisation of innovation is required (Damanpour, 1991, p. 556)

Adding to the knowledge of what impacts innovation is the discipline of economic geography which has contributed with research and knowledge on how different types of proximities are impacting innovation (Boschma, 2005, p.62). There is research proposing that the effect of different types of proximities on innovation are not constant sizes, rather the different dimensions of proximity seem to be interrelated in intricate ways (Oerlemans & Meeus, 2005, p. 90). Too much and too little proximity can have a negative impact on innovation and different proximities can act as substitutes and complements for each other (Boschma, 2005, p. 71-72).

Our review of literature on how proximities impact innovation, showed that an inter-organizational perspective is dominating over individual firm perspective. For example, there is vast research on regional innovation, networks and clusters (Cooke, 2001), (Pittaway, Robertson, Munir, Denyer & Neely, 2004).

At the same time, there seems to be a tendency to underestimate contributions from internal resources (Oerlemans & Meeus, 2005, p. 92). This imbalance is paradoxical, having in mind that most of the innovation takes place within individual companies (Nelson, 1993, p. 510). When companies search for new knowledge, they typically search near their existing knowledge base (Boschma, 2005, p. 63). It follows that innovations will often stem from search processes within companies, with a high degree of tacit knowledge involved (Boschma, 2005, p. 63). Thus, we propose that research on micro-level, i.e. knowledge about how different dimensions of proximities within a company impact on innovation is equally important as research on macro-level, i.e. the impact of different dimensions of proximities between companies.

Although innovation culture is recognized as an important determinant for a company's innovation capability and research has established that different proximities have an impact on innovation, we have not found any studies applying a micro-level perspective examining how different proximities within a company may impact the company's innovation culture.

We propose that such knowledge would be very valuable to global machine bureaucracies attempting to become ambidextrous, attempting to master both operations and innovation. Further, for a global machine bureaucracy, we suggest that it will be of particular relevance to have knowledge about how position in hierarchy, team composition and difference in national culture affect innovation culture. With our dissertation, we want to fill this gap in knowledge.

Our research question is:

How do organisational, cognitive and cultural proximities within a global medium-sized company, categorised as a machine bureaucracy, influence the innovation culture for different groups of *employees in the company?*

More specifically, we want to research how position in hierarchy, a cross-functional co-operative team and different national cultures within a global medium-sized company, categorised as a machine bureaucracy, influence innovation culture.

To answer these questions, we develop theoretical hypotheses and test them empirically. Our study and our findings represent a relevant complement to existing literature on innovation management and on proximities. We seek to provide new insight and direction for further research.

An introduction to the theoretical foundation for innovation, innovation capability, innovation culture and proximities is provided in the next chapter followed by the theoretical foundation for our hypotheses. Thereafter we present the method applied followed by a presentation of the data and the findings. The final chapters of the paper contain the discussion, limitations of our study, implications and recommendations. We round off with the conclusions where we summarize our work.

2 Theory & model

2.1 Defining innovation

A company's ability to successfully innovate has an impact on the company's competitive advantage (Hogan, Sotar, McKoll-Kennedy & Sweeney, 2011, p. 1264), (Hult, Hurley & Knight, 2004, p. 429), (Wang and Ahmed, 2004, p. 303). Thus, it is important for a company to understand what innovation and ability to innovate is. One of the first to describe the innovation term was the innovation theorist Joseph Schumpeter. He defined innovation as "new combinations" of existing resources and stated that "*Innovation is novelty that creates economical value*" (Schumpeter, 1934).

Another much referred definition of innovation is successful implementation of creative ideas within an organization (Amabile, Conti, Coon, Lazenby & Herron, 1996, p. 1155). The nature of innovation is holistic as it covers the whole range of activities required to provide value to customers and a satisfactory return to the business (Ahmed, 1998, p. 30). A wide definition, broad enough to include different types of innovations pertaining to all parts of organizations and all aspects of their operation, is offered by Damanpour (1991): "Adoption of an internally generated or purchased device, system, policy, program, process, product, or service that is new to the adopting organization" (Damanpour, 1991, p. 556). Similarly, an innovation can be a new product or service, a new production process, or a new system for administration (Hult et al., 2004, p. 429).

Both radical and incremental innovation is included in the definition of innovation offered by Plessis (2007); "the creation of new knowledge and ideas to facilitate new business outcomes, aimed at improving internal business processes and structures and to create market driven products and services" (Plessis, 2007, p. 21).

The focus of our study is how different proximities within a global company, categorised as a machine bureaucracy, may impact the company's innovation capability and we apply a wide definition of innovation, including both input and output, radical and incremental innovation.

2.2 Innovation capability

A question that researchers have tried to answer for decades is which factors influence a company's innovation potential and capability and how. It is a growing realisation that research on innovation is a complex area where it is difficult to generalise. We apply a wide definition of innovation, as stated in chapter 2.1. In our study of innovation literature, we find that innovation capability is often seen as a multidimensional phenomenon and is frequently defined as the sum of several determinants.

One way of grasping a company's capacity to innovate is to think of it as the company's potential to generate innovative outputs (Neely, Filippini, Forza, Vinelli & Hii, 2001, p. 117). The potential would be dependent upon the company's resources and capabilities which are enabling the company to explore and exploit opportunities (Neely et al., 2001, p. 117). The CBI/DTI study referred to by Neely et al., (2001), suggested that there are three key determinants for a company's innovation capacity. They are: company culture, internal processes and the ability to understand the characteristics and trends of the external environment (Neely et al., 2001, p. 117).

Other researchers have suggested a similar understanding whereby an organization's innovation capability is made up of the skills and abilities that enable the application of resources. The innovation capability reflects the ability to continuously transform knowledge and ideas into new products, processes and systems for the benefit of the firm and its stakeholders (Lawson & Samson, 2001, p. 384). There have also been attempts to develop frameworks, splitting the innovation capability into sub-categories. One framework dividing innovation capability into three components: innovation potential, processes and results (Saunila & Ukko, 2012, p. 356) is shown in Figure 1. The effect of applying the innovation capability would be the attainment of business goals.

A further framework was suggested by Crossan & Apaydin (2010) which proposed that dynamic innovation capabilities reside in the following five managerial levers enabling innovation; missions/goals/strategies; structures and systems; resource allocation; organizational learning and knowledge management tools; and culture (Crossan & Apaydin, 2010, p. 1171).

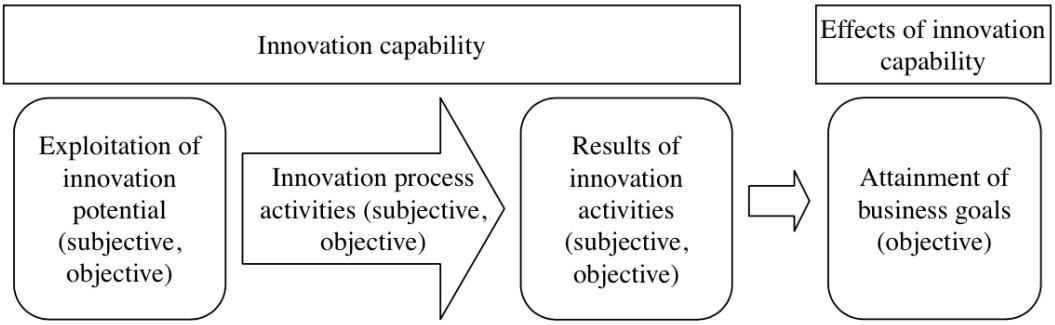


Figure 1 Measurement of innovation capability and its effects (Saunila & Ukko, 2012, p. 364)

A common denominator for the literature on innovation capability seems to be a multidimensional approach, where several variables have been identified. Despite many researchers having tested several and similar variables, it has been found that the results differ with respect to degree of association with innovation rate (Becheikh, Landry & Amara, 2006, p. 644). To improve the understanding of the innovation capability, a systematic review of empirical articles between 1993 and 2003 was conducted in 2006 (Becheikh et al., 2006, p. 644). The most important internal and contextual explanatory variables determining the innovative behaviour and capacity of a company were identified and organised in a framework, see Figure 2 (Becheikh et al., 2006, p. 644).

Among the findings were that managers should seek to establish an organizational culture of innovation support (Becheikh et al., 2006, p. 659). It was also found that main weaknesses affecting previous research was related to the measurement of the variables. It was found that innovation had been measured by different indicators, but without the indicators necessarily measuring the same construct (Becheikh et al., 2006, p. 660). Among the conclusions and implications was a strong recommendation for future research to standardize investigation methods as well as the definition and measurement of variables.

We take a closer look at the framework developed by Becheikh et al. (2006) to get a broad overview and understanding of the most important internal and contextual explanatory variables determining innovation capability. Becheikh et al. (2006) synthesised the learnings from empirical studies in the manufacturing sector and proposed a framework identifying internal and external (contextual) factors influencing the innovation process and hence impacting a company's ability to innovate see Figure 2 (Becheikh et al., 2006, p. 648).

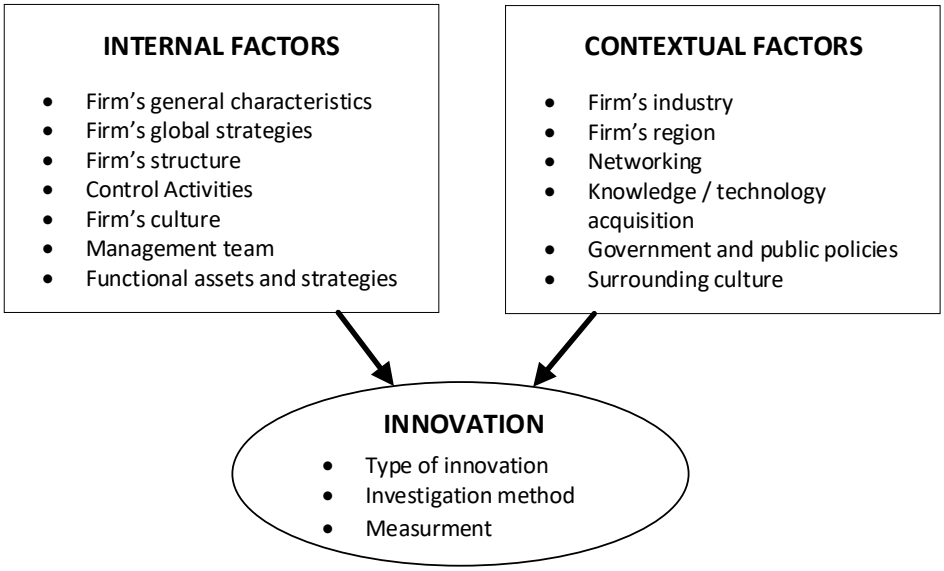


Figure 2 A framework for integrating innovation findings (Becheikh et al., 2006, p. 648)

The framework identifies important internal factors being the company's characteristics, strategies, structure, control activities, culture, management team, functional assets and strategies. In addition, there are contextual factors like the industry where the company is positioned, the region, networking, knowledge/technology acquisition, surrounding culture, government and public policies.

A third category of personal factors, including creativity, competence, carrier opportunities, status and salary as well as passion and endurance, was later added to Becheikh et al.'s (2006) model by Wallevik, Aas & Hjemdahl (2013).

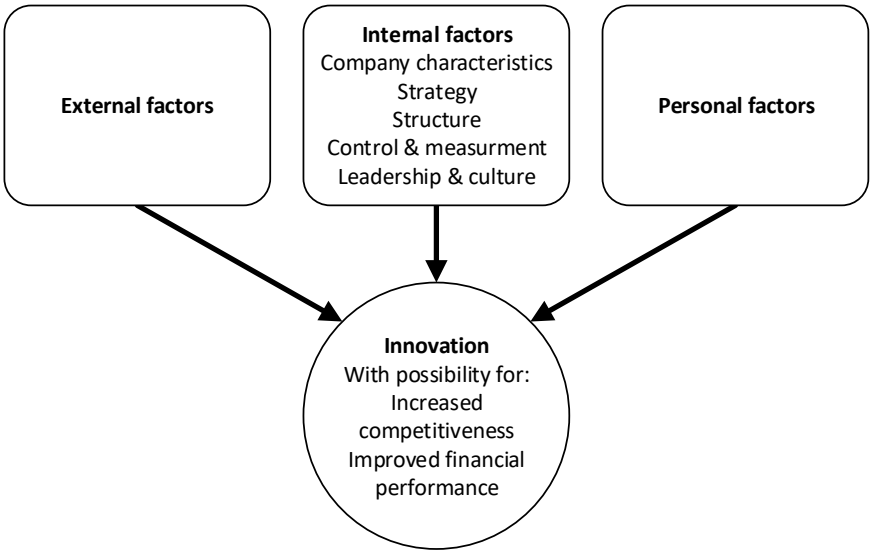


Figure 3 Factors influencing the innovation capability (Wallevik et al., 2013, p. 47)

An important part of the innovation potential in an organisation is the degree of individual level contribution to innovation. The organisation has an important role of ensuring that innovation processes are in place to bring new products and processes to market, but it is dependent on individual's contribution of creativity. One model related to individual innovation is shown in Figure 4.

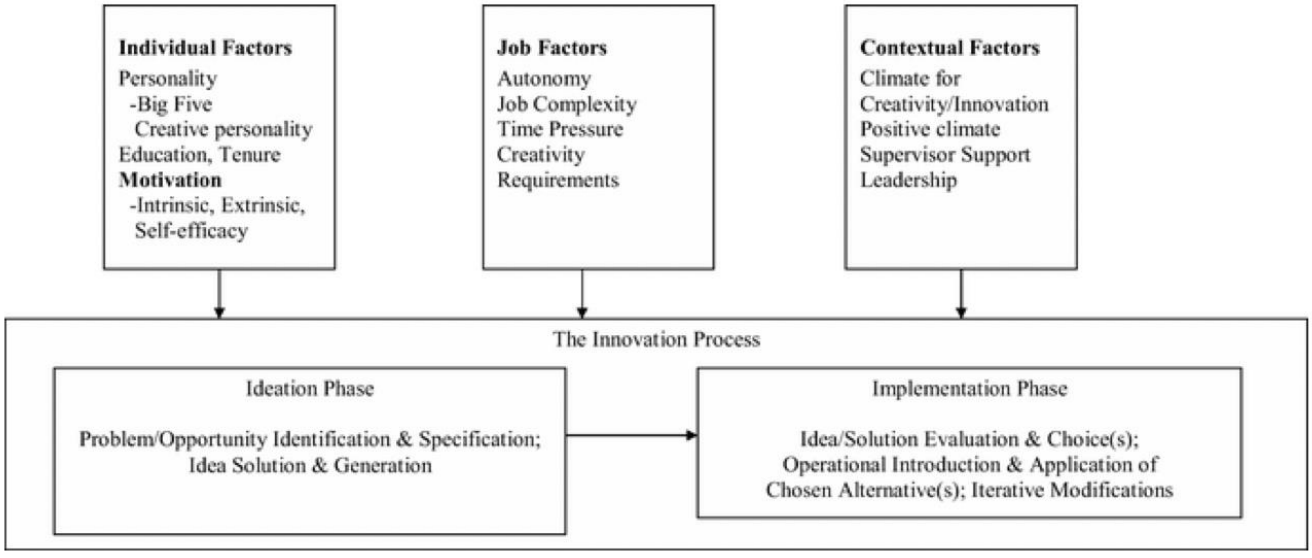


Figure 4 Model of individual innovation (Hammond, Neff, Farr, Zhao, 2011, p.91)

Research on individual-level innovation interestingly demonstrates that too much emphasis can be put on individual factors like personality, education and tenure when it comes to

contribution to innovation. Elements of education and tenure show weak direct relationship with innovation performance whereas individual motivation is found to be important. A strong influence on individual innovation can be found related to job factors like level of autonomy, complexity and the experience of expectations and requirements from leadership (Hammond et al., 2011).

As we have shown above, there is a multitude of factors impacting a company's innovation capability and they can have stronger or weaker correlation with innovation capability. The different factors can be assigned to the following categories; individual factors, internal factors and contextual/external factors.

We find the following determinants in the different frameworks; Company culture, firm culture, climate for innovation. All are variations over the same theme, culture as a determinant for innovation capability. We have mentioned that Becheikh et al., (2006) found that managers should seek to establish an organizational culture of innovation support. Further, there is research suggesting that corporate culture is the strongest driver of radical innovation across nations (Tellis, Prabhu & Chandy, 2009, p. 3). Furthermore, regarding service firms, there is research suggesting that a company's cultural norms represent a critical influence on innovation (Lyons, Chatman & Joyce, 2007, p. 79). Thus, we have chosen to focus on culture as a representation of innovation capability in our study where we examine how different internal proximities in a global company, categorised as a machine bureaucracy, impact on the company's innovation capability.

2.3 Organisational culture and innovation culture

Organisational culture can be defined as the values, beliefs and hidden assumptions that organisational members have in common (Cameron & Quinn, 2011, p 18-21), (Miron, Erez & Naveh, 2004, p. 179). Another way of defining organisational culture is to see it as a set of shared behavioural norms, including the structural and content aspects of the norms (Chatman, Caldwell, O'Reilly & Doerr, 2014).

It has become evident how important company culture is for employees to embrace change and to focus on opportunities rather than the potential threat. It is suggested that company culture influences the employees' behaviour, how they associate themselves with their

company and what importance they assign to innovation as a factor to reach business goals (Hartmann, 2006).

Literature suggests that organisational culture varies in strength and that a company culture can be considered strong when norms and values are "widely shared and intensely held throughout the organization" (Sorensen, 2002, p. 72). Strong-culture firms are thought to be superior compared to firms with weak cultures when it comes to "avoiding internal threats to reliable performance, or breakdowns in coordination and control" (Sorensen, 2002, p. 75). Where the company culture is strong, beliefs about the state of the environment tend to be shared, a factor enhancing internal reliability (Sorensen, 2002, p. 75). Further, in a company with a strong culture, the knowledge base and common beliefs are shared by the majority of the workforce, which in turn enhances organizational reliability (Sorensen, 2002, p. 75). Furthermore, with standardization of the work, and learning of the techniques, variability with respect to both time and quality is reduced (Sorensen, 2002, p. 75).

However, when the environment within which a company is competing, is subject to radical or discontinuous change, organisational performance depends on the extent to which a company is able to adapt routines to respond the altered conditions (Sorensen, 2002, p. 75). To successfully adapt to radical change, a company must be capable of discovering alternative routines, technologies, and purposes, or in other words, be able to master exploration (Sorensen, 2002, p. 76). To do that, a company needs to be able to register changes to the environment and be willing to accept the risk of failing and uncertain income as these risks are inherent to fundamental organisational changes (Sorensen, 2002, p. 76). Literature suggests that companies with a strong culture will have difficulties with mastering exploration (Sorensen, 2002, p. 76). It may be more difficult for them to identify the need for change, as they are more prone to be locked into a certain perception of their environment (Sorensen, 2002, p. 76). Further, strong-culture companies will typically assimilate divergent beliefs to correspond with dominant beliefs in the company, and will lose out on potential new insights (Sorensen, 2002, p. 76).

In summary, it seems strong company culture is well suited for exploitation and less suited for exploration. Later research has added to the understanding through introducing more granularity. When applying the dimensions of content, consensus, and intensity, it is found that strong culture may work also in dynamic environments, provided there is high consensus and provided norm content emphasizes adaptability to a sufficiently intense degree (Chatman

et al., p. 785). However, the point remains, that different company cultures will be more or less suited for exploration. It varies to which degree a certain company culture and certain norms are compatible with exploration.

A company wishing to become ambidextrous faces the challenge that the culture, systems and structures suited for succeeding with exploitation are not necessarily the same that will be required for succeeding with innovation. This is particularly true for the machine bureaucracy, optimizing production (exploitation) and internal efficiency through standardizing work processes and through high degree of formalization and specialization (Lunenburg, 2012). Exploitation, on the other hand, will typically require flexibility, risk taking, less formal systems and control (O'Reilly & Tushman, 2008, p. 190). In search of the receipt for mastering ambidexterity, the question arises; what characterizes a culture fostering innovation? What cultural norms are fostering innovation?

Below, we refer to research evidencing how company culture can support innovation. We present research focusing on the nature and importance of innovation culture as a determinant for innovation capability. There is research indicating that a supporting company culture, with emphasis on supporting creativity as well as a positive climate creating psychological safe working environment, positively correlates with innovation performance (Hammond et al., 2011).

Ahmed (1998) suggests that culture is a primary determinant for innovation (Ahmed, 1998, p. 31). Culture contains several elements which can either strengthen or hinder the tendency to innovate (Ahmed, 1998, p. 31). It is proposed that instead of focusing on what their next product should be, a company should rather focus on creating an environment that stimulates innovation (Ahmed, 1998, p. 42). Ahmed (1998) addresses the interaction between various organisational factors, where the common denominator is culture, and their effect on innovation and proposes factors which promote innovation. One important factor is to which extent management can create a sense of community in the company (Ahmed, 1998, p. 41).

It is proposed that many highly innovative companies behave as focused communities whereas less innovative companies show a behaviour resembling traditional bureaucratic departments (Ahmed, 1998, p. 41). A further factor with potential for positively impacting innovation is empowerment (Ahmed, 1998, p. 40). Among the managerial actions that will help releasing the positive potential of empowerment is ensuring that there are no

bureaucratic bottlenecks which suffocate attempts to innovate (Ahmed, 1998, p. 40). Lastly, regarding leadership and its impact on innovation, it is suggested that leaders need to be able to accept and deal with ambiguity (Ahmed, 1998, p. 39). When tolerating ambiguity, you allow room for risk taking and for exploration of alternative solutions, accepting that they will not always lead to positive business results (Ahmed, 1998, p. 39).

In a study of academic literature on innovation from a 27-year period it was found that organizational culture seems to enable and maintain innovation processes (Crossan & Apaydin, 2010, p. 1171). It was proposed that leaders create innovative cultures by having a clearly stated, attainable, valuable shared vision, by promoting autonomy, by calculated risk taking and motivation (Crossan & Apaydin, 2010, p. 1172). It was emphasized that innovation culture should not be confused with learning environment (Crossan & Apaydin, 2010, p. 1172). Innovation culture includes factors like motivation and managerial control, whereas the primary components of learning environment are organizational learning and knowledge management (Crossan & Apaydin, 2010, p. 1172). In summary, it was proposed that the five managerial levers (mission, goals, and strategy; structure and systems; resource allocation; organizational learning and knowledge management tools; and organizational culture) enable core innovation processes (Crossan & Apaydin, 2010, p. 1172).

Ishak (2017) summarises that companies "need mechanisms and a culture that encourage the embrace of new technologies, kindle the passion for knowledge, and ease barriers to creativity and serendipitous advances" (Ishak, 2017, p. 123). He argues that creative people need wide discretion to perform their work, avoiding leaders getting concerned with budgets and deadlines and consequently stop initiatives before they get off the ground (Ishak, 2017, p. 124). He also focuses on opening organizational space allowing innovators to bypass barriers and hierarchies hindering creativity and establishing organisational trust. Ishak (2017) states the importance of recruiting people able to build an innovation culture.

Several researches have tried to identify which components of the company culture that trigger creativity and innovation. Martins & Terblanche (2003) created a model, Figure 5, identifying five determinants of organisational culture that they suggest promotes creativity and innovation (Martin & Terblanche, 2003, p. 73). The determinants may overlap and interact with one another (Martin & Terblanche, 2003, p. 73). Adding to the complexity is the phenomenon that values, norms and beliefs impacting creativity and innovation can either support or inhibit creativity and innovation (Martin & Terblanche, 2003, p. 64). Accordingly,

it is relevant to establish which factors impact values, norms and beliefs. One such factor is national culture.

A global company will have several national cultures represented. National culture can be associated with certain behavioural traits, much in the same way as organizational culture can (Tian, Deng, Zhang & Salmador, 2018). One of the determinants for organizational culture, influencing innovation and creativity, is behaviour (see Figure 5). An example of a behavioural trait that is positively influencing innovation is risk taking.

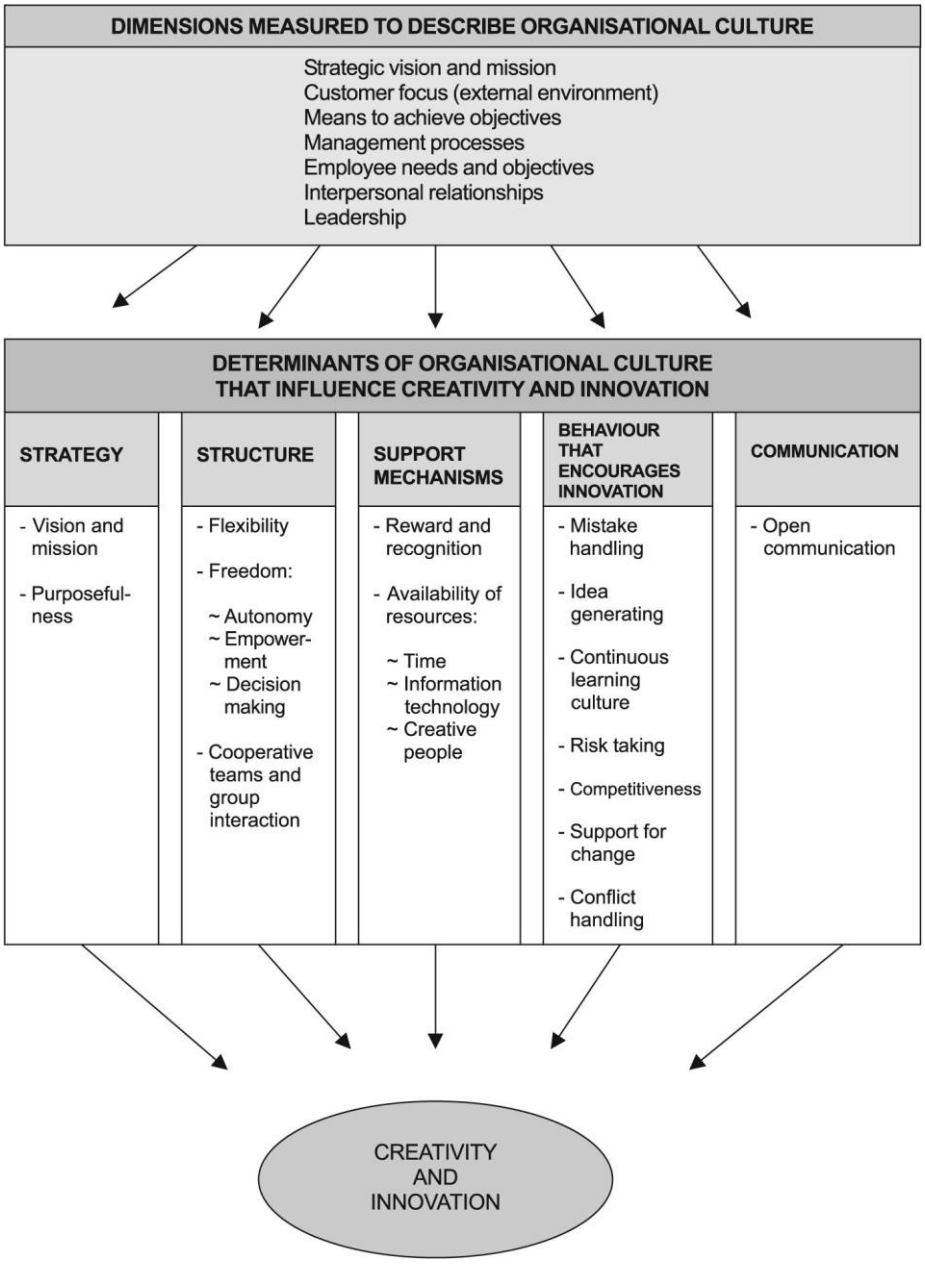


Figure 5 Organisational culture's influence on creativity & innovation (Martins & Terblanche, 2003, p.70)

Risk taking is also among the national culture traits, although at the other end of the scale, namely uncertainty avoidance. One could thus expect to find lower innovation culture among employees/offices that possess the national culture trait of uncertainty avoidance compared to those who do not.

Several researchers have attempted to model innovation culture. However, few studies have focused on developing instruments for measuring a company's innovativeness. As is evident from the literature referred to above, innovation culture is made up of several determinants. Accordingly, to be able to adequately measure a company's innovativeness, a comprehensive instrument able to measure several determinants is required.

One of the few existing studies focusing on developing a measurement of a company's innovativeness was conducted by Dobni (2008). The study defined innovation culture as a multi-dimensional context, including the following four dimensions: "the intention to be innovative, the infrastructure to support innovation, operational level behaviours necessary to influence a market and value orientation, and the environment to implement innovation" (Dobni, 2008, p. 540). Dobni (2008) developed a multi-item measure of innovation culture through exploratory factor analysis. The process, which culminated in a survey tool with 70 statements or items, included review of literature, key informant interviews, and a survey of employees in the financial services industry (Dobni, 2008, p. 539). The 70 statements were divided in seven sub-groups, where statements in the same group were measuring the same underlying construct, for example, value orientation (Dobni, 2008, p. 550). The seven constructs were: Innovation propensity; Organisational constituency; Organisational learning; Creativity and empowerment; Market orientation; Value orientation and Implementation context (Dobni, 2008, p. 551). We find that this comprehensive survey is one of few empirically developed instruments available appropriate for measuring a company's overall innovation culture.

When using models of innovation culture in research, it is important to be aware that studies indicate that different cultures can be innovation cultures. When choosing which model to apply for further studies, researchers should investigate which definition of innovation culture each model is built on to ensure suitability.

Büschgens, Bausch, & Balkin (2013) proposed that different cultures can be innovation cultures. They referred to several successful innovative companies applying very different

organisational cultures. By using Quinn and Rohrbaugh's (1983) Competing Values Framework they focused on clan control and tested what type of organisational culture, e.g. group culture, development culture, hierarchical culture or rational culture, would be suitable to foster innovation (Büschgens et al., 2013, p. 767). To illustrate how various cultures may be linked to innovation we mention a couple of examples.

Group culture values a shared morale and teamwork which is flexible yet internally focused. Where the group culture is strong the organisation focuses on employee development, promotes good working relationships and encourages flexibility towards common procedures. Such focus on human resource development and flexibility is positively linked to the intention to innovate as retaining and creating knowledge without having to follow protocol may lead to innovative ideas. However, the internal focus on human resources could also entail a limit in flexibility should an idea threaten e.g. job security for individuals or groups (Büschgens et al., 2013, p. 768 & 769).

Another example of an innovative culture is the development culture which focuses on growth and resource acquisition. Such culture is positively correlated to innovation in that innovation may be a means to develop. Büschgens at al., (2013) found that a development culture, where external orientation and flexibility are shared values, would be the ultimate form of clan control in organisations that innovate (Büschgens et al., 2013, p. 777).

To summarize, we have seen that a culture consists of several elements that can either hinder or foster innovation. We have pointed out that there is no one optimal innovation culture as several different cultures can be innovation cultures. For a company aiming to become ambidextrous, aiming to master innovation, we suggest that knowledge about which cultural norms foster innovation is crucial.

2.4 Proximity and its effect on innovation

So far, we have presented different innovation frameworks that assist with identifying and arranging different factors influencing innovation capability. We have seen that different factors can have stronger or weaker correlation with innovation capability. We have justified our focus on culture with referring to the strong correlation between culture and innovation capability. However, factors impacting innovation capability do not operate in a vacuum, they are present within companies and companies have their specific characteristics, including

proximities. As mentioned in the introduction, the discipline of economic geography has contributed with research and knowledge on how different proximities are impacting on innovation (Boschma, 2005, p.62).

Traditionally, geographical proximity has been the focus area for research within economic geography and innovation (Capaldo & Petruzzelli, 2014, p. 64). The overarching idea is that co-location is advantageous for knowledge-sharing and innovation, i.e. for transfer of tacit knowledge. In recent years, literature has been supplemented with research proposing that other dimensions of proximities, like organisational, cognitive, cultural, social, institutional, and technological proximity can act as alternatives or substitutes for geographical proximity in solving the challenge of coordinating knowledge-intensive activity like innovation (Capaldo & Petruzzelli, 2014, p. 64).

Boschma (2005) discusses five different dimensions of proximity. These may influence innovation capabilities both positively and negatively depending on the degree of proximity of each dimension and depending on whether they complement one another or act as substitutes for one another. Current research and theory have not fully investigated these relationships. In our thesis we examine how different proximities within a global company impact on the company's innovation culture.

Cognitive proximity

A widespread definition of cognitive proximity is similarities in how actors perceive, interpret, understand and evaluate the world (Knoben & Oerlemans, 2006). Cognitive proximity is present when companies or individuals share the same knowledgebase and expertise. Presence of cognitive proximity is expected to give higher capacity to capture (learn from others), analyse and utilize new knowledge compared with companies or individuals who have a cognitive distance (Boschma, 2005, p. 63). However, too much cognitive proximity can have a negative effect on learning and innovation (Boschma, 2005, p. 63). One could end up in a "lock-in" situation where an organization may find it difficult to learn new ways if their existing routines have proven to work efficiently in the past (Boschma, 2005, p. 64).

Cognitive distance will typically increase the potential for learning as new sources trigger new ideas and creativity, however, there is also the potential downside where cognitive distance makes it harder for a company to absorb new ideas (Boschma, 2005, p. 64). Finally,

if cognitive distance is very small, competitors will be careful not to share too much knowledge, due to the risk of "spill overs" (Boschma, 2005, p. 64). Geographical clusters consisting of diverse, yet complementary knowledge, which are open to new ideas can facilitate, both with respect to combatting 'spill-overs' and 'lock-in' (Boschma, 2005, p. 64).

Organisational Proximity

Boschma (2005) defines organizational proximity as "the extent to which relations are shared in an organizational arrangement, either within an organization, or between organizations" (Boschma, 2005, p. 65). One assumes a continuum of organisational structures from the simplest form to the extreme hierarchy. Examples of differences in internal structures are evident in Mintzberg's Structural Archetypes (Tidd & Bassett, 2008, p.98-99). Organizational proximity is proposed to benefit innovation in that innovation entails uncertainty and organizational structure with control mechanisms (which are derived from the proximity) can assist in combatting such a quandary (Boschma, 2005, p.65).

As an example, Mintzberg's organizational archetype, the simple structure, may be good for innovation in that it is energetic and enthusiastic but may have a weakness in long term stability as these structures tend to be overdependent on one person who may not elect the right direction (Tidd & Bassett, 2008, p. 98). The Simple structure's tight relations between colleagues could enable better transfer of knowledge but too tight relations will introduce issues like not gathering ideas from the outside.

Social Proximity

Social proximity can be seen for individuals tied together by trust, friendship and experience through many years of working together and will facilitates exchange of enhanced knowledge (Boschma, 2005). Social proximity should not be confused with ethnic or religious groupings as those belong in the field of institutional proximity.

Social proximity has its limits when bonds between parties are too emotional, as they may become blind and ignorant to opportunism. Equally, too close connections may prohibit other parties to enter with new and different ideas (Boschma, 2005, p.66). The relationship between innovative performance and social embeddedness is illustrated in Figure 6. Too much or too little embeddedness (i.e. trust or social proximity) will weaken the innovation capability.

Social proximity may affect other dimensions such as cognitive proximity in that high level of trust can reduce the cognitive distance between colleagues over time (Boschma, 2005, p. 67). Equally, geographical proximity may be helpful to achieve social proximity as trust is better built when parties are closer together.

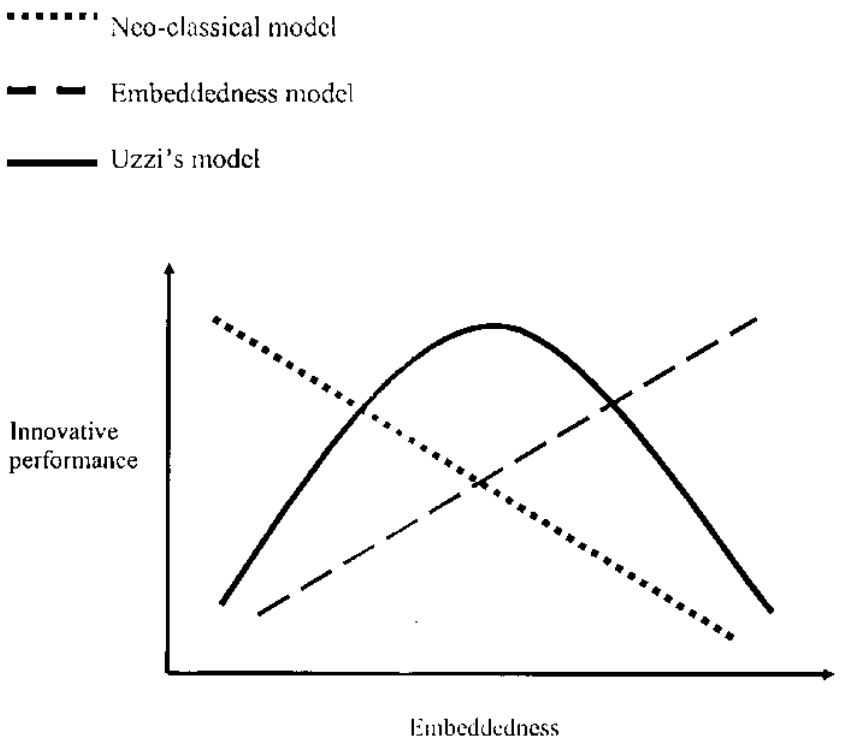


Figure 6 Relationship between the degree of embeddedness and the innovative performance (Boschma et al., 2002, p. 31)

Institutional Proximity

Institutional proximity can be seen between parties with shared values, rules and language and enables steady conditions for interactive and effective learning. If there is limited institutional proximity, such as in situations where formal institutions are limited, social proximity may mitigate lack of laws and regulations in that trust becomes the alternative way of interaction. Equally the informal side of institutional proximity such as shared values and religion, tend to be more interlinked with geographical proximity in that e.g. religion and values may vary significantly between regions. This means that greater geographical distance may entail less institutional proximity in terms of cultural aspects (Boschma, 2005, p. 68). Having a culture where e.g. trust is shared, is said to foster innovation and learning, as information is passed on easier when employees share a common language and have cultural proximity (Boschma, 2005, p. 68). When there is low institutional proximity, where e.g. the legal system does not function well, people are inclined to rely more on informal ways of cooperating based on

trust. Social proximity may therefore compensate to a large extent for cultures that have traits of distrust and malfunctioning formal institutions. This is important as too little institutional proximity as described will affect the ability to take action and implement and therefore hinder innovation.

Geographical Proximity

Geographical proximity describes the physical distance between actors that can influence innovation (Boschma, 2005, p. 69). Sharing of tacit knowledge is essential for innovation to flourish and this exchange is easier for actors with high geographical proximity. The greater the distance between actors the greater difficulty in exchanging tacit knowledge (Howells, 2002). This theory has been questioned by Torre & Rallet (2005). The introduction of internet, enhanced information and communication technologies (ICT) capabilities and increased mobility provide continuous opportunities for interaction across the globe (Torre and Rallet, 2005, p. 52-53). Given the mobility of man, geographical distance can be combated by travels to facilitate face-to-face interaction. Such interaction is essential, yet only temporarily needed, for knowledge intensive cooperation such as innovation (Torre and Rallet, 2005, p.54).

Relevant proximities for our study

We have chosen to study the effect of organisational proximity on innovation culture since we have not found any empirical studies focusing on how organisational proximity, in the form of position in a hierarchy, impact on innovation culture specifically. Knowledge about how position in a hierarchy impact on innovation culture will be relevant for many companies as a hierarchy is a common organisational structure, and particularly so for machine bureaucracies.

We have chosen to study the impact of a team's cognitive proximity on innovation culture as we have not found previous empirical studies with this focus. Knowledge of how cognitive proximity within a team impact innovation culture is very relevant when companies are considering the composition of innovative team(s) as a step to become more innovative.

Lastly, we have chosen to study the effect of cultural proximity on innovation culture. There is research indicating which behavioural traits have a positive impact on innovation culture and there is a vast literature on how national culture impact behavioural traits. However, we have not found studies on how different national cultures, present within a global company, impact the innovation culture of the company. Knowledge about how the different

behavioural traits you are likely to find in different parts of a global organisation impact innovation culture is very relevant for a global company seeking to establish an innovation culture across all offices.

2.5 Hypothesis – The impact of proximity on innovation culture

We are studying how organizational, cognitive and cultural proximities within a global company, a machine bureaucracy, impact the company's innovation culture as we have not found any previous empirical studies applying this micro-level perspective. Knowledge about how organizational, cognitive and cultural proximity impact innovation culture plus knowledge about the ideal degree of each proximity offer a deeper understanding of factors impacting a company's innovation culture. We focus on a subset of organisational types, the machine bureaucracies.

Our hypotheses are founded on theory about the impact of different proximities on innovation.

2.5.1 Hierarchical position and its effect on innovation culture

Do employees at different levels in an organisational hierarchy in a machine bureaucracy experience the same innovation culture?

The older and larger an organisation becomes the more likely it is to increase its formalism and turn into a machine bureaucracy (Mintzberg, 1980). In a hierarchical machine bureaucracy, the majority of the employees will be located at the lower end of the hierarchy. For a machine bureaucracy to succeed with innovativeness, it is of particular importance to ensure contribution from the lower end of the hierarchy as it represents a high percentage of the total, and as contribution from the whole organisation is required.

The strongest correlation with individual level of innovation is found from cultural predictors related to job and contextual factors (Hammond, Neff, Farr, Schwall & Zhao, 2011). Among the job factors are autonomy, role expectations and job complexity. Contextual factors include creativity, positive climate and supervisor support and leadership.

Our thesis focuses on measuring internal factors, specifically culture. The predictors related to job factors and contextual factors could both be cultural elements. For job factors, level of

complexity and role expectations are found to have a positive effect on innovation (Hammond et al., 2011). Other important factors are employees' experience of autonomy and involvement in their role in the organisation (Wallevik et al., 2013). Contextual predictors like availability of resources and the ability to act on creativity also contribute positively to individual innovation (Hammond et al., 2011).

To what extent does a hierarchical machine bureaucracy allow for autonomy, involvement, job complexity and availability of resources at all levels of the organisation?

Research has proven that type of organisation is one of the primary contingency variables related to innovativeness (Damanpour, 1991). Burns and Stalker (1961) categorised organisations in two distinct groups, mechanistic and organic. Later research within management theory categorised organisations into five different types of simple structures, machine bureaucracies, professional bureaucracies, divisionalized and adhocracies (Mintzberg, 1979). Mechanical and machine bureaucracies are categorised by high formalism, centralisation and lower internal and external communication compared with organic organisations and adhocracies (Burns and Stalker, 1961). The Dual-core model states that administrative innovation is best supported by mechanic organisations while technical innovations would benefit from support of organic organisations (Damanpour, 1991).

We have highlighted the need for mastering ambidexterity as one of the important capabilities for a machine bureaucracy in a changing environment, given the positive impact of ambidexterity on innovation (O'Reilly & Tushman, 2013). The dual-core and ambidextrous models have been proven to be a good fit for the machine bureaucracy where administrative or technical innovations is achieved in different parts of the organisation (Damanpour, 1987).

We propose that a hierarchical machine bureaucracy is not the ideal organisation form with respect to allowing for autonomy, involvement, job complexity and availability of resources at all levels of the organisation.

Theory on proximity and its effect on innovation performance similarly touch on the importance of autonomy. Organisational proximity focuses on agents, their given autonomy and the degree of control in organisational arrangement (Boschma, 2005). We would in our case study define an agent as either leader or non-leader. Theory on organisational proximity states that high organisational proximity in hierarchical organisations will foster innovation to

a certain point because of the ease of transfer of complex knowledge and facilitation of feedback between agents (Boschma, 2005).

Top leaders in machine bureaucracies are handling complex tasks with high degree of autonomy and involvement and possess resources to support them. Leaders experience higher levels of organisational proximities through the autonomy bestowed upon them and closer access to complex knowledge. Leaders are also typically having closer relations to the board of directors, top management team and knowledge about structure and organisation, global strategies and functional assets. These factors are all defined as important internal factors influencing innovation, see Figure 2 (Becheikh et al., 2006). They will also typically have a better overview of some of the contextual factors influencing their competitiveness like the company's industry sector, external network and government and public policies (Becheikh et al., 2006).

Our hypothesis thus proposes that employees in the higher levels of the organisational hierarchy of a machine bureaucracy experience a relatively stronger innovation culture than the rest of the organisation in medium-sized global companies.

Hypothesis 1 – Leaders perceive a stronger innovation culture than non-leaders in a medium-sized global machine bureaucracy.

2.5.2 Cross functional cooperative teamwork and its effect on innovation culture

To survive in an uncertain environment, companies need to master the balancing act of maintaining operations in parallel with adapting to new opportunities and threats (Nooteboom, 1999, p. 132). Companies must become ambidextrous. So how can a company combine exploitation with exploration? For explorative activities, we suggest that establishing a cross-functional, co-operative team can be a solution.

A corporate culture valuing collaboration across levels and divisions, can have significant positive effect in stimulating and supporting innovation (Arad, Hanson & Schneider, 1997, p. 53). Organisational structure may reinforce values that influence creativity and innovation in either positive or negative direction as some structures have been found to promote innovation; flat structure and work teams, whereas other structures have been found to hinder to innovation; specialisation and formalisation (Martins & Terblanche, 2003, p. 70). Among

the determinants of organisational culture that have been found to have a positive impact on creativity and innovation in organisations is co-operative teamwork. A cooperative way of working in teams allows for diversity and individual talent complementing one another (Martins & Terblanche, 2003, p. 71). A further determinant with positive effect on innovation is cross-functional teams encouraging interaction (Martins & Terblanche, 2003, p. 71).

A later study of which factors affect the success of cross-functional teams in new product development indicate that co-operation is the most important factor within the category of team behaviour. Further, co-operation is also among the top three factors across all three categories measured which were stage setters, enablers and team-behaviours (McDonough, 2000, p. 232). Co-operation was defined as working together to accomplish the work of the team. Terms used to describe cooperation include collaboration, team-work, interaction, communication and integration (McDonough, 2000, p. 231). The study included multiple regression analysis of cross functional teams, number of employees, company age, revenues and change in revenues examining the relationship between cross-functional teams and project performance and it was found that only the use of cross-functional teams had a positive impact on project performance (McDonough, 2000, p. 230).

Further, a study of the results from 32 project groups in a large R&D organization showed that group cohesiveness had a positive relationship with project groups' performance (Keller, 1986, p. 723). Group cohesiveness was found to clearly be the strongest predictor of project groups' performance across criteria, both at initial assessment and over time (Keller, 1986, 723).

Organisational structure regulates interactions through for instance formalisation of roles and centralisation of decision making. Formalisation of roles may impede cross functional co-operation and may render it difficult to make use of multiple sources of expertise (Mumford, Whetzel & Reiter-Palmon, 1997, p. 14). A mitigating action can be to choose a different structure for roles where creativity is needed to allow for skill variety (Mumford et al., 1997, p. 14).

An appropriate structure for research and development teams could be a cross functional team with high levels of autonomy. Such cross functional teams should provide the diversity needed for creativity and innovation (Arad, 1997, p. 47) The teams have several information resources, cross area communication and multiple perspectives and expertise (Arad, 1997, p.

47). For example, cross functional research and development teams can improve innovation by creating social and technical interaction between developers and implementors, as well as increasing the range of perspectives and values to be considered (Arad, 1997, p. 48).

In summary, managerial literature points to co-operative teamwork and group cohesiveness as dimensions of organizational culture having a positive effect on creativity and innovation. Regarding team composition, research indicates that the diversity present in cross-functional teams has positive impact on innovation.

However, as we have described in chapter 2.4. different dimensions of proximity will also impact on innovation. So, turning to the theory of economic geography, what dimension of proximity is relevant for assessing to what extent a cross-functional co-operative team is likely to possess an innovation culture? Research and literature within the dimension of cognitive proximity provide relevant insight as to whether such team is likely to possess a strong innovation culture. As described in chapter 2.4 above, the concept of cognitive proximity is built on the assumption that people who share the same knowledge base and expertise may learn from each other (Boschma, 2005, p. 63). Similarly, cognitive proximity has been defined as the extent to which more actors share a similar knowledge background, for example belong within the same scientific discipline (Davids & Frenken, 2014, p. 26). There should ideally be some cognitive distance to avoid lock-in and to increase the potential for learning (Boschma, 2005, p. 63-64).

In summary, cognitive proximity enables understanding, but for exploration to take place there must be new ideas and thus a certain cognitive distance is also required (Nooteboom, 1999, p. 140). A company should strive to find the right balance. The cognitive distance must not be too small, generating too few new ideas, nor too big, causing communication problems (Nooteboom, 1999, p. 140).

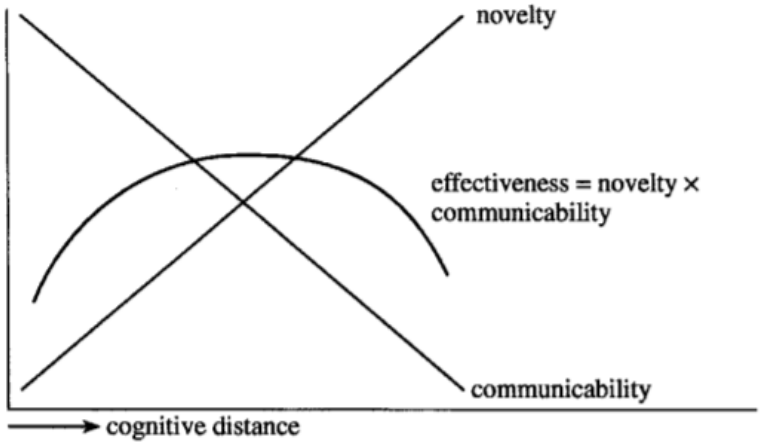


Figure 7 Cognitive distance (Nooteboom,1999, p.140)

Within a cross-functional team there will be some cognitive distance as people have different skill sets and capabilities, whilst the distance is not too large with the team members coming from the same company being united by the same overarching core values, vision and strategy. In summary, we propose that within a cross-functional co-operative team where all team members come from the same company, there will be an ideal cognitive distance represented by the variety in functions, shared values and strategy. This ideal cognitive distance in a cross-functional co-operative team should increase the potential for new ideas and creativity.

Hypothesis 2: Employees in a global machine bureaucracy that are members of cross-functional, co-operative teams perceive that the innovation culture is stronger compared with employees in specialized teams in the same company.

2.5.3 Cultural differences and its effect on innovation culture.

For a global company, it is relevant to know that institutional proximity may impact on an organisation's innovation capability, as described in chapter 2.4. This builds on the notion that institutions have various formal and informal constraints for structuring economic and social interaction. The informal side of institutional proximity, i.e. the cultural aspects (Boschma, 2005, p. 68) like shared traditions, customs and taboos could typically remain a constraint at a local level (Knoben & Oerlemans, 2006, p. 76).

We are studying how informal institutional proximity, i.e. how cultural aspects, within a global machine bureaucracy will impact on innovation culture.

Geert Hofstede is the world leading cross cultural expert who developed the cultural dimensions framework. He defined culture as "the collective programming of the mind which distinguishes the members of one group or category of people from another" (Peng, 2014, p. 105). The framework is distinct from an organisation's culture as it seeks to describe the effects of a nation's culture on the values held by the people and how the values impact behaviour. The framework originally had four dimensions but is has been refined and now contains six dimensions. We plotted five countries i.e. Hong Kong, Japan, Singapore, United States and Norway (Hofstede Insights, 2018).

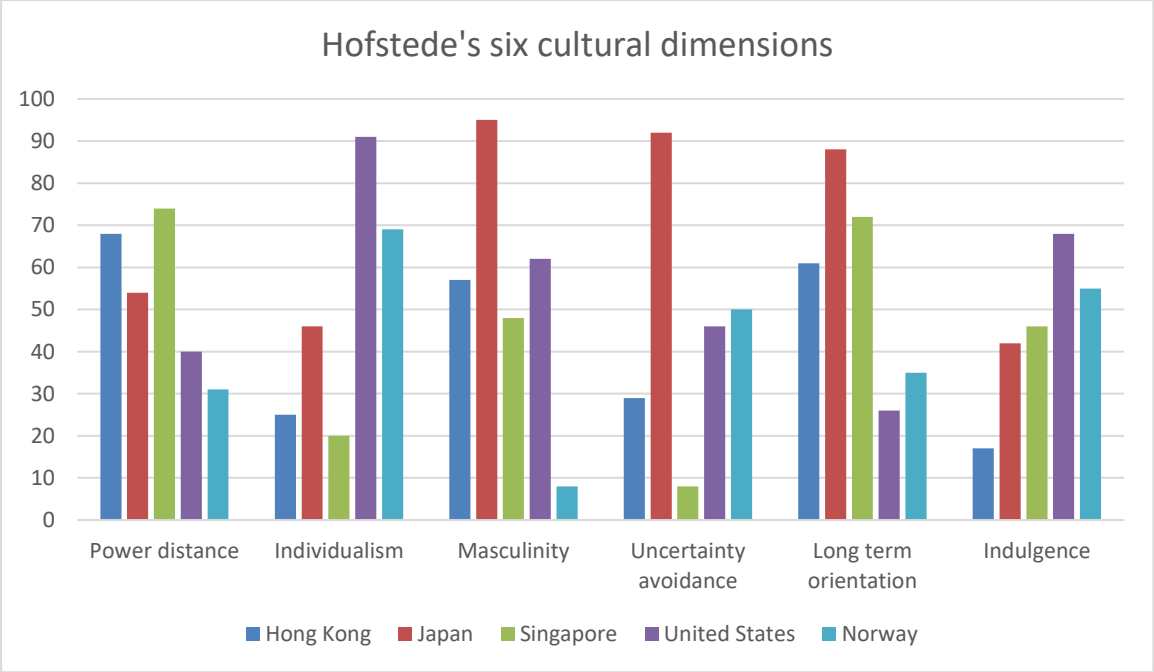


Figure 8 Hofstede's cultural dimensions

As is evident from Figure 8, there are great differences in how the countries score on the cultural dimensions. Below we will present some theory providing insight on what each of the cultural dimensions measure. To get a broad view of how these behavioral traits influence innovation, we have based our theory on Tian et al. (2018); who conducted a systematic literature review of how Hofstede's national dimensions affect innovation. Lastly, we have looked at the extent to which the behavioral traits correspond with the determinants of organisational culture influencing innovation shown in figure 5.

Power distance; "*The extent to which the less powerful members of institutions and organisations within a country expect and accept that power is distributed unequally*", (Hofstede Insights, 2018).

We see a lower power distance in Norway compared with the Asian countries. In low power distance cultures, there are less barriers and this results in a higher level of innovation when compared to high power distance cultures. In high power distance cultures, some may sense that they lack resources, thus reducing their capability to make decisions on innovation, and this may lower their incentive in solving problems through innovative ideas (Tian et al., 2018, p. 1095). The extent of positive impact of high-power distance is uncertain as it lacks empirical research (Tian et al., 2018, p. 1096). This coincides with Kaasa, who suggests that power distance is negatively related to innovation, however, more so to input than to output of innovation (Kaasa, 2016, p. 99).

A study conducted to see if power distance is negatively related to innovation index scores on the Global Innovation Index (GII) found that Power Distance was negatively related to both GII input and output (Rinne, Steel & Fairweather, 2012, p. 100). On balance we expect that high-power distance has a negative impact on innovation culture but more so on innovation intention than implementation.

Individualism; "*The degree of interdependence a society maintains among its members",* (Hofstede Insights, 2018)

Norway and United States score high on individualism compared with the Asian countries. In an individualistic culture, individuals think about themselves first, they take risks, they like their independence, have entrepreneurial ideas and expect to be rewarded for their achievements, which are traits that promote innovation. The opposite is a collective culture where the aspirations of a group trump the aspirations of an individual which is negatively related to innovation. A collectivism culture is said to first and foremost prioritise the interests of the groups they represent (Tian et al., 2018 p. 1096).

However, there is another school of thought that contradicts the above, in favour of a collective culture. Several Asian nations with a collective and hierarchical culture have become increasingly innovative, and some studies indicate that individualism has no great effect on innovation (Tian et al., 2018 p. 1097).

Masculinity; "*The fundamental issue here is what motivates people; wanting to be the best (masculine) or liking what you do (feminine)*", (Hofstede Insights, 2018).

For this dimension all countries score high on masculinity compared with Norway. A masculine society is expected to be more success and achievement orientated. This is because the individuals there are perceived to be confident, positive and willing to initiate new projects and take risks. For these reasons they are seen to bring more of an innovative orientation (Efrat, 2014).
However, other authors suggest that masculinity is negatively associated with innovative activity (Kaasa, 2016, p. 99). Feminine societies, on the other hand, place greater emphasis on people, have a warm climate, and higher trust levels which are all elements that enable colleagues to deal with uncertainty related to new ideas (Kaasa, 2016, p. 87).

Uncertainty avoidance; *"The extent to which the members of a culture feel threatened by ambiguous or unknown situations and have created beliefs and institutions that try to avoid these*", (Hofstede Insights, 2018).
Although there are differences between the Asian countries we believe as a region the score would be fairly similar to that seen for Norway and United States. The difficulty with high levels of uncertainty avoidance is that individuals try to reduce the perceived risks by becoming embroiled in consensus, formal rules, protectionism and procedures that stifle innovation. This ironically brings about a search for a hero at the top who will blatantly ignore the rules, norms and procedures and bring about innovative ideas (Tian et al., 2018, p. 1097-1098).

With low levels of uncertainty avoidance, there is more of an acceptance of competition which is said to be beneficial in generating ideas leading to innovation (Tian et al., 2018, p. 1098).

Long term orientation; "*How every society has to maintain some links with its own past while dealing with the challenges of the present and future",* (Hofstede Insights, 2018).
The Asian region has a greater long-term orientation than both Norway and United States. Here the focus is on long term rewards by perseverance. As many innovation projects require taking a long-term view, this long-term orientation is seen as being compatible with innovation (Tian et al, 2018 p. 1097).

However, increasing consumer demands require the roll out of products quickly i.e. in the short term. Tian et al. suggest that this type of short termism may also give rise to innovative

ideas, but this needs to be scrutinised and studied in greater depth before reliance can be placed on it (Tian et al., 2018, p. 1097).

Indulgence; *"The extent to which people try to control their desires and impulses",* (Hofstede Insights, 2018).
This dimension is new and requires further empirical studies before any reliance can be put on the limited data and conclusions available. Above, we have presented how various behavioral traits vested in national culture influence innovation.

We move on to look at the extent to which the behavioral traits correspond with the determinants of organisational culture that influence innovation where behaviour is one of them (Figure 5). Behavioural traits that positively influence innovation, are risk taking, idea generation and competitiveness. Turning to national culture, traits like low uncertainty avoidance and low power distance are found among the behavioural traits positively influencing innovation as it fosters risk taking, competitiveness and idea generation (Tian et al., 2018, p. 1098). Accordingly, we see that certain national cultures possess behavioural traits that are positive for innovation.

A further example of a national culture trait is individualism. There appears to be a link between an individualistic culture which is expected to have entrepreneurial ideas, and the behavioural trait of idea generation (Figure 5). Thus, one could expect to find a higher innovation culture among employees possessing the individualistic trait, compared to those who do not.

Taking Asia as a group (Singapore, Hong Kong & Japan), Asia scores much higher on power distance, masculinity & long-term orientation, and lower on individualism when compared to Norway. Accordingly, we expect to see a difference in innovation culture between the two regions. Given the United States' strong score on masculinity & individualism, when compared to Norway, we expect to see a difference in innovation culture between the two regions. In summary, as national culture traits may impact on innovation culture differently, we expect that innovation culture will vary within a global company; it will vary between offices located in different regions of the world.

Hypothesis 3: The innovation culture score in medium-sized global companies varies between offices located in different countries because of difference in national cultures.

2.6 Research model

The model in Figure 9 depicts our research model on how the position in the hierarchy (hypothesis 1), cooperative cross-functional teams (hypothesis 2) and cultural differences (hypothesis 3) influence the innovation culture in a global company.

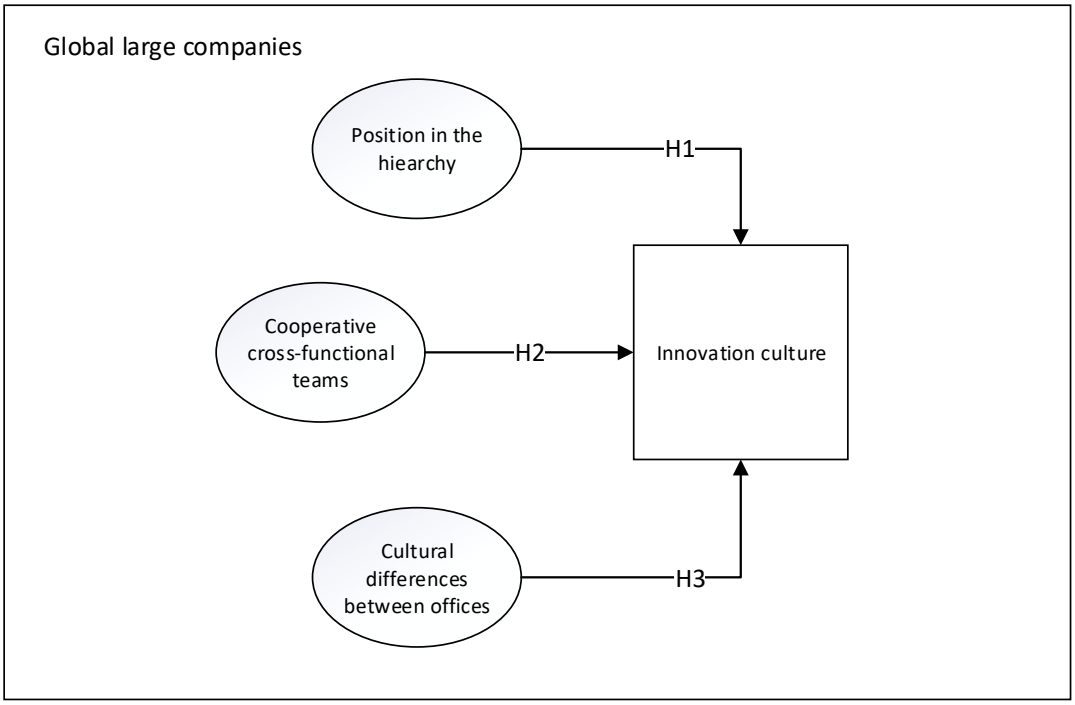


Figure 9 Research model

3 Methodology

3.1 Research Design

Through our study, we aim to add new insight in the complex area of innovation, a topic within social science. There is substantial research and literature on different aspects of innovation based on both qualitative and quantitative methods. Perhaps somewhat simplified, one could say that what characterises a qualitative approach is to derive theory from the analysis of the qualitative data collected. The quantitative research however will typically use collected data to validate or reject an existing theory (McLeod, S. A., 2017).

In our work we have studied a wide variety of theories on innovation culture and the factors influencing it. Based on a combination of elements from existing theory on innovation culture and theory on the effect of proximities on innovation, we have derived hypotheses that we want to test. We will therefore in this thesis apply a quantitative approach to empirically test our theory.

An advantage of applying a quantitative approach is the ability to get a cross-sectional assessment of innovation culture across individuals, leaders and non-leaders, business units and offices within or across organisations. Quantitative analysis can also easily be reproduced for example when studying changes to the innovation culture over time. Another advantage is to have a common articulated frame of reference for interpreting the data (Cooke, Rousseau, 1988).

3.2 Sample

Our hypotheses relate to how the innovation culture for different groups within a global organisation will be affected depending on position in organisational hierarchy, business unit and cultural distance from head office. Our case organisation needed to be of a certain size with a noticeable hierarchy, ideally resembling a machine bureaucracy, have clearly defined business units and global presence for testing our hypotheses.

We chose the global marine insurer Gard AS as the case organisation. Gard AS was established in 1907 and the company is a typical incumbent in its industry. Its' role is to handle insurance risks for shipowners. Marine insurance is a market which has seen relatively

little change since Edvard Lloyd established Lloyd's of London in his coffeeshop in about 1686. Over the years, Gard has grown to become a global organisation as regards customer base, offices and employees.

Offices are spread globally on 13 locations in Europe, America and Asia. The organisation is categorised by professionals with a diverse background ranging from technology and marine biology to law, finance and mariners. Gard could be defined as an actor in the service sector with a knowledge-based service delivery in addition to the core financial insurance product. The traditional market segment of marine insurance is now experiencing substantial changes, particularly in the form of technology driven innovation, pressure on rates and a market shift to Asia.

Considering its age, size and conservative industry sector, it is not surprising that the case organisation is characterised by formalism, vertical and horizontal job specialisation, functional grouping, vertical centralisation and limited horizontal decentralisation and is a good fit for a case organisation categorised as a machine bureaucracy (Mintzberg, 1980). It could be argued that Gard also has characteristics similar to Mintzberg's professional bureaucracy, related to e.g. having a stable and complex environment and also parts of the organisation having a high degree of professionalism. Still, the marine insurance sector is also highly regulated by international body's and as Mintzberg states "*the greater the external control of an organization, the more its structure tends to be centralized and formalized*" (Mintzberg, 1980, p. 333). Gard is categorised with a high focus on continuous standardisation of roles, processes and procedures and a highly centralised organisation with a large head office where also majority of top management is located.

The company has shown a growing interest in innovation as a business capability and was motivated to participate in this case study. One of the outputs for the case organisation is that they will get a baseline for innovation culture, provided we are able to utilise the quantitative method as intended. Armed with the baseline, the case organisation will be able to test the impact of measures taken to improve their innovation culture.

Our data set was collected using a survey distributed to the employees in our case study organisation. At the time of the survey, our case organisation had 485 permanent employees and some additional temporary employees. Data were collected from all organisational layers, all business units and all offices. The theoretical population size included 485 permanent and

55 temporary employees. Data were collected in the period from 9th October 2018 to 19th October 2018 using an online survey tool. The population size was 537, as the three authors of the thesis did not participate. We received 340 responses of which 256 with status completed.

The survey tool set status to Completed when all items were answered, and the respondent reported Done. The survey was voluntary, without mandatory items and some respondents completed the survey leaving some items unanswered. We discarded all responses with missing data on the variables Leaders, Office location, Business unit. We also discarded all responses where more than 3 out of 70 items were unanswered. This gave a total sample of 249 respondents.

The confidence level was set at 95% and the error of margin set at 5%. With a population size of 537, the sample size had to be minimum 225 to be statistically representative for the case organisation. The required sample size was calculated using the sample size calculator in the survey distribution tool, SurveyMonkey. Our sample size of 249 completed surveys met this criterion. Completed surveys for groups related to hypotheses are shown in Table 1.

Hypothesis	**Group**	**No of receivers**	**Complete responses**
Baseline	All employees	537	249
H1	Leaders	101	57
	Non-leaders	436	192
H2	Specialised departments (Claims, Finance, HR, Underwriting, Underwriting Operation & Other)	489	217
	Cross functional team (Technology and Business Transformation & Project ONE)	48	32
H3	Americas	22	15
	Asia	55	24
	Europe excluding head office	172	86
	head office	288	124

Table 1 Completed samples per group

The cross functional team (TBT/ONE), relevant for testing Hypothesis 2, was a combined group. It consisted of the two units Technology and business transformation unit (TBT) and the project organisation (ONE) delivering a large transformational program for the case organisation.

3.3 Measure

The hypotheses needed quantitative measurements for both the independent variables represented by hierarchy position, business unit and office region as well as for the dependant variable represented by the innovation culture. We included no control variables in the survey, which will be discussed in chapter 5.4.

Hierarchy position

The position in the hierarchy was needed for hypothesis 1 and was measured by a question about whether the respondent was a leader or not. Our case organisation was categorised by a hierarchy with five basic levels: CEO; Chief officers; Vice presidents; Managers and other employees. Leaders were defined to include CEO, Chief officers, Vice presidents and Managers.

Business unit

Information about which business unit the respondent belonged to was needed for hypothesis 2 and was measured through an initial question asking the respondent to answer which specific business unit they reported to. Our case organisation was divided into the following main business units;

- Underwriting (UWR) – Sales
- Underwriting Operation (UWR Ops) – Sales support
- Claims – Claims handling
- Finance & Accounting (F&A)
- Human Relations (HR)
- Technology and Business transformation (TBT) – IT department
- Project ONE – Corporate business transformation initiative

Region

Office location, and hence global region, was needed for hypothesis 3 and was captured adding an initial question where the respondents were asked to answer which region they belonged to. It would have benefited the thesis if the respondents had answered specifically which of the 13 offices they report to. However, to ensure anonymity for the respondents at the smaller offices, we grouped offices into regions. The following regions were defined:

- Head office – Arendal (Norway)
- Americas – New York (US), Rio de Janeiro (Brazil) and Bermuda
- Asia – Tokyo (Japan), Singapore and Hong Kong (China)
- Rest of Europe – London (UK), Helsinki (Finland), Athens (Greece), Bergen and Oslo (Norway)

Free text field

Respondents were given the possibility to provide general feedback on the survey for future improvements. We enabled this feedback through adding a non-quantitative open-ended question asking the respondents: "*Do you have any further comments to the content of the survey or suggestions for improvement?"*. The intention with this question was to seize the opportunity to collect feedback on potential improvements to the survey or other improvements.

Innovation culture

Traditional measurement of innovation has concentrated on the business outcome of the innovation capability and the Development Management Association found "*Profit from new products sales*" and "*New product sales as a percentage of total sales*" to be the most used innovation metrics (Markham & Lee, 2013). As mentioned in chapter 2.3, measurement tools for innovation culture (enabling subsequent monitoring) are still limited. Adams, Bessant & Phelps (2006) identified a comprehensive set of innovation metrics, by reviewing innovation measurement literature, that focused around the innovation input elements of strategy, portfolio management and commercialisation. For innovation culture, it was found that the culture or climate that is optimal in the initial stage of innovation (initiation) will not be optimal for the implementation phase (Adams et al., 2006, p. 34). There was not found an appropriate articulation, nor measurement of this shift.

Wang & Ahmed (2004) developed an organisational innovativeness construct. Based on review of literature, five dimensions were identified which constitute organisational innovativeness. They went on to validate a 20-item measurement construct which could serve as a framework for measuring an organisation's innovativeness (Wang & Ahmed, 2004, p. 312).

For our study, we chose to use a comprehensive quantitative survey, previously tested in the same business sector as our case organisation, the financial services industry.

Dobni (2008) developed an even more comprehensive instrument, compared to Wang and Ahmed, for measuring an organisation's innovation culture; the seven-factor model. Dobni defined innovation culture as a multi-dimensional context, and he identified the following four dimensions; the intention to be innovative, the infrastructure to support innovation, operational level behaviours necessary to influence a market and value orientation, and lastly the environment to implement innovation (Dobni, 2008, p. 540).

Each of the four dimensions are in turn represented by underlying factors. Dobni's findings, when developing the seven-factor model, suggested that an innovation culture scale may best be represented through a structure that consists of seven factors identified as innovation propensity, organizational constituency, organizational learning, creativity and empowerment, market orientation, value orientation, and implementation context (Dobni, 2008, p. 539).

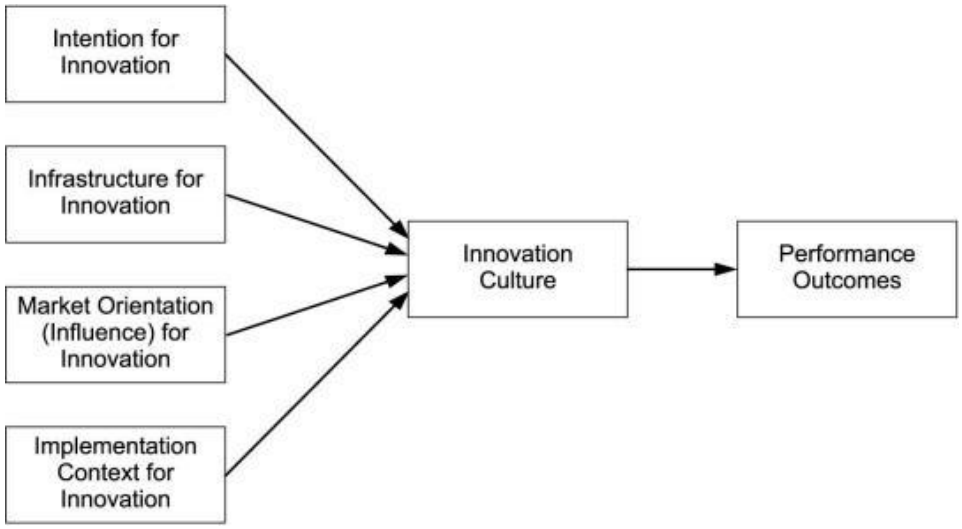


Figure 10 Model of innovation (Dobni, 2008, p.541)

Dobni's instrument for measuring an organization's innovation culture is a survey consisting of 70 statements representing the seven factors which in turn represent the four dimensions of innovation culture. Refer to Appendix 1 for a list of the 70 statements used. The 70 statements, or items, were derived from literature, interviews and a survey of employees from the financial services industry (Dobni, 2008, p. 539).

Survey distribution

To ensure sufficient sample size, support from the case organisation object's top management was obtained. The survey was promoted by the Chief Customer Officer prior to distribution. Employees were given ten days to respond and reminders where sent to managers and employees before closing the survey.

We used an online survey tool (SurveyMonkey) to distribute the survey and capture responses. Responses with no answers to our variables Leaders, Office location and Business unit were discarded. Responses with more than 3 unanswered items out of 70 were discarded. Actual number of responses per item was considered when calculating arithmetic mean, standard deviances and variances.

Dobni (2008) used a 7-point Likert scale without a specific justification when he developed the tool. We also chose a 7-point scale for our case study as research suggests that 7-points is the optimal scale (Krosnick & Presser, 2010). The following numeric values were allocated to the Likert scale for statistical calculations:

7	**6**	**5**	**4**	**3**	**2**	1
Very Strongly Agree	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Very Strongly Disagree

3.3.1 Pre-testing and adjustment

The survey was originally written by native English speakers and tested on Canadians. We considered that it was vital for our study that our respondents had a good understanding of the statements in the survey. Poor understanding would impact the reliability of the test result. Research advises a pre-test with a selected test group who shares the characteristics of the population of individuals who are going to answer the survey (Johannessen, Christoffersen,

Tufte, 2011). We tested the understanding of the survey on a limited group prior to distribution to our full test population.

A pre-survey was sent to 20 employees with different native languages, including both leaders and non-leaders and including a selection of business units and offices. The respondents were asked to state, for each of the 70 statements, whether it was well understood or not and use a comment field to describe any ambiguities. 15 responses were received from the pre-test survey and survey statements were categorised in following groups: Understood by >11 was acceptable. 61 of the statements fell into this category. Understood by <12; was to be evaluated for potential rephrasing. There were 3 statements in this category. Understood by <11; the statement had to be rephrased. There were 6 statements in this category. Comments to individual statements were analysed in detail and issues with clarity were identified.

Further, we found that certain words had not been understood. To mitigate, we did some rephrasing, with care not to amend the meaning of Dobni's statements. A more detailed overview of the analysis and rephrasing is found in Appendix 2.

3.4 Statistical analysis

In the seven-factor model, each factor is created by calculating a composite score (mean) per factor from the individual scores of the items each factor is made up of (ranging from 6 to 17 items per factor). Thus, the composite score for Likert scales should be analysed at the interval measurement scale. A similar approach was followed for finding standard deviances for different respondent groups.

Conclusions on statistical difference was based on a 95% confidence level to accept or reject null hypotheses. The null hypothesis for all hypotheses was defined to be no statistical difference between the two populations tested and the alternative hypothesis was defined to be a statistical difference between them. Statistical difference was established based on difference in central mean tendencies between our defined two groups on basis of samples from both groups. This was repeated for each of the hypotheses.

The Review of statistical tests used in papers published in Behavioural Ecology (Volume 16, issues 1–5) revealed that typically three types of tests are used for establishing statistical difference between two groups of data. Ranked by popularity the most popular were the

Student's t-test for equal variances followed by *Mann–Whitney U* test and lastly the *Student's t-test for unequal variances* (Ruxton, 2006). The most popular, *the Student's t-test for equal variances* is robust for normally distributed samples with equal variance across samples. We considered that we would see different variances between our samples and contemplated applying either the *Mann–Whitney U* test or the *Student's t-test for unequal variances* which are known to be more robust for unequal variances (Ruxton, 2006). The *Student's t-test for unequal variance*s is an effective replacement for the *Mann-Whitney U test* if data in the two populations is ranked before the test is used (Zimmerman & Zumbo, 1993). We chose to use a two-tailed t-test for unequal variances, also being effective for equal variances (Ruxton, 2006).

The degree of normality for our samples was evaluated through a simple statistical descriptive analysis investigating mean, median, kurtosis and skewness in addition to histograms. Student's t-test for equal variances is fairly robust for samples with moderate non-normality (Kim, 2013). We assumed acceptable degree of normality for skew values < 2 and excess kurtosis < 4 on basis of recommendations from literature (West, Finch & Curran, 1995).

Completed surveys were exported from the survey tool and uploaded into Microsoft Excel before Likert-scale data were converted to numeric values. Responses with more than three individual items unanswered were removed from the data set. Arithmetic mean values for each of the responses were calculated across all 70 statements as well as for each of the seven factors, Dobni (2008). Mean values were ranked before a statistical description analysis and *Student's t-test for unequal variances* were applied. The Microsoft 365 Analysis Tool pack Add-in was used for statistical analysis and *Student's t-test.*

3.5 Reliability & validity

Reliability here is defined as our survey´s ability to consistently being able to measure the seven factors defined by Dobni (2008). A common test applied for Likert scale surveys is the Cronbach alpha test (Cronbach, 1951), a test which was also used by Dobni when developing his tool (Dobni, 2008). We used this test to ensure validity and accuracy for the interpretation of our data (Tavakol & Dennick, 2011). A low Alpha could be explained by limited number of statements or low inter-relatedness between statements or heterogeneous constructs (Tavakol & Dennick, 2011). High values of Alpha could indicate that some of the statements

are redundant with several statements testing the same question (Tavakol & Dennick, 2011). The acceptable range for Alpha is from 0.7 to 0.95 (Tavakol & Dennick, 2011).

Alpha was between 0.8 and 0.9 overall as well as for the first 6 factors, see Table 2 results from the Cronbach's Alpha test. Only for the factor of *Employee Creativity and empowerment* was the Alpha below 0.8, possibly caused by the low number of statements (6) testing this factor (Tavakol & Dennick, 2011). We assume high reliability for our test data based on the value of Alpha (Tavakol & Dennick, 2011).

Factor	**Number of statements**	**Cronbach's Alpha**
Overall	70	0.95
Implementation Context	17	0.88
Organisational constituency	13	0.88
Organisational Learning	10	0.86
Market Orientation	8	0.83
Innovation Propensity	9	0.85
Value Orientation	7	0.81
Employee Creativity and empowerment	6	0.79

Table 2 Cronbach's Alpha test results

We base our assumption of validity on Dobni's work who considered content and construct validity in his study (Dobni, 2008). We do not question his evaluation of the construct validity related to how valid his measurement method is. The content validity, i.e. whether the tool accurately covers all appropriate aspects of innovation culture, is discussed in chapter 5.4.

4 Findings

This chapter presents the overall findings from our survey. For the understanding of the data, Likert data was converted to numeric values from 1-7, with "Very Strongly Disagree" being converted to 1 and "Very Strongly Agree" converted to 7. A value of 4 would hence read Neutral. Dobni's tool is constructed so that positive answers ("Very Strongly Agree") for all 70 constructs would correspond to a strong innovation culture.

4.1 Overall innovation culture in case organisation

The mean overall scoring for the innovation culture of the company, across the 7 dimensions was 4.97, close to an overall Agree (5) on the Likert scale. Across offices, leadership levels and business units, the respondents showed an average positive score above 4 – Neutral, with a mean close to 5 - Agree, on innovation culture. The average standard deviation across all dimensions and respondents was 0.85.

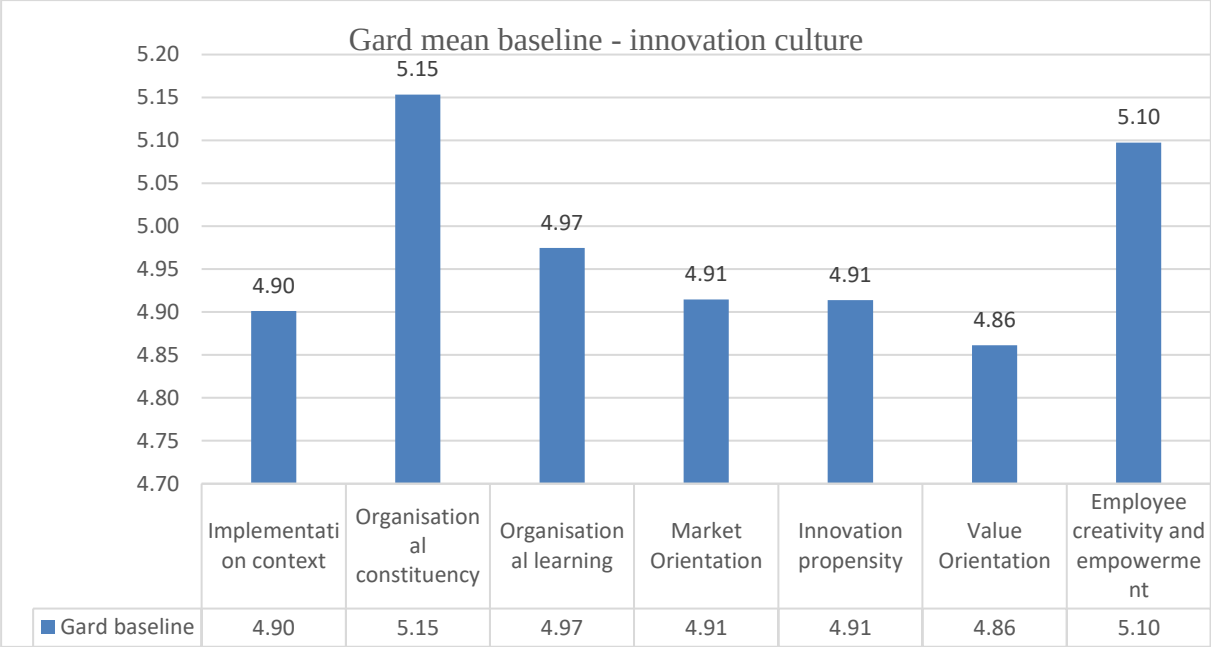


Figure 11 Mean score – baseline

The highest arithmetic mean score was found for the factors of *Creativity and Empowerment* (5.10) and for *Organisational constituency* (5.15). The factor of *Creativity and Empowerment* seeks to measure elements like respondents' attitude to creativity, resilience to uncertainty and the support for creativity by the organisation. Statements sorting under the factor of

Organisational constituency is capturing elements like the ability and support for individuals to contribute, the quality of internal communication and the trust level between leaders and non-leaders.

Lowest arithmetic mean score was found for the factors of *Implementation context* (4.90) and *Value orientation* (4.86). *Implementation context* focuses on respondents feeling of e.g. need to change the existing business models, resources available for innovation, speed and ability to change as well as the level of performance management related to innovation. *Value orientation* contains statements measuring the level of customer intimacy and ability to act on customer needs.

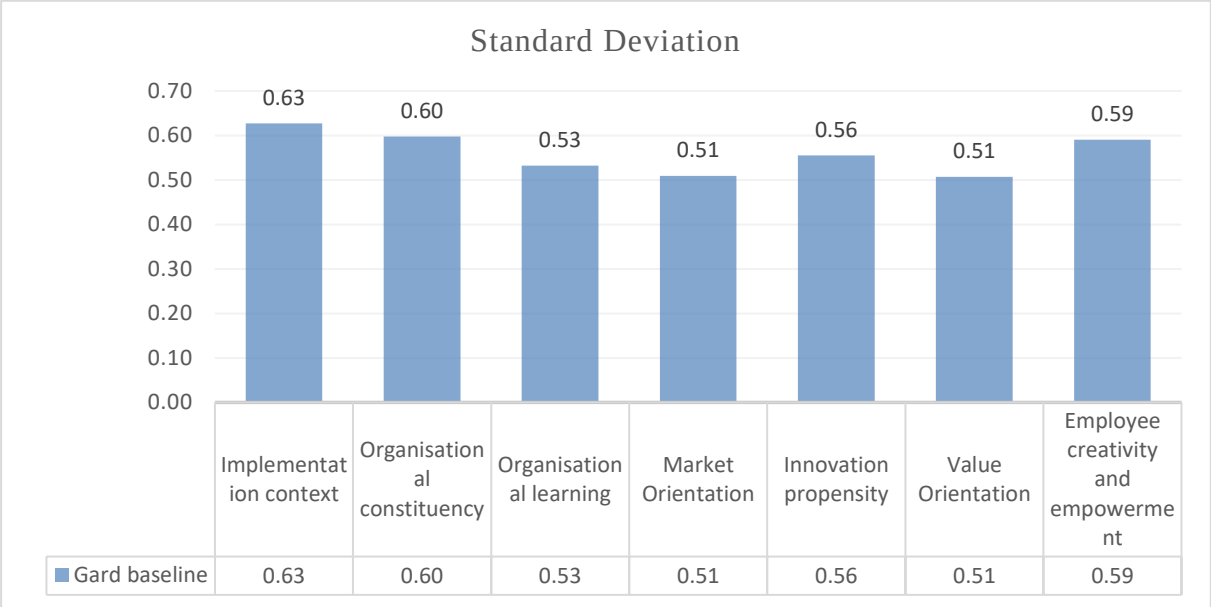


Figure 12 Standard deviation

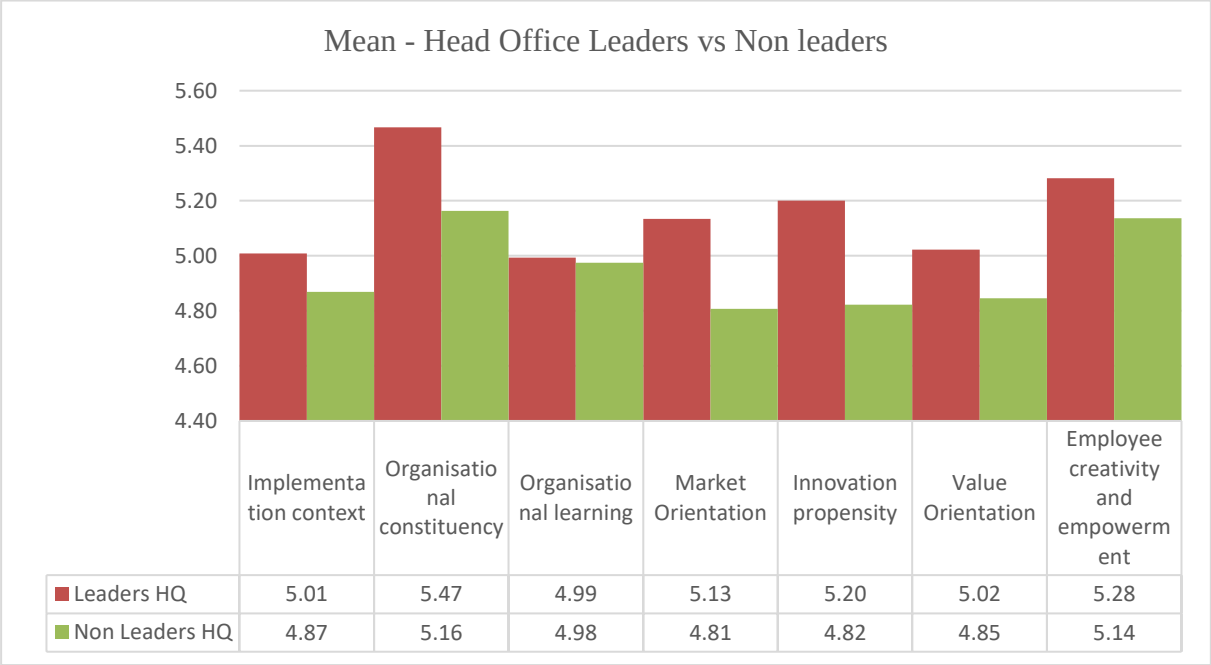
4.2 Hypothesis 1 – Effect of hierarchy

Our hypothesis 1 states that leaders perceive a stronger innovation culture than non-leaders in a medium-sized global machine bureaucracy. In the case organisation, the majority of the leaders are located at the head office. We therefore focused on leaders and non-leaders at head office. This selection gave the additional advantage that we could separate out influence from other proximities related to cultural differences as studied for hypothesis 3.

Leaders in the head office displayed an overall higher arithmetic mean value on innovation culture (M=5.16, Variance = 0.11) than non-leaders (M = 4.95, variance= 0.13). The variances between the two populations were low (maximum difference 0.11).

Table 6 also shows that we have an indication of normal distribution in the samples with Mean and Median being close (max difference 0.14). The highest Skewness found was 1.71 for *Innovation Propensity* below our limit of 2. The kurtosis (5.21) overall for Non-leaders was slightly high but deemed to be acceptable and we trusted the *t_Test assuming* unequal variances to be robust. We used it to test statistical differences between leaders and non-leaders overall and for each of the factors. All results from applying the *T-test for unequal variance* are given in Table 3.

The null-hypothesis for H1, assuming that leaders will not perceive a stronger innovation culture than non-leaders, will be rejected for p<=0.05 with a defined 95% confidence level. The test gave a two-tail p=0.007 overall for innovation culture in the two groups. We rejected the null-hypothesis and concluded that leaders of a medium-sized global machine bureaucracy perceive a stronger innovation culture than non-leaders. We could not specifically conclude on rejecting our null-hypothesis for H1 when inspecting the individual factors of Implementation context, Organisational Learning, Employee creativity and empowerment.



	Implementation context	Organisational constituency	Organisational learning	Market Orientation	Innovation propensity	Value Orientation	Employee creativity and empowerment
Leaders HQ	5.01	5.47	4.99	5.13	5.20	5.02	5.28
Non Leaders HQ	4.87	5.16	4.98	4.81	4.82	4.85	5.14

Figure 13 Mean differences between leaders and non-leaders

Factor	Overall		Impl context		Org Const		Org Learning		Market Ori		Innov Prop		Value Orient		Emp C & E	
Group	*N*	*L*	*N*	*L*	*N*	*L*	*N*	*L*	*N*	*L*	*N*	*L*	*N*	*L*	*N*	*L*
Mean	4.95	5.16	4.87	5.01	5.16	5.47	4.98	4.99	4.81	5.13	4.82	5.20	4.85	5.02	5.14	5.28
Variance	0.134	0.106	0.202	0.141	0.224	0.190	0.270	0.163	0.207	0.226	0.297	0.200	0.281	0.173	0.331	0.308
Observations	98	26	98	26	98	26	98	26	98	26	98	26	98	26	98	26
t Stat	-2.85		-1.60		-3.11		-0.19		-3.15		-3.66		-1.82		-1.18	
P(T<=t) one-tail	0.0034		0.0577		0.0017		0.4239		0.0016		0.0003		0.0375		0.1219	
t Critical one-tail	1.68		1.68		1.68		1.68		1.69		1.68		1.68		1.68	
P(T<=t) two-tail	**0.0067**		**0.1155**		**0.0034**		**0.8478**		**0.0032**		**0.0006**		**0.0751**		**0.2439**	
t Critical two-tail	**2.02**		**2.01**		**2.02**		**2.01**		**2.02**		**2.01**		**2.01**		**2.02**	

Table 3 H1 T-test for unequal variance – Leaders(L) and Non-leaders(N)

4.3 Hypothesis 2 - Effect of cross functional teams

Hypothesis 2 states that employees in global companies that are members of cross-functional, co-operative teams perceive that the innovation culture is stronger compared with employees in specialized teams in the same company.

In the case organisation, the business units can be divided into two main categories regarding specialization. One category is the cross-functional business unit TBT/ONE consisting of the case organisation's Technology and Business Transformation and their large enterprise transformation project group called ONE. The other category consists of the Specialised Departments, representing traditional, non-cross-functional units.

Comparing arithmetic mean values between the employees working in the cross-functional business unit (TBT/ONE) with the remaining employees in specialized departments, showed a lower arithmetic mean value on innovation culture for TBT/ONE (M=4.95, Variance = 0.18) than for the specialized departments (M = 4.98, variance= 0.14). The overall variances between TBT/ONE and the specialized departments were low (0.14 and 0.18).

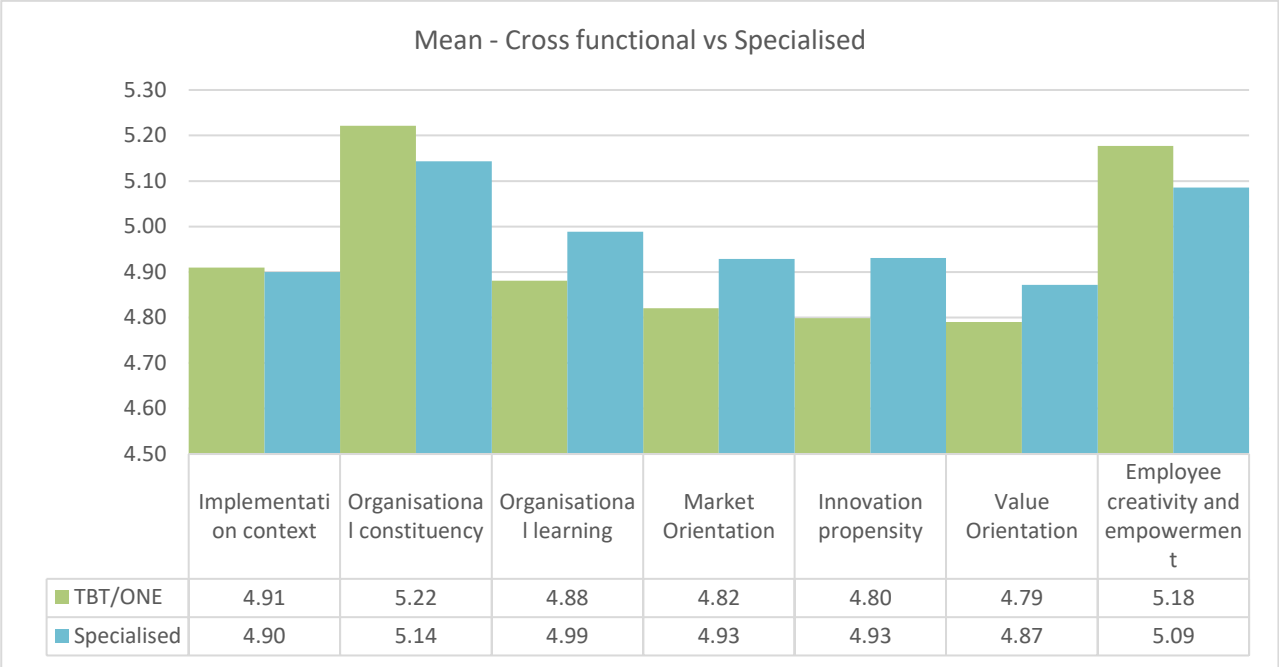


Figure 14 Mean difference between specialised departments and the cross functional team (TBT/ONE)

The null-hypothesis for H2, assuming no positive correlation for Cross functional, co-operative teams on high innovation culture, will be rejected for p<=0.05 with our defined 95% confidence level. Results of the *T-test for unequal variance* is given in Table 4. By inspecting the P(T<=t) two-tail value, we concluded that our null hypothesis overall as well as for individual factors cannot be rejected.

Table 7 shows the statistical description for Specialised departments and the Cross-functional team. Mean and Median values were close, with a maximum difference of 0.18. The highest Skewness of 2.84, related to the factor *Value Orientation* for the cross-functional team, was close to the limit of 2. A kurtosis of 12.7 for the Cross-functional team on the Value Orientation factor was higher than our limit of 4 and could indicate a less degree of normalised data.

The histogram in Figure 20 also indicates a less degree of normal distribution for the data set received from the Cross-functional department compared to the histogram for Special departments in Figure 19. We had a limited sample size of 32 for the cross-functional department. However, as the *t-Test assuming unequal variances* is rather robust also for less degrees of normality we used it to test for statistical difference overall and for each of the

factors. The *t_Test assuming* unequal variances gave a two-tail p=0.72 overall for innovation culture which lead to the null hypothesis not being rejected with a p>0.05.

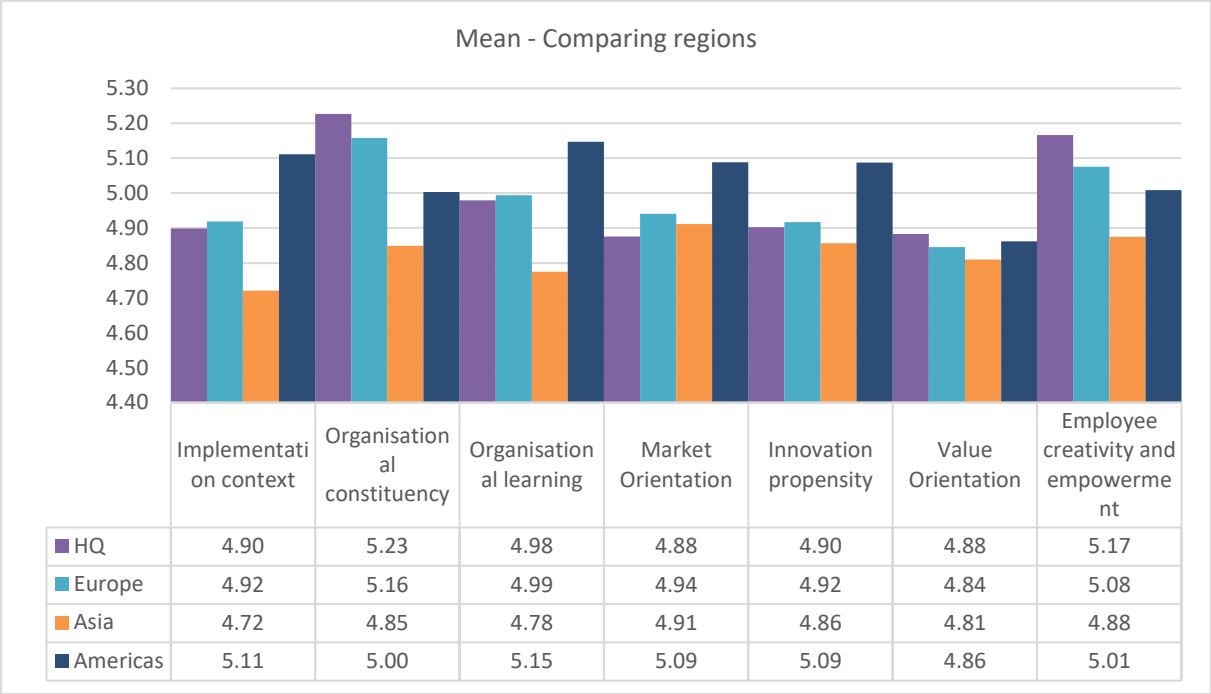
Factor	Overall		Impl context		Org Const		Org Learning		Market Ori		Innov Prop		Value Orient		Emp C & E	
Group	*Spec*	*Cross*	*Spec*	*Cross*	*Spec*	*Cross*	*Spec*	*Cross*	*Spec*	*Cross*	*Spec*	*Cross*	*Spec*	*Cross*	*Spec*	*Cross*
Mean	4.98	4.95	4.90	4.91	5.14	5.22	4.99	4.88	4.93	4.82	4.93	4.80	4.87	4.79	5.09	5.18
Variance	0.143	0.179	0.214	0.175	0.250	0.322	0.264	0.201	0.258	0.280	0.294	0.287	0.266	0.245	0.321	0.407
Observations	217	32	217	32	217	32	217	32	217	32	217	32	217	32	217	32
t Stat	0.35		-0.13		-0.74		1.24		1.08		1.30		0.87		-0.77	
P(T<=t) one-tail	0.3624		0.4500		0.2331		0.1101		0.1424		0.1000		0.1955		0.2238	
t Critical one-tail	1.68		1.68		1.69		1.68		1.68		1.68		1.68		1.68	
P(T<=t) two-tail	0.7248		0.9001		0.4661		0.2201		0.2848		0.2000		0.3911		0.4477	
t Critical two-tail	2.02		2.02		2.02		2.02		2.02		2.02		2.02		2.02	

Table 4 H2 T-test for unequal variance – Specialised Departments and Cross functional team

4.4 Hypothesis 3 - Effect of cultural differences

Hypothesis 3 states that innovation culture score in medium-seized global companies varies between offices located in different countries because of difference in national cultures. The results below show statistical mean for our four regions. Testing of hypothesis was done by testing statistical difference between offices with the largest cultural difference to head office in Norway. This limited the candidates to Asia and Americas where Europe was discarded. Few responses, (15), were received from Americas. The case organisation had one office in the United States, Bermuda and Brazil. The low number of respondents and the low degree of normalized data led to us discard Americas. This thesis focuses on comparing Asia and head office in Norway.

Comparing arithmetic mean values between the employees based in the head office and the employees based in Asia showed that the head office scored higher on all of Dobni's seven factors except the factor Market orientation. Employees in the head office showed a higher arithmetic mean value on innovation culture (M = 4.99, variance = 0.13) than employees in the Asian offices (M = 4.81, variance = 0.1).



	Implementation context	Organisational constituency	Organisational learning	Market Orientation	Innovation propensity	Value Orientation	Employee creativity and empowerment
HQ	4.90	5.23	4.98	4.88	4.90	4.88	5.17
Europe	4.92	5.16	4.99	4.94	4.92	4.84	5.08
Asia	4.72	4.85	4.78	4.91	4.86	4.81	4.88
Americas	5.11	5.00	5.15	5.09	5.09	4.86	5.01

Figure 15 Mean differences between geographical regions

Statistical description of data from our two groups can be found in Table 8. We have an indication of normal distribution with Mean and Median being close (max difference 0.12). The highest Skewness found was 1.29 for *Innovation Propensity* for head office, well below our limit of 2. A maximum kurtosis of 3.38 for Head Office overall was within our limit of 4.

We therefore trusted the *t-Test assuming* unequal variances to be robust and usable to test statistical differences between Head office and Asia overall and for each of the factors. The t-test on the overall innovation culture gave a two-tail p=0.0199. The null hypothesis was rejected for p<=0.05 and we concluded that innovation culture scores in a medium-sized global machine bureaucracy vary between offices located in different countries.

The null-hypothesis for H3 will be rejected for p<=0.05 with our defined 95% confidence level. Results of the *T-test for unequal variance* is given in Table 5. Inspecting the P(T<=t) two-tail value, we could conclude with rejecting our null-hypothesis overall. We could not specifically conclude on rejecting our null-hypothesis for H3 when inspecting the individual factors of *Market orientation*, *Innovation propensity* and *Value orientation.*

Factor	Overall		Impl context		Org Const		Org Learning		Market Ori		Innov Prop		Value Orient		Emp C & E	
Group	*HQ*	*Asia*	*HQ*	*Asia*	*HQ*	*Asia*	*HQ*	*Asia*	*HQ*	*Asia*	*HQ*	*Asia*	*HQ*	*Asia*	*HQ*	*Asia*
Mean	4.99	4.81	4.90	4.72	5.23	4.85	4.98	4.78	4.88	4.91	4.90	4.86	4.88	4.81	5.17	4.88
Variance	0.134	0.100	0.192	0.090	0.230	0.157	0.246	0.092	0.227	0.266	0.298	0.286	0.262	0.211	0.327	0.348
Observations	124	24	124	24	124	24	124	24	124	24	124	24	124	24	124	24
t Stat	2.44		2.45		4.12		2.68		-0.31		0.38		0.70		2.23	
P(T<=t) one-tail	0.0100		0.0093		0.0001		0.0049		0.3785		0.3537		0.2440		0.0166	
t Critical one-tail	1.69		1.68		1.69		1.68		1.70		1.69		1.69		1.69	
P(T<=t) two-tail	**0.0199**		**0.0185**		**0.0002**		**0.0098**		**0.7570**		**0.7074**		**0.4879**		**0.0331**	
t Critical two-tail	**2.03**		**2.02**		**2.03**		**2.01**		**2.04**		**2.03**		**2.03**		**2.04**	

Table 5 H3 T-test for unequal variance – Head office (HQ) and Asia

5 Discussion

5.1 Hypothesis 1 – Effect of hierarchy

Our findings confirmed our hypothesis stating that leaders in a medium-sized global machine bureaucracy would perceive a higher innovation culture than non-leaders. Comparing arithmetic mean values showed that leaders in the head office scored higher on all of Dobni's seven factors. Highest differences were seen for Dobni's (2008) factors *Innovation propensity* and *Market Orientation*.

Statements related to the factor of *Innovation propensity* touches on strategic intent for innovation, the presence of innovation vision, leaders' ability to communicate the need for innovation, innovation as a core value and strategy planning. Our hypothesis was built on an assumption that a stronger innovation culture could be seen amongst leaders because of a higher organisational proximity and therefore closer access to information and knowledge related to strategy and vision than non-leaders.

The factor of *Market orientation* is built on statements evolving around the understanding of the value chain, markets and segments to support growth, ability to act on market insight etc. Leaders, in a machine bureaucracy, would be expected to have a better and broader overview, more complex work, autonomy to act and resources to do so, and we found that they score higher than non-leaders. This finding is in line with our propositions derived from the innovation theory summarised in chapter 2.5.1.

The findings are interesting because they highlight that different employee groups experience different innovation cultures. We know from theory, chapter 2.2, that innovation potential in an organisation is highly dependent on individual level contribution. The machine bureaucracy is often characterized by a traditional hierarchy with a large base of employees in the lower part of the organisation. To unleash the overall innovation potential in the organisation, it is important to secure the non-leaders' contribution.

Our findings support a need to focus on increasing the organisational proximity for non-leaders to strengthen the innovation culture in this organisational layer. This could be achieved through an increased level of autonomy and involvement, through increase in job complexity and increased knowledge of the organisation's vision, strategy, value chain and

market position. Still, we know from the theory of impact of organisational proximity that it is a balancing act and too much organisational proximity can lead to lock-in. Further, care must be taken to ensure that positive characteristics of machine bureaucracies, like supporting administrative innovation, related to process innovation, is not lost. Machine bureaucracies could, by adjusting structure, culture and proximities, strike the right balance and achieve ambidexterity. Thereby securing their exploitation efforts in parallel with focusing on exploratory innovation.

5.2 Hypothesis 2 - Effect of cross functional teams

The second hypothesis stated that members of cross-functional, co-operative teams in a global machine bureaucracy perceive that the innovation culture is stronger compared with employees in specialized teams in the same company

However, we found that employees in a global company that are members of cross-functional, co-operative teams did not perceive that the innovation culture was stronger compared with employees in specialized teams in the same company. Contrary to our expectations, we rejected our second hypothesis based on our findings.

In the following we will discuss possible causes why we did not find statistical difference in perception of innovation culture between the TBT/One Team and the specialized teams.

One possible cause may be that a cross-functional, co-operative team in a global machine bureaucracy does not possess the ideal degree of proximity. As described in chapter 2.5.2, cross functional teams should provide the diversity needed for creativity and innovation (Arad, 1997, p. 47) and use of cross-functional teams has been found to have had a positive impact on project performance in product development teams (McDonough, 2000, p. 230). However, we know that too much or too little cognitive proximity can have a negative impact on innovation (Nooteboom, 1999, p. 140). For example, too much cognitive proximity may mean that there is not enough variety of knowledge and competence to generate new ideas. Further, too much cognitive proximity may lead to cognitive lock-in (Boschma, 2005, p. 64). To illustrate, the common notion of “the way we do things around here”, common routines and heritage may blur the vision and may make the company insensitive for emerging technologies, new markets and new competitors (Boschma, 2005, p. 64).

It can be hard for an organisation to let go of the recipe for past success and learn to embrace new ways. This is particularly true for machine bureaucracies that have focused on optimizing processes through standardization and formalization. Innovation in the form of adopting new ways of working, new systems and new processes is obviously more radical than incrementally improving existing processes and represents a big shift for a machine bureaucracy. A possible cause why the cross-functional, co-operative TBT/One team in the case organisation did not have a higher perception of innovation culture than the specialized teams can be too high proximity in the TBT/One team stemming from common heritage, common routines and common past focus on incrementally improving existing ways of working.

Further, too great cognitive distance can also have a negative impact on innovation. If the cognitive distance is too big, it may hinder understanding, effective communication, and absorption of information (Boschma, 2005, p. 64). Accordingly, a possible explanation for why we did not find statistical difference in innovation culture between a cross-functional co-operative team and a specialized team can be that there was too high cognitive distance within the TBT/ONE team. For example, it may be that the different specialists, representing different functions, had too little understanding of each other's specialities which in turn would hinder communication and actual co-operation, despite good intentions and willingness to understand and co-operate.

Another mechanism that could render it difficult for a company to break with lock-in, is vested interests in organizations. An attempt to implement change that would undermine positions, would typically be met with resistance (Boschma, 2005, p. 65).

There are further possible explanations for why we did not find statistical difference in innovation culture between the cross-functional, co-operative team and the specialized teams in the case organization. As highlighted in chapter 2.5.2. above, organisational structure also plays a role. Flat structures with high degree of autonomy facilitate innovation, whereas formalisation, bureaucracy and a hierarchical structure may hinder innovation (Martins & Terblanche, 2003, p. 70). Despite TBT/ONE, being a cross functional, co-operative team and having the necessary prerequisites for creativity and innovation, it may be that a hierarchical team structure and project structure within TBT/ONE hinder creativity and innovation.

Furthermore, as described in the Introduction, we know that different proximities are interrelated in intricate ways (Oerlemans & Meeus, 2005, p. 90). A common denominator for the theory on proximity is that different proximities can enhance each other, act as substitutes for one another and both too much and too little proximity can hinder innovation. Thus, we cannot rule out the possibility that the reason why we did not find statistical difference in innovation culture between a cross-functional co-operative team and a specialized team can be the effect of other proximities than cognitive proximity. As touched upon in chapter 2.5.2., the degree of autonomy and degree of control that can be exercised within the organizational arrangement, also known as organisational proximity has an impact on innovativeness. Too much organisational proximity brings with it the risk of dependency on certain exchange-relations (Boschma, 2005, p. 65). For instance, strong ties may limit the access to sources of new information (Boschma, 2005, 65). Another challenge with too much proximity, in the form of hierarchy, is that it does not have the same feedback mechanisms as a flat structure (Boschma, 2005, 65). There may be no or little reward and recognition for new ideas and little interactive learning (Boschma, 2005, 65), meaning there will be less ideas. Thus, a possible explanation for why we did not find statistical difference in innovation culture between a cross-functional co-operative team and a specialized team may be that the organisational proximity present within the TBT/ONE team is neutralizing the impact on innovation culture of being cross-functional and co-operative.

Lastly, as described in chapter 2.5.2. too close geographical proximity can hinder creativity and innovation. The TBT/One team is a co-located team and could thus be prone to spatial lock-in and blind spots which could hinder creativity and innovation (Boschma, 2005, p. 69). A company can become so self-centred that it loses its capability to innovate and is unable to respond adequately to new developments and emerging threats (Boschma, 2005, p. 70). It is possible that the reason why we did not find statistical difference in innovation culture between a cross-functional, co-operative team and a specialized team is found in too close geographical proximity in the TBT/ONE team, in the form of co-location.

In summary, we did not find a stronger perception of innovation culture in a cross-functional, co-operative team than in the specialized teams within a global company and we propose that too much or too little cognitive proximity in the cross-functional team, or potentially the effect of other proximities, is the reason why the team does not have a stronger perception of innovation culture than the specialized teams.

5.3 Hypothesis 3 - Effect of cultural differences

The third hypothesis stated that innovation culture score in medium-sized global companies varies between offices located in different countries because of difference in national cultures.

Out of the factors measured, different national cultures appear to affect the following factors of innovation culture the most: *Implementation context, Organisational learning, Employee creativity and empowerment* and *Organisational constituency.* For these factors, we saw a difference in arithmetic mean ranging between 0.18 to 0.38.

It is interesting to note that we failed to find support in our hypothesis for the remaining three factors (*Innovation propensity, Value orientation* and *Market orientation*), as they did not appear to have been affected much by difference in national culture. The scores from Asia and the Head Office were very close, with Asia scoring slightly higher than the Head Office for *Market orientation.*

Innovation propensity measures how employees rate the organization's established architecture to develop and sustain innovation and its management's ability to embed innovation as a core value for the organization (Dobni, 2008, p.551). Asia's mean score for *Innovation propensity* is very similar to the Head Office.

Innovation constituency measures employees' own engagement in the innovation imperative (Dobni, 2008, p.551) and for this factor, Asia's overall mean score was distinctly lower than the Head Office.

As these two factors, *Innovation propensity* and *Innovation constituency*, load to the Innovation Intention Dimension (Dobni, 2008, p.551), it is striking to see that for *Innovation propensity* the regions appear to score very similar yet a notable difference in scores is seen for *Innovation constituency.* This could indicate that national culture does not affect the way employees perceive the organization and its management's ways of operationalising innovation. National culture appears to have a much greater impact on innovation culture when employees rate their own participation in innovation. This is seen from the scores rating the *Organisational constituency* factor. Could this indicate that national cultural traits such as power distance and individualism are only actualized when employees evaluate their perception of their personal participation and not when they evaluate how they perceive the organisation?

Could this also indicate that geographical distance, i.e. low geographical proximity, has limited impact? Despite the geographical distance between Asia and Norway the employees rate the management's ability to relay and embed the organisation's visions and goals in relation to innovation similarly. This could support Torre & Rallet's (2005) theory that low geographical proximity can be combated by travels facilitating face-to-face interaction and by technology (Torre and Rallet, 2005, p.54).

Little difference between the regions is seen in the scores for *Market orientation* and *Value orientation.* Both factors load to the Innovation Influence Dimension.

The *Market orientation* factor measures how employees feel they interact with and understand the value chain and markets they serve, and the degree to which employees collect and distribute valuable knowledge from the external market across the organisation (Dobni, 2008, p. 551). This factor stands out as it is the only factor where Asia has a higher mean score (4.91) than the Head Office (4.88).

The *Value orientation* factor measures the degree to which employees are involved in value creation for customers (Dobni, 2008, p. 551). Again, we see notably similar scores between Asia (4.81) and Head Office (4.88), indicating that different national cultures have little or no impact on innovation culture as regards the value creation dimension.

The Asian offices are all placed in business hubs within the local markets they serve. Could it be that we see a high score for the innovation influence dimension because employees rate their value creation and market orientation towards a market that have similar national cultures to their own and share their level of institutional proximity in the same way as other offices serving local markets? Would we have seen a difference in the innovation influence scores if the Asian offices had served markets with different national cultures e.g. Norwegian culture?

There is a further possible explanation for Asia having a higher mean score than the Head Office for *Market orientation.* A high percentage of the positions held in the Asian offices are positions that entail a large degree of interaction with customers and the market. In the head office there is a different composition, with a much higher percentage of employees performing office support functions. This could have influenced the score negatively in the head office as many support functions have limited direct contact with the market and clients.

Finally, the regional offices in Asia are all situated in cities that are major marine hubs. Several of the clients are also based in these cities facilitating face to face interaction with the market on a daily basis. In comparison, employees in the head office have few local customers and mainly serve a market that is geographically further away. Above we proposed support to Torre & Rallet's (2005) theory that geographical distance can be mitigated by travel and technology, but in an intra-organisational context. Could it be that the same theory is not as valid for innovation influence, i.e. geographical proximity may have greater impact for external interaction?

5.4 Limitations

Our study has several limitations and in the following we will present the ones with the greatest potential impact on the quality of our findings and our ability to answer our research questions.

Research design

One of the most important limitations is the nature of our research design; the choice of a case-study focusing only on a single, medium-sized global company, a machine bureaucracy, in the financial sector. For increased confidence in the validity of our findings, the findings need to be confirmed in studies of companies of different sizes, different structures, in different segments and with different global spread (Polit & Beck, 2010, p. 1454). We chose to survey only one company to optimize our chances of getting a sufficient number of responses to our survey. We all work in the case organisation and knew that we could count on our colleagues to support our research through responding to the survey. We could have surveyed more insurance companies, which would have increased the population size but with the risk of a lower response rate.

Missing Control variables

Our independent variables include position in hierarchy, business unit and region. They influence the dependent variable represented by the innovation culture. To empirically prove correlation between two phenomena, a proximity and innovation culture, one of the requirements is that you can control for all theoretically relevant variables (Johannessen et al., 2011, p. 325-326). One way you can do that is to introduce control variables by either keeping them constant or by using regression analysis to separate their effect on innovation

culture. Given the importance of the control variable, we wanted to include some and considered to add age, sex, nationality, length of employment at case organisation, overall length of career, specific position in hierarchy and level of education. Control variables would have added to our understanding of the data collected. For instance, for H1 we established a positive correlation between position in the hierarchy and innovation culture. Introducing length of employment at case organisation as a control variable could have shown that this latter variable drove the result. Results from other surveys in the case organisation have shown that new employees have a different view on the organisation compared to those with longer length of employment.

The reason for not adding control variables was the need to ensure confidentiality, given that our case organisation was a medium-sized company. The survey contained statements related to management hence demanding confidentiality for respondents. Adding the suggested control variables for the Asian, American and European region would, when combined, have accurately identified individuals.

Limited samples

The population size of our case organisation was 537. The relatively small population size meant that the sample sizes were limited for several groups of respondents tested. It also meant that we had to limit the granularity for our independent variables when testing the hypotheses. Sample size matters because when a sample is smaller than the ideal, it increases the chances of assuming as true a false premise (Faber & Fonseca, 2014, p. 28). The rate of normality for our samples could also have been checked more formally as degree of normality has an impact of which test is appropriate. We could have done this by applying tests like the Kolmogorov-Smirnov or the Shapiro-Wilk Test.

H1 testing

When comparing leaders and non-leaders, it is a limitation that we have only studied how leaders at head office perceive innovation culture. This has a potential impact on our ability to answer our research question, as it is only for the head office that we have proven that leaders perceive a stronger innovation culture than non-leaders. We could have included leaders at all offices but chose not to in an attempt to rule out other potential influences like cultural proximity.

H2 testing

The histogram in Figure 20 indicates a less degree of normal distribution for the data set received from the TBT/One Team. For example, the Kurtosis values for some of the factors exceed our limit of 4. Further, the sample size is small with only 32 respondents. When modelling the distribution of a random variable, Yn, the Central Limit Theorem shows that as n grows larger, "the distribution of Yn will converge to a known function, which very often is the normal distribution" (Neftci, 2000, p. 24). However, as our sample size is small, we cannot assume normal distribution. Even if the statistical method applied, the Student's t-test for equal variances, is fairly robust for samples with moderate non-normality, we cannot rule out that the tendency of non-normal distribution affects the validity of our findings.

H3 testing

It is a limitation of our study that we did not measure the effect of institutional proximity on innovation culture for each of the offices in Asia. However, we had no choice but to group the responses from all Asian offices since we needed to maintain anonymity and since the sample sizes for each office were too small on their own. The grouping of respondents from Asian offices represents a limitation for the validity, as the findings are not necessarily valid for each office, i.e. the correlation could be weaker or stronger from office to office.

Survey

Dobni's (2008) tool is based on his specific definition of innovation culture and this represents a limitation for our ability to answer our research questions. Dobni's survey contains 70 statements and it may miss factors or dimensions that are relevant for other definitions of innovation culture. As described in chapter 2.3, there is research to support that different cultures can be innovation cultures. Accordingly, Dobni's instrument is not necessarily suitable for measuring innovation culture, where the innovation culture one wants to measure is based on a different definition. One could argue that Dobni's tool for measuring innovation culture represents an attempt to oversimplify a complex area of social science. In summary, our findings are potentially not relevant for other definitions of innovation culture.

Further, when developing the scale items and ensuring content validity, Dobni worked with the financial services industry. It is a limitation for our study that the content validity is not necessarily transferable to other industries and that the scale items are not necessarily appropriate for measuring innovation culture in other sectors.

Measure - Length and language of the questionnaire

There is a high probability that we received some "false responses" and this represents a limitation of our study as it affects the quality of our findings. Our pre-test (Appendix 2) showed that the language in Dobni's survey was somewhat difficult to understand. This finding was confirmed by the comments submitted to our open-ended question, that we added at the end of the survey (Appendix 3). Also, 91 respondents started the survey without completing and respondents who completed commented that the survey was too long (Appendix 3). When respondents do not understand the statements, we are not able to capture their true perception. When respondents find the survey too long, the likelihood of indifferent responses increases. Both these factors will have a negative impact on the quality of our findings.

The effect of no Negatively worded statements in the survey

It is a limitation of our study that the survey did not contain any negatively worded statements as this increases the risk of "false responses" which potentially impact on the quality of our findings. Negatively worded statements are subject to reverse scoring and should be included to ensure that respondents engage in an intelligent and controlled way. Negatively worded statements help combat the risk of "auto respond" (Chen, Y., Rendina, G., & Dedrick, F., 2007).

Lack of a clear definition of Innovation

Dobni's questionnaire included the word *innovation* in several statements (Dobni, 2008, p. 546-548) without providing a definition of innovation in the survey. The lack of a definition represents a limitation of our study. It affects the accuracy with which we can answer our research question. We found that several respondents asked what was meant by innovation (Appendix 3). Our review of innovation theory has taught us that innovation and innovation culture may be defined in several ways (chapter 2.1 and 2.3), whereas our findings are potentially only relevant when applying Dobni's multi-dimensional understanding of innovation culture (Dobni, 2008, p. 552)

General limitations

It is important to emphasize that our case organisation was a medium-sized company, and thus our findings are not necessarily relevant for a large company as some researchers point to

a difference between SMEs and large companies. An analysis of empirical research on the innovation–performance relationship in SMEs identified several important contextual factors that impact the innovation performance relationship for SMEs (Rosenbusch, Brinckmann & Bausch, 2011, p. 454).

Our case organisation's origin in marine insurance implies that it is positioned in the service sector with a knowledge-intensive offering. There is research suggesting that the conceptualization of the innovation capability construct, underpinning our hypotheses, is mainly developed with basis in manufacturing companies and thus a different conceptualization may be required in a knowledge-intensive service context, namely for professional service firms (Hogan et al., 2011, p. 1264).

A review of empirical articles from 1993 to 2003 revealed that several studies had shown that certain variables strongly distinguish innovative firms from non-innovative ones, with size and industry seeming to be the two main variables (Becheikh et al., 2006, p. 660).

We are aware of the research mentioned above which points to the relevance of size, sector and industry, but have not factored this into our analysis, which admittedly represents a limitation for our study.

Another important addition to innovation theory which was not addressed in our analysis, is to what extent organisations today increase their innovation capability by cooperating with external partners. The combination of internal and external ideas and processes that utilise not only internal participants, but also external sources of information are typically categorised as open innovation (Chesbrough, 2003). In our thesis we have limited our analysis to intra-organisational factors.

In summary, our findings must be seen in light of the specific industry sector and size of our case organisation. Our findings would not be generalisable without further research.

5.5 Further research

Theory

In Innovation theory, there are still gaps in the theoretical foundation explaining factors influencing the innovation capability and in our case the innovation culture. Our research focused on how internal factors (Figure 3**)** like organisational, cognitive and cultural

proximities' influence on innovation culture, and thereby added a dimension to previous research, with a specific focus on global machine bureaucracies.

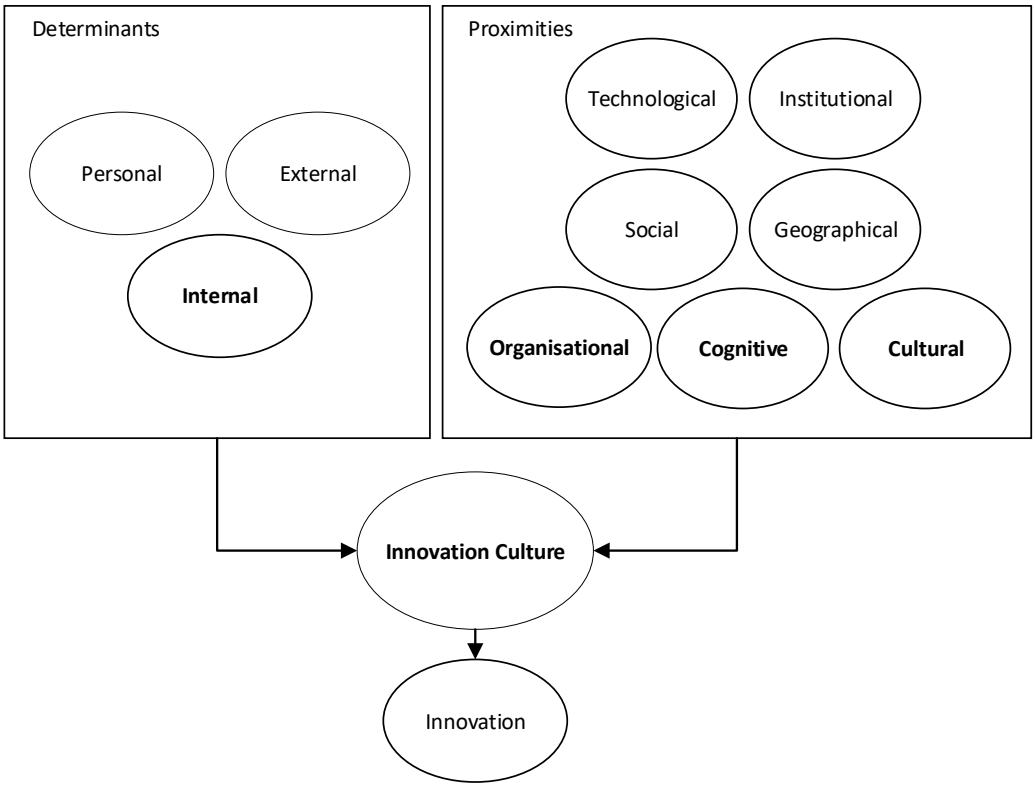


Figure 16 Combined innovation model

Our findings show a correlation between proximities and innovation culture. Further research is required to establish with more certainty the specific influence and strength of the different proximities and how they apply to different organisation types. Previous research has identified several determinants for innovation culture. For further research we suggest that all known determinants are combined in a comprehensive model. The model should be enriched with all known proximity dimensions relevant for innovation, as we are aware that in literature, there are several frameworks for proximity dimensions.

We suggest applying a framework where cultural proximity and technological proximity are treated as separate dimensions to be able to study their individual impact. Such comprehensive model would give management a broad overview of factors influencing innovation culture and awareness of the complexity. We suggest more case studies across industry sectors, size and age of companies, organisation types (manufacturing, service, knowledge), organisational structures and cultures. Studies across different global companies, with the addition of control variables, would enable researchers to establish with more

confidence the impact of each proximity. We focused only on three specific proximities and all known proximity dimensions relevant for innovation should be included in future studies.

In contrast to theory we saw that different national cultures did not affect the innovation culture score for the innovation influence dimension. We recommend that further research is done to establish if cultural proximity would affect innovation culture scores differently if the market an employee serves has a different national culture than the office one serves in. Equally, we saw that different national cultures did not affect the innovation culture score for the innovation propensity factor. This contrasts theory and we recommend further research to identify if national cultures affect employee's perception of an organisation.

We suggest that quantitative methods, like application of Dobni's seven-factor model, should be combined with qualitative methods, to provide deeper understanding and perhaps uncover more interdependencies. Qualitative method can mitigate some of the limitations identified in chapter 5.4. In an interview the interview object can ask and get an explanation if a question is not understood.

Theory suggests that different cultures can be innovation cultures (chapter 2.3). More research should be done to identify if more than one innovation culture should be adopted within an organisation. It may be that different innovation cultures are appropriate depending on e.g. position in hierarchy, specialized vs non-specialized teams, operational vs. R&D teams.

Finally, as stated in chapter 2.5.3, Hofstede's new dimension, indulgence, requires further empirical studies to verify if it has an impact on innovation before it can be assessed if it impacts on innovation culture or not.

Leader vs Non-leaders

More research is needed on innovation culture and how it may differ between different layers of an organisation. We found limited literature and research in this area when building support for Hypothesis 1. In our study we combined data from several layers of leaders when testing our hypothesis and we did not have sufficient granularity to study differences in innovation culture between top and middle management. We need more understanding of the differences between different layers in the organisation and more insight on what is causing it. Such insights could provide guidance to future leaders aiming to build a strong innovation culture throughout the company. From a managerial perspective, it will be valuable to gain

further insight into how global companies best can be managed to achieve a strong innovation culture across offices and across levels and how factors like job complexity, autonomy and optimal proximity plays a part and can add to the innovation managers' tool box.

Cross functional teams

We were not able to identify any difference between cross-functional, co-operative teams and specialised teams. More research should be performed to establish how one can facilitate innovation contribution from cross-functional co-operative teams as there is theory to support that cross-functional co-operative teams have such potential. There is a need for more research and theory to answer the question of how the potential can be released. The research should focus on the cognitive proximity present in the cross-functional, co-operative teams with the aim to identify the ideal degree of cognitive proximity. We suggest that further research is done on organizations that have cross-functional, co-operative teams and are successful at innovating as these organizations have presumably found the right degree of cognitive proximity. A quantitative study, like the one we carried out, just establishes whether there is a statistical difference between groups or not. A quantitative study does not disclose whether there was too little or too much proximity in the cross-functional, co-operative team in the case organisation. Thus, for further research, we propose that quantitative method is combined with qualitative method. An initial survey could be followed up with interviews. We believe interviews would be a suitable means of gaining further insight and revealing whether lock-in or communication problems are present.

Cultural differences

We tested our hypothesis with data obtained from all Asian offices combined. More research is needed to conclude on how differences in national culture between countries, rather than regions, affect the innovation culture. Especially how the influence of different proximities may impact the results. Our findings suggest that further insight can be gained through research on geographical proximity considering Torre & Rallet's (2005) theory. Does geographical proximity play a larger role for interaction outside the boundaries of the organisation compared to within? Consideration should be given to the number of employees from each nation regardless of location. That way one can make comparison by nationality rather than location which could be an interesting comparison as geographical proximity may turn out not to have an impact in such a scenario.

Include control variables

Further, to enhance the quality of the data we suggest adding a metadata field at the beginning of the survey where respondents indicate whether they have worked with the company more than six months. Newly hired employees will have had little time to experience a company's innovation culture. Thus, a reasonable expectation would be for the newly hired employees to give a higher percentage of neutral responses.

5.6 Implications & recommendations

In our work we have reviewed literature on innovation, proximities and conducted a case study with subsequent analysis of data. We have demonstrated the importance of understanding how different proximities influence innovation culture. We have specifically established impact of position in hierarchy and cultural differences in a medium-sized global a machine bureaucracy.

Managing innovation is a challenge in that one structural archetype, such as the machine bureaucracy, might be suitable for an organisation's overall performance and support administrative innovation, yet not be as supportive of technical innovations compared with other organic organisations and adhocracies (chapter 2.5.1). Furthermore, the need to master ambidexterity is an important capability for incumbents as it positively correlates with firm innovation (chapter 2.5.1). A balance must therefore be struck. With the increased importance of innovativeness and ability to change, leaders of mechanical bureaucracies could consider a hybrid version encouraging creativity and flexibility, also referred to as "machine adhocracy" (Tidd et al., 2018, p. 99). One way to achieve this could be through introducing "lean production" where team work, flattening of hierarchy and broader involvement in problem solving may assist in making the organisational structure more flexible and thus better suited for innovativeness (Tidd et al., 2018, p. 99).

Leaders are important enablers for innovation, particularly for companies in the service industry (Lyons et al., 2007, p. 182). For companies focusing on innovation, leaders should possess knowledge about factors influencing innovation culture and be able to establish an overall status of innovation culture in the company. With the assistance of measurement tools, they should be able to identify differences in innovation culture between groups, and identify factors driving the differences. Leaders should be able to measure development over time and

have knowledge about relevant mitigating actions to ensure that all levels of the organisation are contributing to the innovation effort. This is especially important for machine bureaucracies where the majority of the employees reside in the lower levels of the organisation.

Using our findings diagnostically, we will highlight some results from the case organisation, discuss what they may mean and suggest relevant actions for strengthening innovation culture.

We found that leaders scored higher in perception of innovation culture than non-leaders in a medium-sized global machine bureaucracy. Leaders focusing on building a strong innovation culture should ensure job complexity, autonomy and empowerment across the different layers of the organisational structure (chapter 2.5.1).

Of interest we found that the greatest differences between leaders and non-leaders relate to their perception of how the organisation has been rigged to develop and sustain innovation and their level of engagement and trust with respect to innovation. The underlying statements centre around vision, strategy, culture, equality, mutual respect and involvement. "The origin of creativity and innovation lies in a shared vision and mission, which are focused on the future" (Martins et al., 2003, p. 69). To enhance innovation culture among non-leaders, management must ensure that vision, mission and strategy is shared and embedded in all employees. Further, non-leaders must be given opportunities to engage more in innovation.

It is promising that the highest scores from the baseline were for organisational constituency and employee creativity and empowerment. These two factors **c**over respondents' perception of being creative, empowered, trusted and enabled to contribute to innovation (chapter 5). This represents a latent resource that could be built on. However, it may seem that there is not sufficient sense of urgency nor resources for innovation. The lowest score was for *implementation context* and *value orientation*. These factors cover the respondents feeling of e.g. need to change, resources available for innovation, speed and ability to change.

This finding is further supported by the respondents' feedback (Appendix 3), where lack of time to be innovative featured. This indicates that creating a sense of urgency and allocating time to be innovative could enhance the innovation culture in the organisation (Tidd et al., 2018, p. 118 & 120).

As we saw in chapter 4.1, the lowest arithmetic mean score for the case organisation was found for the factors *Value orientation*. *Value orientation* contains statements measuring the level of customer intimacy and ability to act on customer needs. Here the leaders play an important role. A mitigation action for the case organisation could be that leaders ensure that all employees are aware of customers' needs and expectations. Leaders should provide "strategic information at regular intervals, including company goals for each client relationship" (Lyons et al., 2007, p. 183).

For the case organisation, we saw that for the Asian region, the lowest arithmetic mean score was for the factor Organizational constituency. This factor measures to what degree employees are engaged in innovation work and contains items such as trust and mutual respect. As there is an inherent risk with innovativeness, we recommend that leaders in the case organisation, in particular for the Asian region, ensure that employees feel it is safe and will be rewarded to spend time on strategically aligned innovation efforts (Lyons et al., 2007, p. 184). For the company, this means that they should reward strategically aligned innovation efforts even when the result is not optimal. To succeed with innovation a company needs to accept the risk coming from the fact that decisions will have to be made based on incomplete information (Lyons et al., 2007, p. 185.) The alternative can be worse; being surpassed by an innovative competitor (Lyons et al., 2007, p. 185).

Theory proposes that use of cross-functional, co-operative teams with a high degree of autonomy and empowerment could mitigate weakness in innovation culture when highly creative and productive teams are needed. In our study however, we did not find a statistical positive correlation between a cross-functional, co-operative team and innovation culture. When organising a cross-functional team, appropriate steps must be taken to facilitate production of novel ideas and to hinder lock-in caused by too high proximity. Among potential issues to be aware of are high degree of compliance with project requirements instead of focus on innovation outcomes and focus on internal control instead of influence from external expertise. Both aspects reflect a low risk culture with lack of autonomy (Tidd et al., 2018, p.331). Another aspect could be lack of proximity to a geographical cluster. For the case organisation, we suggest following up with a qualitative study to explore underlying issues.

Our findings revealed that perception of innovation culture is stronger at headquarter than in Asia. As described in chapter 5.3 the difference varies from factor to factor and is particularly

big for organizational constituency evolving around employees' engagement and involvement in innovation. Management should actively facilitate engagement and involvement in innovation for employees in Asia in an attempt to strengthen their perception of innovation culture. To be able to do so in a more precise manner, we suggest that a qualitative survey is carried out to enhance the understanding of which underlying factors are at play. If it turns out that the lower score in Asia is related to national cultural traits, such as power distance, leaders should actively encourage idea generation, and show that all ideas, regardless of quality, are received with appreciation.

Of interest we found that employees in Asia and Norway rated the management's ability to relay and embed the organisation's vision and goals related to innovation similarly. This supports Torre & Rallet's theory that challenges with communication across large geographical distances can be combated by travels facilitating face-to-face interaction and by technology (Torre and Rallet, 2005, p.54). It may be that the organisation's current travel activity and use of communication technology such as Skype, email and intranet is sufficient for spreading the vision and goals to offices in Asia to the same extent that they are spread at headquarters.

From the comments provided in the free-text comment field (Appendix 3), we learned that some respondents felt that the questionnaire was unrelated to their position and not applicable to all staff. Further, some respondents asked what we meant with the word innovation. The pre-survey revealed that the organization's business model was not widely understood and not so easily accessible (chapter 3.3.1 & Appendix 2). Thus, as part of an effort to establish a strong innovation culture across the organization, we propose that management needs to clearly communicate, to all levels in the organization, the definition and relevance of the company's business model and of innovation.

Lastly, we suggest that the case organisation measures development in innovation culture over time. Theory on innovation measurement indicates that organisations that measure innovation seem to perform better than those who do not (Chan, Musso & Shankar, 2008). Quantitative method, like Dobni's survey, provides the possibility to establish a baseline for a company and potentially also industry benchmarks. It can also be used to follow innovation trends over time and to measure the effect of mitigation actions applied to an organisation to improve innovation culture.

6 Conclusions

Innovation culture has an important influence on innovation capability. Management theory focuses on determinants of innovation culture, (Figure 3), while the discipline of economic geography has studied the impact of cognitive, organisational, cultural, social, institutional, technological and geographical proximities on innovation.

We identified a gap in existing research regarding how different proximities within a company impact the perceived innovation culture for different groups within the company. Our research question was: *How do organisational, cognitive and cultural proximities within a global medium-sized company, categorised as a machine bureaucracy, influence the innovation culture for different groups of employees in the company?* Our study focused on position in the organisational hierarchy, cross-functional co-operative teams and different national cultures. We chose a quantitative case-study for our research and three hypotheses were developed:

Hypothesis 1 : Leaders perceive a stronger innovation culture than non-leaders in a medium-sized global machine bureaucracy.

Hypothesis 2: Employees in a global machine bureaucracy that are members of cross-functional, co-operative teams perceive that the innovation culture is stronger compared with employees in specialized teams in the same company.

Hypothesis 3: The innovation culture score in medium-sized global companies varies between offices located in different countries because of difference in national cultures.

A comprehensive measurement instrument for innovation culture, developed by Dobni (2008), was distributed to our case organisation in the form of a survey. Statistical analyses were applied for the response groups defined by our hypotheses. Hypotheses 1 and 3 were confirmed. Leaders perceived a stronger innovation culture than non-leaders. Difference in national culture had an impact on innovation culture. No statistical difference was found between a cross functional, co-operative team and a specialized team in perception of innovation culture.

There were several limitations related to our study. Future surveys should include control variables like e.g. respondent's nationality to improve quality of the analysis of the effects of

proximities on innovation culture. Confidentiality issues combined with limited sample sizes in the medium-sized case organisation made it difficult for us to add control variables and increase granularity for important independent variables (hierarchy position, business unit and national culture). Organisational level could have enabled us, for H1, to study each of the organisational levels and how perception potentially changes through the levels from non-leader to top management team. A general challenge in our case study was the rather small sample sizes for some of the groups we tested. This produced challenges regarding degree of normal distribution which could have influenced the rejection of H2. Respondents were asked to specify which region they report to (Asia, Americas and Europe and head office). We did not know the respondent's nationality, and this constituted a limitation when investigating the impact of cultural proximity.

It is difficult to generalise our findings without repeating the study in other organisations with other characteristics. Further research should include studies across industry sectors, size and age of companies, organisation types (manufacturing, service, knowledge), organisational structures and cultures to see if our findings could be generalized. We suggest that a comprehensive model is required, incorporating all known determinants as well as all known proximities. Such comprehensive model would enable more precise measurement of innovation culture. We studied a subset of proximities (organisational, cognitive and cultural) and did not discuss specific impact from institutional, social, technological and geographical proximities. Improvements, through addition of control variables, would enable future research to establish with more confidence the impact of each proximity.

We provided several recommendations. Some being of generic nature like making structural changes to allow for more creativity, flexibility, autonomy and job complexity. For the case organisation we recommended that leaders should focus on improving communication to ensure that mission, vision and strategy is embedded in all employees. Regarding cross-functional teams, we recommended that the case organisation follow-up with a qualitative study to explore potential lock-in or potentially to high cognitive distance. Lastly, negative impact from different national cultures could be mitigated by leaders enhancing employee's engagement and involvement in innovation.

The study contributes with insight on how organizational, cognitive and cultural proximities may impact a global company's innovation culture. Through adding independent variables to an existing model for measuring innovation culture we provide a means of testing how

proximities impact on innovation culture. Innovation culture is just one of several determinants of innovation capability and since we have just studied three dimensions of proximities, it must be emphasized that our study casts light on only a part of a larger phenomenon which is correlations between proximities and innovation capability, however, our study offers a starting point for increased understanding.

Appendix 1 - Survey Statements

Factor	ID	Statement
Implementation context	1	*Over the next year we could change up to 50 percent of the processes that support our current business model. [1]*
	2	*We are prepared to commit new resources or direct current resources to support ventures that result from our innovation pathway.*
	3	*We have a wide resources base in our organization linked to innovation.*
	4	*We have put measurable resources (human and financial) into innovation.*
	5	*We are prepared to discontinue products and services that only marginally serve our purpose in efforts to build capacity for new products and services.*
	6	*We have a good record of rolling out new product and service offerings.*
	7	*We are prepared to launch a new product /service even when it is not clear how successful it may be.*
	8	*Ideas flow smoothly through to commercialization*
	9	*Our management helps break down barriers that stand in the way of implementation.*
	10	*Regarding innovation, there is an understanding that mistakes will occur or an opportunity will not develop as expected.*
	11	*We can quickly facilitate changes to our products and services based on client or competitive reaction.*
	12	*We are quick to turnaround ideas to marketable products/services.*
	13	*We can sense when customers are either under-served or over-served, and make adjustments accordingly.*
	14	*We can modify systems and processes fairly quickly to support our competitiveness.*
	15	*Project managers have the autonomy to speed up, slow down, change course or cancel projects altogether.*
	16	*We have metrics to measure the effectiveness of our innovation initiatives.*
	17	*Performance management information is used for improvement rather than for control.*
Organisational constituency	18	*My contributions are valued by my fellow employees.*
	19	*I understand how I contribute to innovation in our organization.*
	20	*Employees are treated as equals among peers, and this is evident in their participation levels.*
	21	*There is trust and mutual respect currently between management and employees.*
	22	*The employees in my area act as a team. There are no weak links and we have a sense of ownership in everything we do.*
	23	*I am sufficiently engaged in the strategic planning process.*
	24	*Communications are open and honest.*
	25	*We have an effective environment for collaboration within and between departments.*
	26	*As an employee, I feel enabled to generate ideas.*
	27	*I know how I personally contribute to innovation in this organization.*
	28	*I feel obliged to help create the future for this organization.*
	29	*I am encouraged to challenge decisions and actions in this organization if I think there is a better way.*
	30	*I feel that I am trusted to act in the organization's best interests with minimal supervision.*

Organisational learning	31	*Everyone in our organization is involved in learning (training).*
	32	*The training I take is related to support strategic initiatives as opposed to being general in nature.*
	33	*The training I receive is directed at helping me deliver customer value.*
	34	*There is an expectation to develop new skills, capabilities and knowledge that is directed toward supporting innovation in this organization.*
	35	*I know what training/learning I need to engage myself in to support innovation.*
	36	*Continued organizational learning is encouraged and there is time/opportunity to improve skills and capabilities.*
	37	*There is mentorship and post-training support.*
	38	*The management team acts as coaches and facilitators in support of training.*
	39	*Managers possess the appropriate leadership qualities to support innovation*
	40	*I am empowered to apply what we have learned.*
Market orientation	41	*When I find out something important about a customer or competitor that may affect others in the organization, I know what to do with that information.*
	42	*I have a good understanding of the value chain and vital interests concerning our division/organization.*
	43	*We know which customers (and/or market segments) that will provide the most solid foundation for future growth.*
	44	*We have an idea which competitors will target which set of customers.*
	45	*We are encouraged to share information that is beyond the obvious/obscure.*
	46	*We take time to understand our competitive environment to the point where we can anticipate industry shifts.*
	47	*We have reliable and valid processes that captures knowledge from our stakeholders on a consistent basis and the knowledge is used to direct plans.*
	48	*The knowledge that we generate allows us to create a differential advantage in the marketplace.*
Innovation propensity	49	*Innovation is an underlying culture and not just a word.*
	50	*Our business model is based on our strategic intent. [1]*
	51	*Our senior managers are able to effectively cascade the innovation message throughout the organization.*
	52	*We have an innovation vision that is aligned with projects, platforms, or initiatives.*
	53	*This organization's management team is diverse in their thinking in that they have different views as to how things should be done.*
	54	*There is a coherent set of innovation goals and objectives that have been articulated.*
	55	*Innovation is a core value in this organization.*
	56	*We have continuous strategic initiatives aimed at gaining a competitive advantage.*
	57	*Our strategic planning process is opportunity-oriented as opposed to process-oriented.*
Value orientation	58	*We co-define value with our customers.*
	59	*In an attempt to create value, we proactively interact with others in the value chain (i.e. members, clients, brokers and ESP's).*
	60	*There is a consensus among employees about what creates value for customers/stakeholders.*
	61	*I actively search for new ideas and innovation at all stages of product/service development.*
	62	*I get the information we need to make value added decisions.*
	63	*I understand what systems/processes we must excel at to deliver customers/stakeholder value.*
	64	*I have the freedom to develop the appropriate responses in efforts to create value for our clients.*

Employee creativity and empowerment	65	*I consider myself to be a creative/innovative person*
	66	*Innovation in our organization is more likely to succeed if employees are allowed to be unique and express this uniqueness in their daily activities.*
	67	*I view uncertainty as opportunity, and not a risk.*
	68	*This organization uses my creativity to its benefit, that is, it uses in in a good way.*
	69	*I am given the time/opportunity to develop our creative potential.*
	70	*I am prepared to do things differently if given the chance to do so.*

Appendix 2 – Survey statement changes

ID	Statement	Understood by	Reason not understood	Mitigating actions
1	Over the next year we could change up to 50 percent of the processes that support our current business model	11	Gard's business model is not known	Leave question as is, but include introductory section in questionnaire with definition of Gard's business model[1]
14	We can modify systems and processes fairly quickly and as necessary to support competitive thrusts	11	Word **thrusts** not understood	**Rephrase:** We can modify systems and processes fairly quickly to support our competitiveness
27	I am connected to an innovation movement in this organization in that I know how I personally contribute to innovation	11	Words **innovation movement** not understood	**Rephrase:** I know how I personally contribute to innovation in this organisation
4	We have already put measurable resources (human and financial) behind our innovation agenda	10	Words **Innovation agenda** not understood	**Rephrase:** We have put measurable resources (human and financial) into innovation
10	There is an understanding that mistakes will occur or an opportunity will not transpire as expected	9	Word **transpire** not understood	**Rephrase**: Regarding innovation, there is an understanding that mistakes will occur or an opportunity will not develop as expected
50	Our business model is premised on the basis of strategic intent.	9	Gard's business model is not known neither is strategic intent	Include introductory section in questionnaire with definition of Gard's business model and **rephrase:** Our business model is based on our strategic intent. [2]

3	We have a wide resources base in our organization as it relates to innovation	7	Phrasing is confusing	**Rephrase:** We have a wide resources base in our organization linked to innovation
45	We are encouraged to flush out information on what most would consider the "not so obvious" or even obscure	7	Poor phrasing and word obscure not understood	**Rephrase:** We are encouraged to share information that is beyond the obvious/obscure.
47	Knowledge generation is strategic in that we have a reliable and valid process that surveys stakeholders on a consistent basis, and that knowledge is used to direct plans	7	Too long sentence and **knowledge generation is strategic** is not understood.	**Rephrase:** We have reliable and valid processes that captures knowledge from our stakeholders on a consistent basis and the knowledge is used to direct plans.

[1] **Business model**: Gard is a shipowner-controlled provider of P&I, marine and energy insurance products.

The insurance companies in the Gard Group assume risk from individual payers and the risks are redistributed across a larger portfolio. Revenue is generated through charging premium in exchange for insurance coverage and reinvesting this premium. There are no external capital owners, therefore, profits are retained for the benefit of the ship owners, the Members.

[2] **Strategic intent**: Together we enable positive m Gard is a shipowner-controlled provider of P&I, marine and energy insurance products.

Appendix 3 - Feedback from respondents

“A bit difficult to answer other than Neutral to some of the business due to short time "on board" and some distance to the actual business (being in TBT :-))”

“I think this was a bit difficult to do, hence all the neutral tick offs. Do you want my observations or my opinions?”

“Sometimes it was difficult to understand the intention of these questions - whether it was the company is actually going to do something (f.ex. change all processes in a year) - or whether I believe it could do this if wanted to.”

“Make it shorter next time!”

“The survey was very long and with heavy Business Langangen. Difficult to separate the questions from each other and i felt like i answered The same question many times just with a different wording.”

“Not easy questions to answer. I agree innovation is critical to survive, and ideas must come up, but we need to be aware that there are so many internal tasks and systems we have to learn and follow that it is challenging our external duties.”

“this survey is not applicable to all staff members of gard”

“Some questions seems to be duplicates. I don't know the answer to many of the questions, as I am not involved in innovation or the underwriting side of the business. I am therefore forced to state "neutral", meaning " I don't know" to many of the statements. The survey was a little long, and the questions didn't seem too relevant to my daily work in Finance and Risk Management department.However, i tried to answer as best as I could on the ones that did seem relevant/I had some knowledge on.”

“questions a bit difficult to understand and unrelated to my position”

“Too many questions: less is more”

«good survey»

“Most of the questions are linked to groups dealing with members. Others with no direct link to insurance activities may find it really hard to answer questions, hence the number of neutral questions.“

“The questions difficult to answer as it seems clear that a certain answer is wanted”

Appendix 4 - Assumptions on normality

H1 – Non-Leaders vs Leaders at Head office

Factor	Overall		Impl context		Org Const		Org Learning		Market Ori		Innov Prop		Value Orient		Emp C & E	
Group	*N*	*L*	*N*	*L*	*N*	*L*	*N*	*L*	*N*	*L*	*N*	*L*	*N*	*L*	*N*	*L*
Mean	**4.95**	**5.16**	**4.87**	**5.01**	**5.16**	**5.47**	**4.98**	**4.99**	**4.81**	**5.13**	**4.82**	**5.2**	**4.85**	**5.02**	**5.14**	**5.28**
Std Error	0.04	0.06	0.05	0.07	0.05	0.09	0.05	0.08	0.05	0.09	0.06	0.09	0.05	0.08	0.06	0.11
Median	**4.93**	**5.16**	**4.82**	**4.97**	**5.08**	**5.42**	**4.9**	**5**	**4.75**	**5.06**	**4.78**	**5.11**	**4.79**	**5**	**5**	**5.42**
Mode	4.67	4.93	4.82	4.71	5	4.92	4.8	5	5	5	4.67	5.11	4.57	5	4.67	5
Std Dev	0.37	0.33	0.45	0.38	0.47	0.44	0.52	0.4	0.45	0.48	0.54	0.45	0.53	0.42	0.58	0.56
Sample Variance	0.13	0.11	0.2	0.14	0.22	0.19	0.27	0.16	0.21	0.23	0.3	0.2	0.28	0.17	0.33	0.31
Kurtosis	**5.21**	**0.16**	**1.82**	**2.81**	**1.95**	**-1**	**2.91**	**-0.5**	**3.58**	**0.53**	**4.63**	**-0.3**	**2.58**	**0.35**	**-0**	**-1.2**
Skewness	**1.36**	**-0.3**	**0.94**	**0.92**	**1.01**	**-0.2**	**1.31**	**-0.1**	**1.12**	**-0.1**	**1.71**	**0.37**	**1.08**	**-0.1**	**0.51**	**-0.3**
Range	2.54	1.34	2.41	1.94	2.77	1.54	3	1.5	2.88	2.13	3	1.78	3	1.71	2.83	1.67
Minimum	4.21	4.36	4	4.24	4.23	4.54	4	4.2	4	4	4	4.44	4	4	4	4.33
Maximum	6.74	5.7	6.41	6.18	7	6.08	7	5.7	6.88	6.13	7	6.22	7	5.71	6.83	6
Sum	485	134	477	130	506	142	488	130	471	134	473	135	475	131	503	137
Count	98	26	98	26	98	26	98	26	98	26	98	26	98	26	98	26

Table 6 Statistical Description – Non-Leaders vs Leaders at Head office

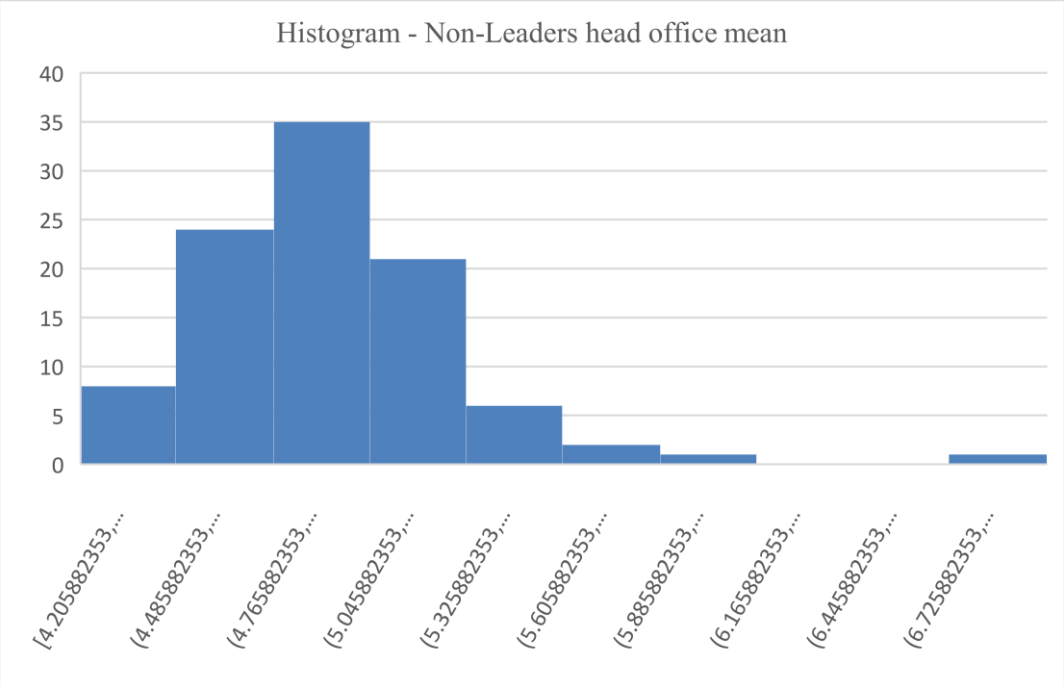


Figure 17 Histogram Non-Leaders vs Leaders at Head office

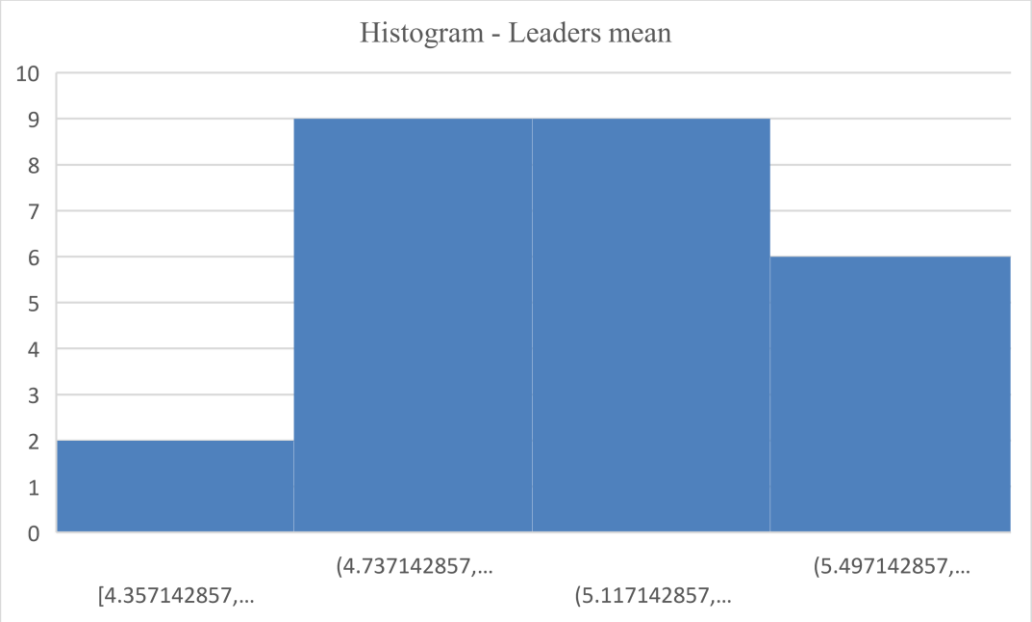


Figure 18 Histogram Leaders at Head office

H2 – Specialised vs Cross functional units

Factor	Overall		Impl context		Org Const		Org Learning		Market Ori		Innov Prop		Value Orient		Emp C & E	
Group	*Spec*	*Cross*	*Spec*	*Cross*	*Spec*	*Cross*	*Spec*	*Cross*	*Spec*	*Cross*	*Spec*	*Cross*	*Spec*	*Cross*	*Spec*	*Cross*
Mean	**4.98**	**4.95**	**4.9**	**4.91**	**5.14**	**5.22**	**4.99**	**4.88**	**4.93**	**4.82**	**4.93**	**4.8**	**4.87**	**4.79**	**5.09**	**5.18**
Std Error	0.03	0.07	0.03	0.07	0.03	0.1	0.03	0.08	0.03	0.09	0.04	0.09	0.04	0.09	0.04	0.11
Median	**4.96**	**4.89**	**4.82**	**4.88**	**5.08**	**5.19**	**4.9**	**4.84**	**4.88**	**4.75**	**4.89**	**4.72**	**4.86**	**4.71**	**5**	**5**
Mode	5.16	4.87	4.82	4.88	5.15	5.38	5	5	5	4.5	5	4.78	4.57	4.57	4.67	5
Std Dev	0.38	0.42	0.46	0.42	0.5	0.57	0.51	0.45	0.51	0.53	0.54	0.54	0.52	0.49	0.57	0.64
Sample Variance	0.14	0.18	0.21	0.17	0.25	0.32	0.26	0.2	0.26	0.28	0.29	0.29	0.27	0.24	0.32	0.41
Kurtosis	**1.47**	**9.85**	**1.22**	**4.28**	**0.68**	**1.92**	**1.72**	**3.34**	**0.47**	**6.46**	**1.21**	**8.66**	**-0**	**12.7**	**-0.4**	**0.27**
Skewness	**0.49**	**2.51**	**0.82**	**1.54**	**0.66**	**1.06**	**0.9**	**1.5**	**0.58**	**1.95**	**0.84**	**2.44**	**0.48**	**2.84**	**0.36**	**0.94**
Range	2.67	2.43	2.59	2.12	2.85	2.77	3	2.1	2.57	2.88	3	2.89	2.57	3	2.67	2.5
Minimum	4	4.31	4	4.29	4	4.23	4	4.3	4	4	4	4.11	4	4	4	4.33
Maximum	6.67	6.74	6.59	6.41	6.85	7	7	6.4	6.57	6.88	7	7	6.57	7	6.67	6.83
Sum	1080	158	1063	157	1116	167	1083	156	1069	154	1070	154	1057	153	1104	166
Count	217	32	217	32	217	32	217	32	217	32	217	32	217	32	217	32

Table 7 Statistical Description – Specialised vs Cross functional units

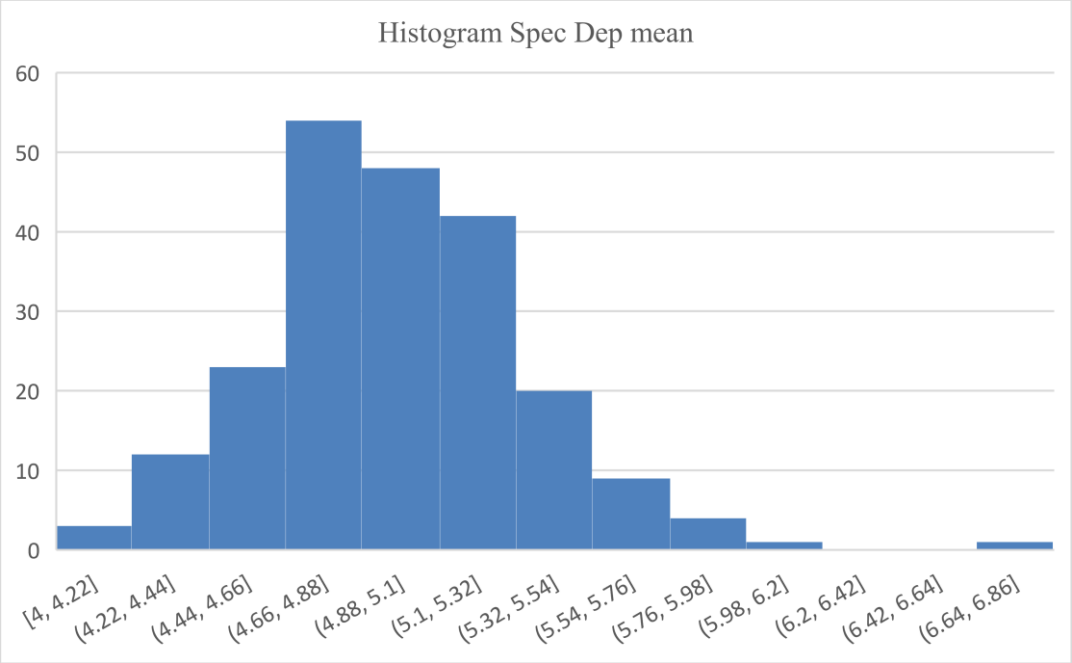


Figure 19 Histogram Special Departments mean

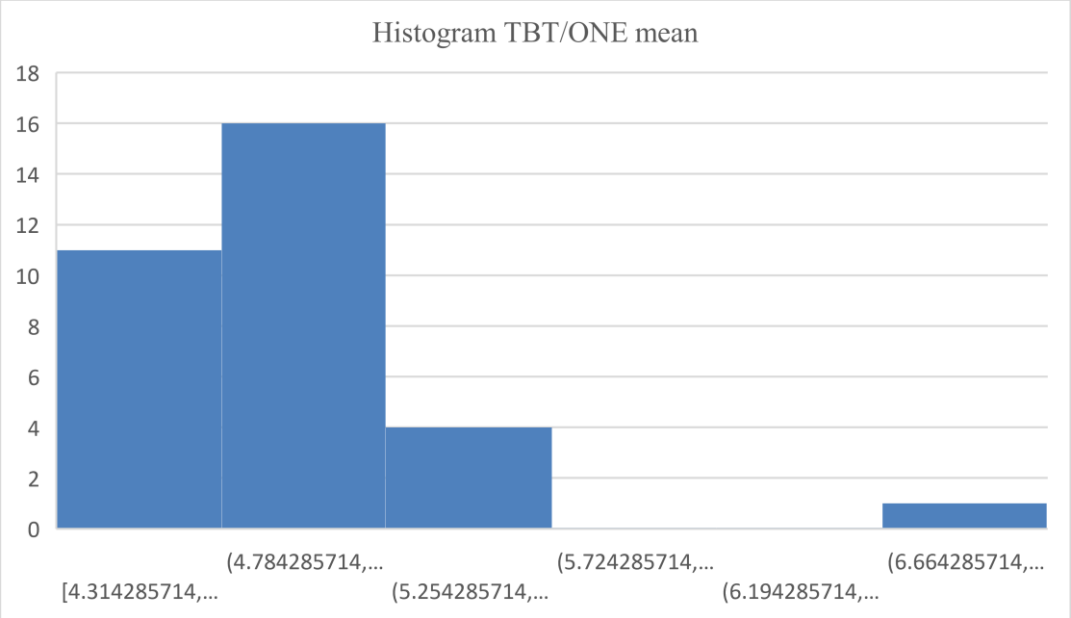


Figure 20 Histogram TBT/ONE mean

H3 – Headoffice (HQ) vs Asia

Factor	Overall		Impl context		Org Const		Org Learning		Market Ori		Innov Prop		Value Orient		Emp C & E	
Group	*HQ*	*Asia*	*HQ*	*Asia*	*HQ*	*Asia*	*HQ*	*Asia*	*HQ*	*Asia*	*HQ*	*Asia*	*HQ*	*Asia*	*HQ*	*Asia*
Mean	**4.99**	**4.81**	**4.9**	**4.72**	**5.23**	**4.85**	**4.98**	**4.78**	**4.88**	**4.91**	**4.9**	**4.86**	**4.88**	**4.81**	**5.17**	**4.88**
Std Error	0.03	0.06	0.04	0.06	0.04	0.08	0.04	0.06	0.04	0.11	0.05	0.11	0.05	0.09	0.05	0.12
Median	**4.95**	**4.83**	**4.88**	**4.76**	**5.15**	**4.81**	**4.9**	**4.8**	**4.88**	**4.88**	**4.78**	**4.83**	**4.86**	**4.79**	**5.08**	**4.83**
Mode	4.67	####	4.82	4.82	5	4.69	4.8	5	5	4.38	5	4.22	5	4.43	5	4.5
Std Dev	0.37	0.32	0.44	0.3	0.48	0.4	0.5	0.3	0.48	0.52	0.55	0.53	0.51	0.46	0.57	0.59
Sample Variance	0.13	0.1	0.19	0.09	0.23	0.16	0.25	0.09	0.23	0.27	0.3	0.29	0.26	0.21	0.33	0.35
Kurtosis	**3.38**	**0.44**	**1.75**	**1.03**	**0.79**	**-0.1**	**2.73**	**0.83**	**1.89**	**-0.1**	**2.77**	**-0.3**	**2.08**	**0.67**	**-0.4**	**0.11**
Skewness	**0.97**	**-0.6**	**0.86**	**-0.4**	**0.7**	**-0.2**	**1.16**	**-0.5**	**0.8**	**0.34**	**1.29**	**0.41**	**0.86**	**0.68**	**0.34**	**0.53**
Range	2.54	1.29	2.41	1.35	2.77	1.54	3	1.4	2.88	2.13	3	2.11	3	2	2.83	2.33
Minimum	4.21	4	4	4	4.23	4	4	4	4	4	4	4	4	4	4	4
Maximum	6.74	5.29	6.41	5.35	7	5.54	7	5.4	6.88	6.13	7	6.11	7	6	6.83	6.33
Sum	619	116	607	113	648	116	617	115	605	118	608	117	605	115	641	117
Count	124	24	124	24	124	24	124	24	124	24	124	24	124	24	124	24

Table 8 Statistical Description - Head office (HQ) vs Asia

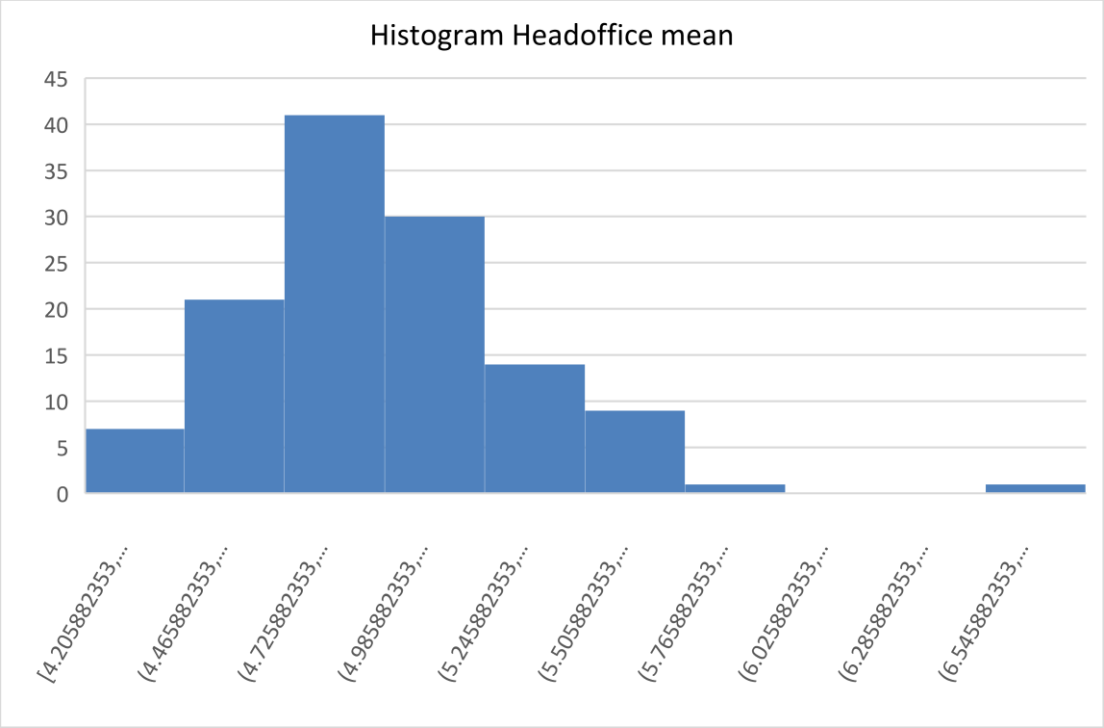


Figure 21 Histogram Head Office mean

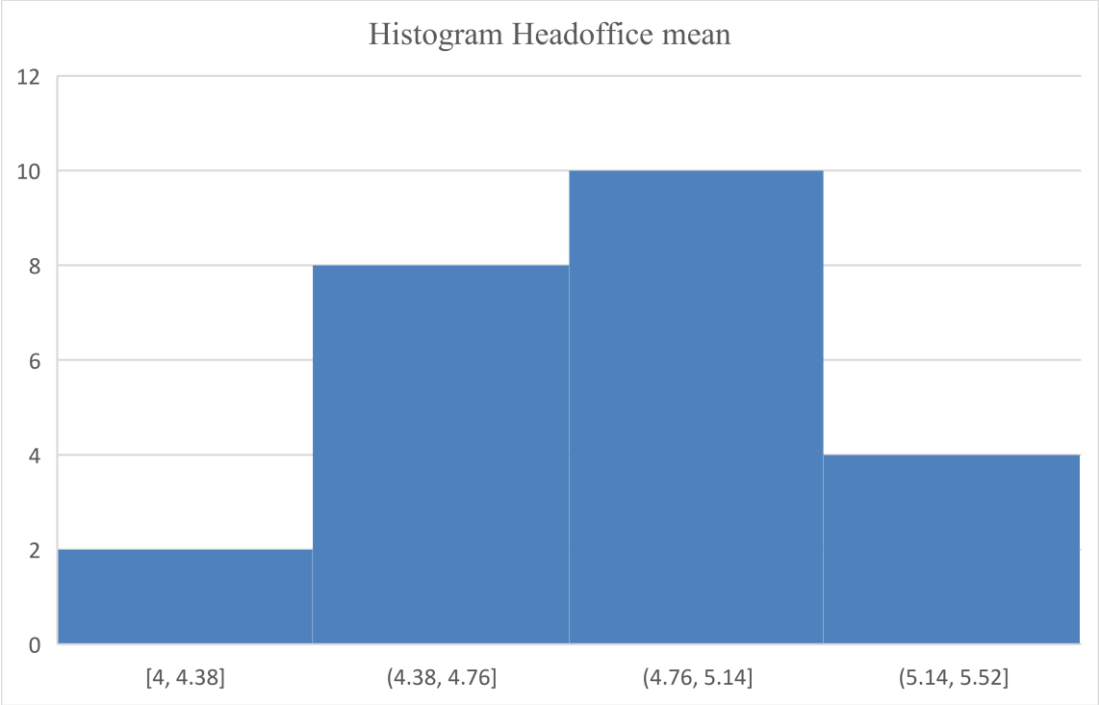


Figure 22 Histogram Asia mean

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