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An organizational capability perspective on knowledge management: The effect of knowledge management capabilities on organizational effectiveness of maritime equipment suppliers in Møre and Romsdal

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The presented thesis constitutes the end of my Master of Science program in International Business and Marketing, at NTNU Ålesund. This experience has been challenging, however also very interesting. The research topic is chosen based on personal interest in both academia and for the maritime cluster in Møre and Romsdal. The current situation of the industry presents an interesting viewpoint for investigating important characteristics of the cluster and its members. Thus, assessing the effects of knowledge and how it might serve to increase effectiveness is now very important.

First, I would like to thank Trond Strømmen at Furuno, Jan Are Remme at Rolls-Royce and Klaus Kjerstad at Acel for taking the time and allowing me to access important insight into their organization. Valuable information was obtained during these interviews, which resulted in relevant findings in the qualitative part of the study and furthermore guided the thesis forward. I would also like to thank all the companies that took the time and effort to participating in the survey.

Most importantly, I would like to express my deepest thanks to my supervisor, Professor Øyvind Strand, for his guides and support throughout this process.

Executive summary

Previous studies have emphasized the importance of knowledge management capabilities (KMC´s) and outlined their influence on organizational effectiveness. Today's economic environment has been described as knowledge based and knowledge management (KM) is recognized as the most important resource of the modern organization. However, few researchers focus on knowledge management capabilities in a Norwegian context.

The present study investigates the relationship between the KMC´s and organizational effectiveness of maritime equipment supplier in Møre and Romsdal. Moreover, the moderating effect of firm size and outsourcing on the relationship of the model is analysed. The research of Gold et al. (2001) is adopted to fit the context of the cluster, and a triangulated method approach is utilized. Three preliminary in-depth interviews were conducted to analyse the fit of the research model to the context of the equipment suppliers and to obtain better understanding of the research topic. Through a survey distributed to all 169 suppliers, empirical data of 70 respondents were collected. From statistical analysis conducted in SPSS and SmartPLS, results indicated that Knowledge culture and Knowledge structure are important constructs of KM infrastructure capability. Knowledge application was found to be an important contributor to KM process capability. Process capabilities were also found to inflict positive impact on organizational effectiveness, indicating that increased efforts in such activities will enhance the equipments suppliers' effectiveness. Contradictive to initial indications, KM infrastructure capability was not found to significantly affect organizational effectiveness. Furthermore, intensity of outsourcing was found to decrease the relationship between KM infrastructure and organizational effectiveness. However firm size, as a moderator on the relationships of the model was not detected. To the end of this thesis the discussion of the relative findings, implications, limitations and suggestions to further research on the topic is presented.

Keywords: Knowledge Management, Knowledge Management Capabilities, Outsourcing, Firm Size

"An investment in knowledge pays the best interest"

- Benjamin Franklin

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Concepts

CFA-Confirmatory factor analysis

EFA-Exploratory factor analysis

EK- Explicit knowledge

ETO- Engineering to order

GCE- Global centre of expertise

KM- Knowledge Management

KMC- Knowledge Management Capabilities

KMO- Kaier-Meyer-Olkin measure of sampling adequacy

MNE- Multinational enterprises

M and R- Møre and Romsdal

PLS- Partial least square

RBV- Resource-based view

R&D- Resource and development

ROE- Return on Equity

ROI- Return on investments

SEM- Structural equation modelling

SME- Small and medium-sized enterprises

SPS- Simple probability sampling

TK- Tacit knowledge

VIF- Variance inflation factor

1.0 Introduction

The need to understand and effectively utilize its knowledge base is of paramount importance for every organization. Especially now in an economic environment were knowledge has surpassed capital and natural resources as the most important resource of the organization (Drucher, 1995). Knowledge has always been a vital part of the organization, however only in the last decades has it been recognized as a strategic asset of firms (Beijerse 1999;Dawson, 2000). Effectively managing knowledge resources, constitutes an integral part of company's core competences, and serves as prerequisites of success (Leonard-Barton, 1995). Claims have also been put forward from researchers that the central activities of firms involves integration (Grant, 1996), application and processing of knowledge (Dawson, 2000). However, a consensus regarding the definition of knowledge has yet to be presented. (Alavi and Leidner, 2001).

Organizational capability is essentially to effectively manage resources that the company possess. One of the most basic resource of a company is knowledge, thus the capabilities of the firm must effectively manage the knowledge base (Lenard-Barton, 1995). However, KM programs may be difficult and hard to initiate. Dependent on different factors, firms may not be equally predisposed for developing successful KM programs. Furthermore, understanding the failure and success of knowledge management and assess the preconditions which facilitates successful KM initiatives is necessary (Gold et al, 2001). Organizational behaviour literature, describe these preconditions in broad terms as "capabilities" or "resources" (Gold et al, 2001).

Knowledge management capabilities are a comprehensive set of organizational attributes that facilitates knowledge management, which improve effectiveness of the firm and provide competitive advantages (Croteau and Li, 2003). Gold et al (2001) described these capabilities to be both related to infrastructure of the firm and the process of handling knowledge. When studying the KMC´s the objective is to investigate key organizational capabilities, which impact and facilitates organizational attributes for successful knowledge management. The relationship between the KMC´s and organizational effectiveness has been assessed in several studies (e.g. Gold et al 2001, Anderson 2009, Bharadwaj et al, 2015, Mehdibeigi et al, 2016),

however a lack of concencus exist in the measurement of the concepts and the presented findings. This research aims to analyse the effects of the KMC´s on organizational effectivness for the maritime equiptment suppliers in Møre and Romsdal (M and R).

As unique contributors to a cluster which has achieved a profound global position, the contextual situation of the equiptment suppliers presents an interesting view point for assessing the effects of the KMC´s. Moreover, the Menon report (2015) argues that the success of the maritime cluster in M and R is due to its knowledge-based and innovation-driven operations. Thus, invastigating the effects of the KMC´s for this cluster is of particular interest.

Outsourcing activities is often view as negative for the knowledge base and effectivness for organizationas (Gibson and Wallace, 2012). Firms enphazise on cost saving when initating outsourcing activities and often neglegt to prepare for the consecuenses. Tacit knowledge of the organization is especially effected by outsourcing (Lewis, 2005). Evidence show that having an effective and sound KM program, can limit the negative effects of outsourcing (Blumenberg et al, 2009). Limited research analyse the relationship between outsorucing and knowledge management capabilities. Even less have looket at how outsorucing effect the relationship between the capabilities and orgniazational effectivness, hence this study aims to fill this gap in the litereature.

1.1 Research questions

Three research questions are investigated in this study:

RQ1: How does knowledge management capabilities affect organizational effectiveness of maritime equipment suppliers in Møre and Romsdal?

RQ2: How does firm size moderate the relationship between organizational effectiveness and the KMC´s?

RQ3: How does outsourcing moderate the relationship between organizational effectiveness and the KMC´s?

To answer the research questions, the study utilize a triangulated approach, which comprise both qualitative and quantitative methods of gathering and analyzing data. Three preliminary in-depth interviews are conducted, which initially test the research approach and provided better understanding of the topic. Thereafter a survey is

distributed, targeting top-level management of the maritime equipment suppliers. The items of the questionnaire are measured on a 7-point "Likert scale", thereafter the scales are validated through confirmatory factor analysis. Structural model are assessed through partial least square (PLS), to analyse the relationship between the KMC´s and organizational effectiveness, as well as the moderating effects of outsourcing and firm size.

1.2 Scope and delimitations

This thesis focus on the maritime clusters of M and R, and more specifically the maritime equipment suppliers. The maritime industry of Norway is among the largest and most profitable in the world. With the second larges fleet in the world, the country represents a large contributor to the fares of the sea (GCE Blue Maritime, 2016). At the west cost of Norway a cluster of firms has achieved great impact on the worlds maritime industry. As a result of the clusters innovativeness and position in the global maritime market, it was recognized as a "Global Centre of Expertise" in 2014 (GCE Maritime, 2014). Maritime equipment supplier represents one of the most important actors of the cluster. This segment consists of 169 firms, which contribute immensely to the value creation of the cluster (GCE Maritime, 2014). However, rapid decrease in oil prices and major changes to the global petroleum industry has lead to decreasing demand for products and services, resulting in diminishing of turnover and results for the cluster members (GCE Blue Maritime, 2016). The equipment suppliers have experienced large changes, which have initiated search for new markets and creation of new solutions. Knowledge and creativity has never been more important for the members of the cluster.

1.3 Structure

The first chapter of the thesis constitute the structure, scope, research questions and purpose of the study. Thereafter follows chapter two which comprise the theoretical frameworks of the study. Towards the end of chapter two, the research model and hypotheses are presented. Chapter three outlines the context for the research. The following chapter describes the methodologies used for collecting and analysing the data. Results form the data analysis is presented in chapter five. Thereafter the results are further discussed in chapter six. The seventh chapter provides implications and limitations of the research. Last concluding remarks to the study are presented in chapter eight.

2.0 Theoretical framework

The following chapter outline important theories and research on the topic of knowledge management and organizational capability theory. The chapter starts by defining knowledge. Thereafter the theory of knowledge management will be presented. The theoretical framework comprising organizational capability and knowledge management capabilities (KMC's) will be presented. Last, empirical findings on the KMC´s will be analysed in support of the research model.

2.1 The concept of knowledge

2.2.1 Defining knowledge

Scholar and practitioners have for a long time recognized knowledge as a valuable organizational resource. Nevertheless, only in the past decades has it received the profound status as the main source of competitive advantage and key determent of sustainability and success (Dave and Koskela 2009; Ofek and Sarvary, 2001; Smith, 2001). Knowledge has been characterized as the new wealth of organizations, which when managed properly can generate higher performance and competitive advantage (Anderson, 2009; Al-Alawi, Al- Marzooqi, & Mohammed, 2007; Amit and Schoemaker, 1993; Barney, 1991; Bohn, 1994; Drucker, 1992; Gloet & Terziovski, 2004; Grover & Davenport, 2001; Hoopes and Postrel, 1999; Jolly and Thérin, 2007; Kalling, 2003; Liu and Tsai, 2007; Prahalad and Hamel, 1990; Stewart, 1991, 1997; Teece, 1982). Today's economic environment has been characterized as knowledge-based, emphasizing the importance of knowledge in the modern business environment (Khuzaimah and Hassan 2012; Alavi and Leidner, 2001; Davenport, Long, and Beers, 1998; Drucker, 1993; Nonaka and Takeuchi, 1995). Succefullness and survival of firms rest on the effective management of internal and external knowledge (Dave and Koskela 2009;Switzer, 2008; Egbu, 1999; Drucker, 1994). When an organization utilize existing knowledge gained form past experiences, time used on problemsolving can be reduced, and thus increasing the quality of organizational tasks execution (Dave and Koskela 2009). Initially capital, raw material and labour have been considered the more valuable resources of firms. With the informational age and the knowledge revolution, demand for new, imaginative and inspiring leadership with the ability to convert human intellect to useful products continue to grow (Smith 2001; Goffee and Jones, 2000). Employees with the lack of education and training, or the adequate explicit knowledge, find it difficult to keep up (Smith, 2001).

Knowledge is the basic element of competencies and human capital. People are essential to the process of knowledge management. As a consequence people's intellectual engagement in the process of knowledge identification, creation, obtaining, protection and transferring will depend on a variation of factors (Lendzion, 2015). Intellectual conditions, values, norms, attitudes, loyalty and mutual trust are factors that influence the personal engagement of employees in the knowledge process (Lendzion, 2015). It has also been ephazised in previous research that knowledge is restricted to the human mind and exist in tacit forms, therefore making it difficult to manage (Khuzaimah and Hassan 2012; Rezgui, 2001). Knowledge has also regularly been explained as "justified personal beliefs", indicating the individual as important for the understanding of knowledge (King, 2009). This definitions is in line with the definition of knowledge presented by Alavi and Leidner (2001)

"Knowledge is information possessed in the mind of the individuals: it is personalized information (which may or may not be new, unique, useful, or accurate) related to facts, procedures, concepts, interpretations, ideas, observations, and judgements".

2.2.1 Types of knowledge

There are different types of knowledge, which is specified by various taxonomies. Tacit and explicit knowledge is the most fundamental types of knowledge (Yuqin et al. 2012; Huang and Newell, 2003). The dividence of knowledge in to two types is also perhaps the most profound definition of knowlede (Yuqin et al, 2012).

When executed successfully, sharing of *tacit knowledge* can lead to synergy between employees and the organization, which can be beneficial for all (Yuqin et al, 2012). However, due to its non-structual characteristics, tacit knowledge is difficult to share and transfer (Yuqin et al. 2012; Xunlian et al, 2005; Sanidas, 2004). Tacit knowledge depends on the interpretation of people and is embedded in the human mind (King, 2009; Polanyi´s, 1966). This type of knowledge is often impossible or hard to articulate. Through experiences, reflection and intuition acquired over time, tacit knowledge is developed (Khuzaimah and Hassan 2012; Davenport and Prusak, 2000; Nonaka and Takeuchi, 1995). Moreover tacit knowledge is created through business activities and relationships over time, and improved through continuous actions of trial and error, and thus implemented through this process (King, 2009). However tacit knowledge is often underutilized by the organization (King, 2009; O'Dell and

Grayson, 1998, p. 154). Underutilization rise form the truth that *" the organization does not know what is knows"* (King, 2009; O'Dell and Grayson, 1998). Knowledge is often tacit in the beginning, however verbalized over time. The most important element of KM is therefore transferring and sharing of knowledge, which is characterized as tacit (Yuqin et al. 2012; Huang and Newell, 2003). Wagner and Sternberg (1987) also emphaziesed that having the ability to create and manage tacit knowledge is crucial for managerial success (Smith 2001; Wagner and Stenberg, 1987). *Explicit knowledge* is embedded in physical data. This type of knowledge is articulated through words, documents, computer programs and so fourth. One fundamental issue in KM is to explicate knowledge, which is tacit in nature, to make it usable for the organization, and therefore transferable (King, 2009).

2.2.2 Data information and knowledge

Defining knowledge might be difficult due to its interrelationship with information and data (Gevorgyan and Ivanovski, 2009). Within technologically oriented disciplines, as for example information systems, knowledge is often treated in the same manner as information. In such disciplines knowledge is looked up on as something which can be codified and transmitted, where IT plays a prominent role in sharing knowledge. This form of simplifying knowledge has occurred after information technology became increasingly important. Theirauf (1999) defined the three constructs as data at the lowest level that only contains facts and figures, information at the middle level, regarded as structural data and knowledge at the top level, defined as the "information about information". Many have defined the three different constructs, as Devenport and Prusak (1998), who define data as "a collection of objective facts that is specific to some events". Data has often no purpose when it is separated from context (Devenport and Prusak, 1998). Combining data yields purposeful information. "Information is a message that contains relevant meaning, implication, or input for decision and/or action"(Liew, 2007). Liew (2007) further explain that information fills the purpose of aiding decision-making, problem solving and realizing opportunity. "Knowledge is (1) cognition or recognition (know-what), (2) capacity to act (know-how), and (3) understanding (know-why) that resides or is contained within the mind or in the brain (Liew, 2007).

The relationships between the three concepts are by no means hierarchical and absolute, however the relations are influences by conditions and the individuals

determining the concepts. Nevertheless it is imperative to mention as previously knowledge is more complete then the other to. Figure 1, illustrates the relationship between the concepts.

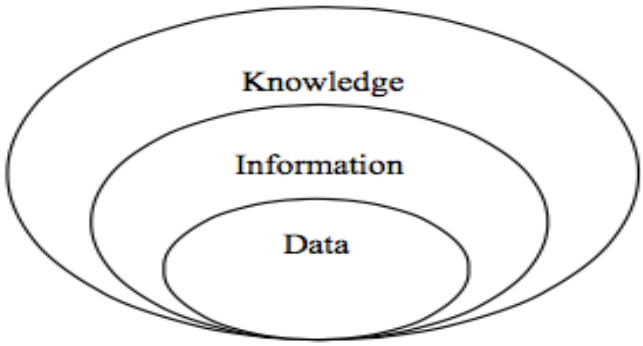

Figure 1*: The relationship between, data, information and knowledge*

Through analysis of the inter-relationship between the three concepts, Gevorgyan and Ivanovski (2009), defined the relationship with the use of the "Knowledge circle", disclosed in figure 2. The figure illustrates the supporting relationship among the three entities.

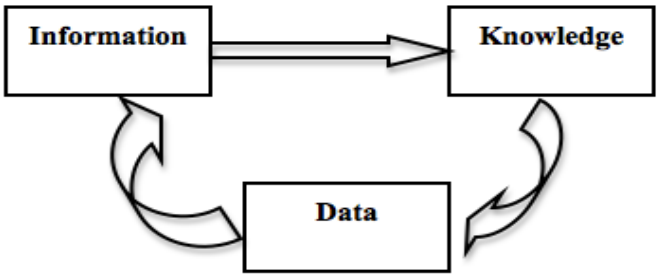

Figure 2: *The knowledge circle (Gevorgyan and Ivanovski, 2009)*

Moreover Alavi and Leider (2001), explain that information could develop into knowledge located in the mind of individuals. The process can also be reversed, as knowledge could become information through a readable format. Thus the relationship between information and knowledge is inter-conversion. This definition emphasize that the hierarchy between the concepts is not that definite. Alavi and Leider (2001) improved the knowledge circle, which resulted in the new version, disclosed in figure 3. This transmission process results in information being highly explicit when in data level, to highly tacit when reached knowledge level. The depth

of meaning and the challenge of interpretation increases, thus more resources are needed to meet the challenge of interpretation.

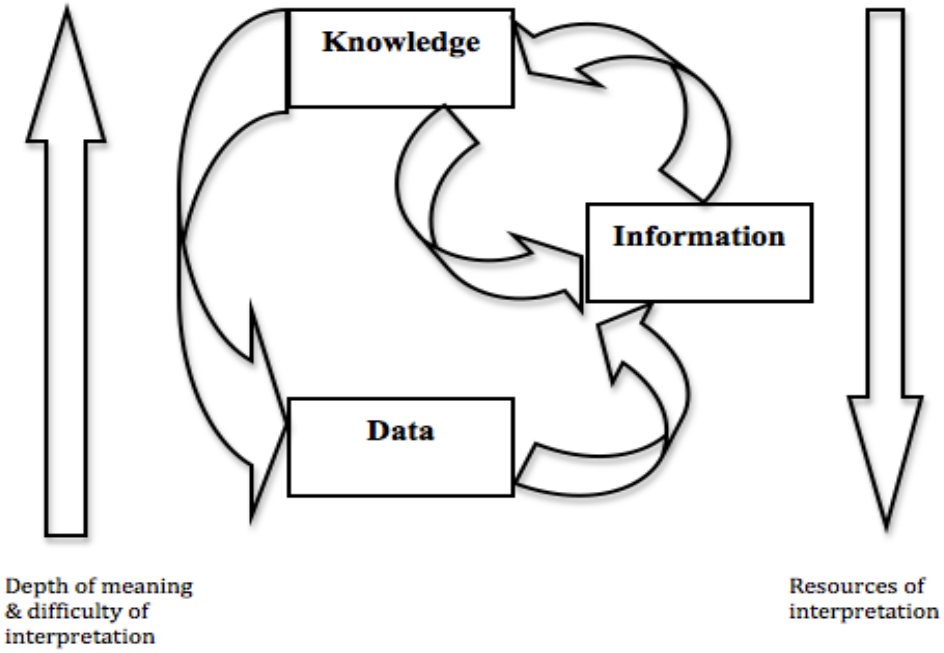

Figure 3: *New interpretation of the knowledge circle (Alavi and Leidner, 2001)*

2.3 The concept of Knowledge management (KM)

2.3.1 Defining knowledge Management

Today's business environment is characterized with high uncertainty and dynamism, which in turn has inflicted a change in organizational focus from tangible and physical resources to knowledge (Nguyen et al, 2008; Wong and Aspinwall, 2005). Firms are increasingly more interested in knowledge, which is recognised as the most important organizational asset (Gunsel et al, 2011; Akgun, Keskin and Gunsel, 2007). With the growing interest in knowledge, the issue of managing knowledge has emerged (Gunsel et al , 2011; Leidner, 1999). The concept of knowledge management has drawn significant attention, leading to an extensive amount of research as illustrated in the figure below.

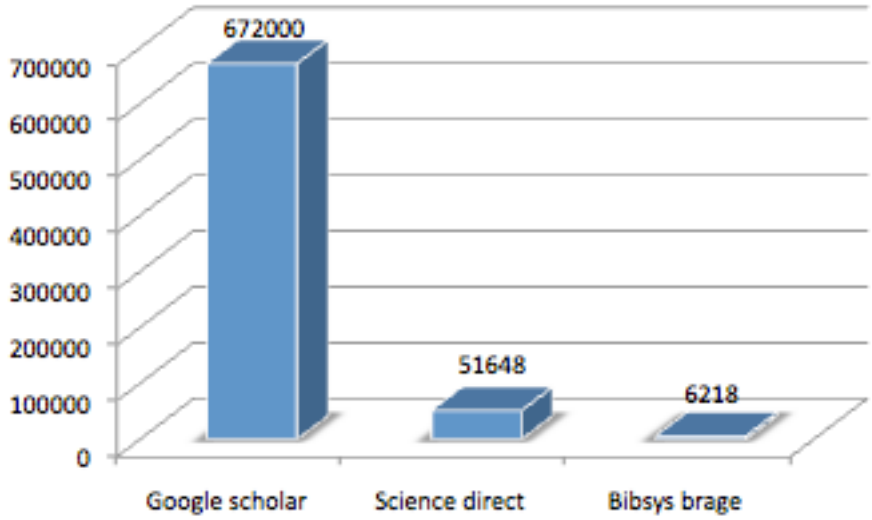

Figure 4 *:Research on the concept of KM the past years*

KM has been defined as a systematic approach to effectively manage, find and transfer knowledge, which in turn facilitate creation of new knowledge leading to reaching collective organizational goals (Kanke, 2016). KM systems help the organization understand and benefit form experience. Printed documents as manuals and patents, "best-practices" databases, employee personal knowledge about their work tasks, team knowledge and knowledge of the organizations products, processes and relationships, are all examples of knowledge-related assets, and therefore can be managed through a KM system (King 2009). KM has been described as the development and management of a sound environment that encourages creation, sharing, enhancing, learning and organizing of knowledge (Gunsel et al, 2011; Kebede, 2010). KM also facilitates innovation, while improving customer service and stimulate orgnaizational effectivness, thus improving the availability of knowledge, generating new knowledge and altogether improve effctivness of knowledge utilization (Demching, 2014). However, the original definitions of KM is understood as applicable to the field of economics, therefore related to other field, the concept of KM might be expected to hold other qualities (Kanke, 2016).

The goal of KM is to leverage and improve the knowledge assets of the organization to facilitate better organizational behaviour, decisions and knowledge practices, which thereafter lead to improved organizational performance (King 2009). KM is an organizational activity, which focus on motivating individual to participate in knowledge processes and creating a social environment to facilitate KM success.

Knowledge is initially embedded in the mind of individuals, making social processes crucial for the success of KM systems. The KM process is therefore people-intensive, however a modern enterprise must support the process with a well established infrastructure containing information and communication technology (King 2009: King, 2008).

Parlby and Taylor (2000) has in their study come to the conclusion that when managed effectively, knowledge serve *"- as a vehicle that supports innovation, generates new ideas and organizational thinking power*"(Gunsel et al, 2011; Parlby and Taylor, 2000). Furthermore, the managing of knowledge has been found to increase value creation through intangible assets of the organization. Providing the right knowledge to the right person at the right time, through KM techniques, facilitate the development of dynamic processes and effective utilization of human resources (Gunsel, 2011; Malhotra, 1997). In line with this rationale of KM, von Krogh (1998) argues that KM identifies and leverages the shared knowledge of the organization, which in turn enhances their ability to compete in the marketplace (Gunsel et al, 2011; von Krogh, 1998). This notion is also supported by the conclusion of Civi (2000), which emphasize that collective knowledge of the employees together with the knowledge of the corporation, describes KM as an organizational process. Through KM processes the organization can create and utilize the aforementioned knowledge that it possess (Gunsel et al, 2011; Civi, 2000).

Investments in knowledge management increase significantly from year to year. KM is important because such programs can accumulate higher utilization of knowledge, which in turn drive performance and innovation (Anderson 2009; Grossman, 2006; MacGillivray, 2003). Organizations strive to value, assimilate and apply knowledge better, to obtain and create new knowledge more efficiently (Anderson, 2009; Denning, 2006). More than 80% of the largest European and U.S based firms use knowledge management systems (Anderson, 2009; Beccerra-Fernandez, Gonzalez and Sabherwal, 2004) and more than 25% of the Fortune 500 operates with a Chief knowledge Officer (Anderson, 2009; Bose, 2004). Resent studies (Anderson, 2009) have found empirical evidence of the positive effect knowledge management impose on organizational effectiveness. Others have also found that both knowledge process and infrastructure have an important effect on knowledge management effectiveness (Bharadwai, Chauhan and Raman, 2015).

2.3.2 Challenges of knowledge management

There are several limitations to the implementation of knowledge management. According to Anderson (2009) between 50-70% of knowledge management attempts fail. Billions of dollars is spent on information-technology, only to end with little improvement (Anderson, 2009; Sveiby, 1997). This makes finding the right capabilities of knowledge management, which drives performance, increasingly important. Establishing sustainable management is not easy for small and medium-sized enterprises (SME´s). Time and resources to develop and implement programs to uphold sustainable management is often scares. Top management support, shared vision and room for learning help in the development of the necessary infrastructure to establish sustainable management programs. Many KM efforts are unfortunately in reality information projects. When such projects fail to innovate and create new products, the KM concept loose credibility. To move forward form information management and successfully launch KM systems, the organization must undertake in complex structural development. (Gold et al 2001).

2.4 The knowledge-based theory of organizational capability

The concept of organizational capabilities has been of great interest to researchers. Teece et al (1997) explained dynamic capabilities of the organization to be its ability to *"- integrate, build and reconfigure internal and external competencies to address rapidly changing environments"*. Moreover Eisenhardt and Martin (2000) considered the dynamic capabilities of the firm to be specific strategic processes (Giniunienea and Jurksiene, 2015). The organizational capabilities underscore the firm's competitive advantages as well as their ability to respond to internal and external changes. Organizational capabilities are the firm's ability to deploy tangible and intangible resources to effectively execute tasks and increase performance (Inan and Bititci, 2015; Amit and Schoemaker, 1993; Grant, 1991; Teece et al, 1997). Capabilities of the organization are also fundamental for effective problems solving (Inan and Bitici, 2015; Dosi et al, 2000).

The concept of organizational capability has been analyzed in a variety of different academic disciplines. The concept often been liked to strategic management and analyzed through a resource-based view (RBV). The resource based view of organizations relates to the examination of the firms idiosyncratic attributes and performance, in relations to the firms internal capacity to utilize opportunities, which

in turn aims to create sustainable competitive advantages (Barney, 1991), Through this RBV organizational capabilities has been identified as an important source for improving and developing sustainable competitive advantages (Scheryögg and Kliesch-Eberl, 2007; Barney, 1991; Wernerfelt, 1984). Differences in resource availability and differences in capabilities, allows of heterogeneity between firms. On the basis of this difference the firms can build sustainable competitive advantages and rent differentials (Scheryögg and Kliesch-Eberl, 2007; Amit and Schoemaker, 1993;Barney, 1997; Peteraf, 1993). The strategic position of a firm will vary with the availability and allocation of resources (Scheryögg and Kliesch-Eberl, 2007; Amit and Schoemaker, 1993). The knowledge-based perspective is emerging as an extension of the resource-based view, which defines firms as *"- a bodies that generate, integrate and distribute knowledge"* (Nguyen et al, 2008; McEvily, and Chakravarthy, 2002; Miller, 2002; Narasimha, 2000; and Narasimha, 2001).

A consensus in the academic literature surrounding the research on organizational capabilities, seem to exist. An organizational capability consists of having both distinctive recourse and finding superior ways of utilizing such resources Therefore capabilities are complex and hard to achieve. A capability also addresses complex processes throughout the organization as product development and customer relationships (Scheryögg and Kliesch-Eberl, 2007). Organizational capabilities are embedded in the social constructs of the firm, and they emerge through social interaction and constitute a collectively shared way of problem solving (Scheryögg and Kliesch-Eberl, 2007; Cyert and March, 1963).

When organizational capabilities are perceived through a knowledge-based view, the main focus is to organize and make important knowledge accessible when and where it is needed. Accordingly, companies perform well and increase value creation when strategies that utilize internal resources and capabilities are implemented. Gold et al. (2001) presents a model, which reflect knowledge management effectiveness in perspective to organizational capability. Two main concepts represent the foundation of the model; social-capital and knowledge-integration. Through social-capital the firm build its intellectual assets and knowledge-integration help in creating knowledge synthesis. The argument of the model is that organizational effectiveness relates to the firms knowledge management infrastructure and process capabilities (Gold et al, 2001). The model developed by Gold et al (2001), which combine

theoretical constructs of KM literature and organizational capability theory is presented below

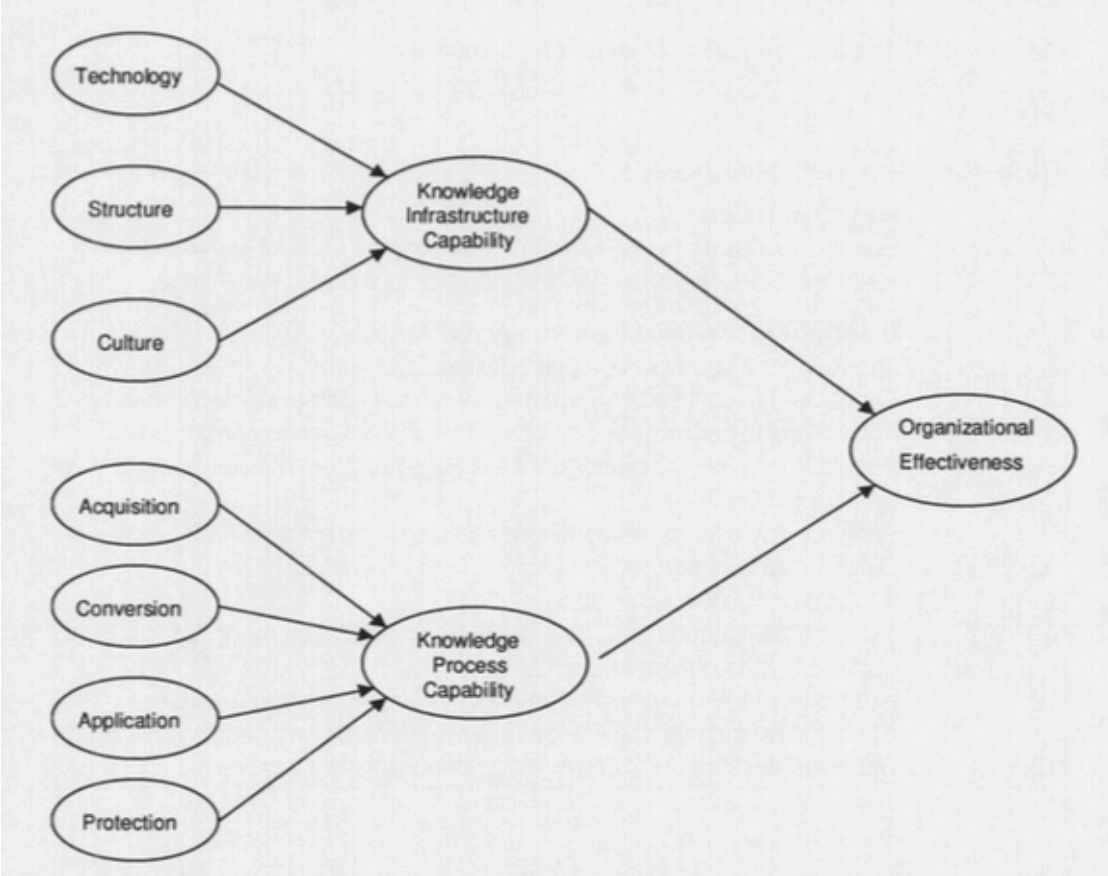

Figure 5: *KMC´s and organizational effectivness*

2.4.1 Knowledge management capabilities

Knowledge is regarded as a vital part of the modern organization, as knowledge resources provide sustainable competitive advantages, which is crucial in the dynamic and competitive economy that today's organizations face (Findikli, Yozgat, Rofcanin, 2015; Davenport and Prusak, 2000; Grant, 1996; Spender and Grant, 1996). Knowledge management is essential for a firm's ability to handle and utilize the knowledge base of its possession. For companies to effectively compete in a challenging market, they need to leverage the knowledge which they posses and generate new knowledge that favourably position them in the market. For this to be achieved the company needs to be able to utilize existing knowledge. The firm needs to assess valuable information, assimilate it and thereafter apply it to the right situation so that new knowledge and capabilities can be developed (Lee and Lee 2007; Cohen and Levinthal, 1990). The ability to utilize prior knowledge in such a way that new knoweldge and capabilites are created is termed *"absorptive capablity"*

of a firm (Gold et al 2001; Cohen and Levinthal, 1990). Two generic processes are essential for the generation of new knowledge, combination and exchange (Gold et al 2001; Nonaka, 1994). For these processes to be put to action, the presenss of social capital is needed (Gold et al 2001; Nahapiet and Ghoshal, 1998). Social capital can be explained as *"- the sum of actual and potential resources embedded within, available through, and derived form the network of relationships possessed by a social unit"* (Gold et al 2001).

2.4.1.1 KM infrastructure capability

Knowledge infrastructure is developed to generate specific desired behaviour in employees (Anderson, 2009). Knowledge infrastructure capability consists of three key variables: culture, structure and information technology, which jointly maximize social capital (Anderson, 2009; Gold et al. 2001). Significant relationship between knowledge infrastructure capability and organizational performance is found in previous studies (Alaarj et al, 2016:Fan et al, 2009; Chang and Chuang, 2011; Sandhawalia and Dalcher, 2011).

Knowledge culture is the part of the organizations infrastructure, which enables sharing and utilization of knowledge. The organizational culture is perhaps the most important element of effective knowledge management (Gold et al 2001). The innovation process depend on interaction and communication between individuals (Gold et al 2001; Badaracco, 1991; Leonard, 1994:Arrow, 1962). Interaction between individuals is important for sharing tacit knowledge, or when attemting to convert tacit knowledge into explicit knowledge, which essentially means that one transform individual knowledge to orgnizational knowledge (Gold et al 2001; Nonaka, 1990; Nonaka, 1994; Nonaka and Konno, 1998; Nonaka and Takeuchi, 1995). Employees must also be able to work individually towards knowledge generation. Finally, vision and orgnaizational values which is communicated throughout the whole organization is important for the effectivness of the knowledge management (Gold et al 2001; O'Dell and Grayson, 1998;Nonaka and Takeuchi 1995).

Knowledge structure is in reference to the norms and trust mechanisms of the organization (Gold et al 2001). The structure of the organization is improtant for the technology architecture. However the structure can also inhibit knwoledge sharing. To take an example, if the organization rewards individualistic behaviour in some

parts of the organization, transfer of knowledge can be limited (Gold et al 2001; O'Dell and Grayson, 1998). Therefore it is highly important that the structure of the organization is designed for flexibility so that communication and collaboration between different parts of the organization is ecurage to share knowledge throuhout the firm and across the supply chain (Gold et al 2001).

Knowledge technology refers to the technical dimensions of the firm that enable the knowledge process (Gold et al 2001). Technology availabe in the organization holds the structual dimensions which drives social capital to mobilize knowledge creation. With technology, organizational communication barriers may be eliminated. Moreover business intelligence technology facilitates knowledge generation of competitors and the external economic environment as well as improve internal knowledge transfer (Gold et al 2001).

2.4.1.2 KM process capability

The knowledge management process is a structural coordination for effectively managing knowledge (Lee and Lee 2007; Gold et al 2001). Organizational processes as innovation, collective decision-making, and both collective and individual learning, are all improved with the successful implementation of the KM processes (King 2009). Furthermore, improved decision-making, service, products and relationships are intermediate outcomes of improvements to organizational processes inflicted by the KM processes (King 2009).

The knowledge process factors leverage the knowledge infrastructure. There is a need for process factors to transform and transport knowledge through the organization (Gold et al 2001). Integration of knowledge, which is important for the process variables, are according to Grant (1996) dependent of three aspects: efficiency, scope and flexibility (Gold et al 2001). Process frequency and variability is important for the efficiency of integration. If the process is variable and lacks frequency the more exceptions must the company handle, which in turn leads to less effectivity in the integration of knowledge. The scope of integration is defned by the variation of knowledge which is integrated through the availability of requisite processes (Gold et al 2001). Factors of infrastructure and process make up the fundation of important aspects of organizational capability, which is relevant in relations to knowledge management (Gold et al 2001).

Four dimensions build the process capabilities; Knowledge acquisition, knowledge conversion, knowledge application and knowledge protection (Anderson, 2009; Gold et.al, 2001). However due to the complexity of the original model presented by Gold et al (2001), and the limitations of the research, some adjustments have been made to the model. Below some definitions of the process variables is given to illustrate the many different approaches for analysing the KM process. Despite of the many definitions of the process variables, some common features are evidential. Creation or acquisition is provided as a variable in every definition. A part from one definition, sharing or transferring knowledge also occurs in all of the definitions presented below. Moreover application or utilization is also commonly a part of the definitions. Many have also provided additional variables to the KM process, which due to limitations will not be elaborated on in this research.

Author(s)	Knowledge management process
Bharadwaj et al (2015)	acquiring, storage, dissemination, application
Alavi and Leidner (2001)	create, store, transfer, apply
Gold et al (2001)	acquiring, converting, Appling, protecting
KPMG (1998)	creation, exploitation, application, dissemination, encapsulation, sharing sourcing, learning
Leonard and Barton (1995)	acquire, sharing, storage, using knowledge capture, transfer
Nonaka and Takeuchi (1995)	acquiring, sharing tacit knowledge, creating, justifying
Wiig (1995)	creation, manifestation, use, transfer

Table 1*: Definition of the KM process*

Knowledge acquisition refers to the process of obtaining and generating knowledge from both internal and external sources. Organizational activities as inter-personal interaction, feedback, innovation and benchmarking are recognized as important components of the process of acquiring knowledge (Alaarj et al, 2016; Nonaka and Takeuchi, 1995).

Knowledge sharing is explained to be the interaction between people and organizations where information, ideas and skills are exchanged (Alaarj et al, 2016; Gharakhani and Mousakhani, 2012). The process of sharing knowledge has previously been related to increased competitiveness of firms (Alaarj et al, 2016). Employee performance has also been found to increase with the present of solid

systems for knowledge sharing (Alaarj et al, 2016; Kuzu and özilhan, 2014). Significant relationship between knowledge sharing and organizational performance is also found in previous studies (Alaarj et al, 2016).

Knowledge application is explained to be the systems that exploit and transformed knowledge, which in turn is used to modify routines to increase performance variables (Alaarj et al, 2016; Lee et al, 2011). Only through effective utilization process, can obtained knowledge positively affect organizational performance (Alaarj et al, 2016; Seleim and Khalil, 2007; Zahra and Georg, 2002). Knowledge utilization has been found to inflict strong effect on organizational performance (Alaarj et al, 2016). A short definition of each variable of the model is provided below in table 2.

Categories	Capabilities	Main principle
Infrastructure	Technology	The IT systems determine the way in which knowledge is transferred and accessed.
	Structure	The organizational structures, formal and informal, can inhibit or facilitate interaction between people, essential in the KM.
	Culture	The organizational culture must support and enhance the activities of knowledge.
Process	Acquisition	The location and Acquisition of knowledge or creation of knowledge through the collaboration between individuals and business partners
	Application	Knowledge must be used to adjust the direction, strategy, solve new problems and improve efficiency.
	Sharing	Through interaction between people and organizations, knowledge is exchanged

Table 2: *Summary of the variables in the model (Adapted form Galvis-Lista and Sánchez-Torres, 2013)*

2.5 The research model

In this part of the chapter research on knowledge management capabilities and the proposed affect they inflict on organizational effectiveness, will be discussed. Firm size and outsourcing, as moderating variables, will also be analysed. Limited research exists where these three constructs are combined. Consequently, important factors

emphasized in the different streams of academic literature, will be joint together to underpin the research model of this thesis.

2.5.1 Knowledge management capabilities effects on organizational effectiveness

There exist a lot of research on the concept knowledge management and the affects such systems inflict on organizational performance and effectiveness. However due to differences in the variables and measurements, the results have achieved less conclusive results (Gold et al, 2001). KMC as conceptualized by Gold et al (2001) was a result of massive review of previous research on the concept of KM. Through his work, a lack of consensus in the definition of the concept and in the research, related to both included variables and measurements of the concepts, became evidential (Gold et al, 2001). With a rapidly changing business environment facing firms today and the growing intensification of competition, scholars and practitioners are paying extensive attention to strategies of organizational effectiveness (Mehdibeigi et al, 2016). Effectivness has been defined as doing the right thing, not doing things right (Mehdibeigi et al, 2016; Malhotra, 2005).

Within the academic literature sourounding knowledge management, it is recognized that KMCs are associated with effectivness and preformance of organizations (Gold et al 2001; Cohen and Levinthal, 1990; Davenport and Prusak, 1998; Nonaka, 1990; Nonaka and Takeuchi, 1995). Organizatiosnl effectivness often viewd as a complex term and holds more than aggregated measures and finanical ratios (Gold et al 2001; Chakravarthy, 1987; Hart, 1992; Hart and Banbury, 1994; Ramanujam et al, 1986; Venkatraman, 1990). Nevertheless, KM should improve firm preformance through processes of capability development (Gold et al 2001; Bohn, 1994; Dutton and Thomas, 1985; Galunic and Rodan, 1998; Huber, 1991; Kelly and Amburgey, 1991; Kogut and Zander, 1993). Bottom line figures as Return on investmet (ROI) and Return on equity (ROE) are important indications for the effectivness of KMCs, but such figures are often influenced by uncontrollable busniess and economic factors. Hence a focus on less confounded controbutional factors to effectivness of the firm, may impart insight on the value-added contributions of resources prossesed by the firm (Gold et al 2001).

Managing knowledge resources has been found important to the direction of the organization, which leeds to enhancment of the preformance and effecivness of the

organization. Zaied, Hussein and Hassan (2012), found that all elements of KMCs has a positive and significant relationship to the preformance and effectivness of the firm. Improving the KMC´s was found to increase the preformance of the organization. In their study, prefomance was measured by productivety, profitability, market share, sales growth, innovativness, cost preformance and competitivness Elements of KM infrastructure were technology, culture, structure and HR, while element of KM proces were acquisition, conversion, application, protection and storing. The results confims the effects of KMC on organizational preformance, with and R-square of 0,48. Storing and HR was found to have the stronges affects on organizational preformance, however all elements of KMC had a statisitcal significant relationship with organizational preformance (Zaied, Hussein and Hassan 2012).

Yang and Wan (2003), emphazied that previous research have focused on retaining employees in their positions, thus preventing them form leaving the company. Their article focus on an alternative strategy, which relates to sharing knowledge and keeping knowledge in the organization. The results show that implementation of knowledge management strategies enhance organizational effectivness. Programs and organizational cultures which provides an good infrastructure for aquiring, sharing and storing knowledge is beneficial for organizational effectivness (Yang and Wan, 2003).

When KM systems are well implemented, this provide predictions of the effectivness of the organization, thus emphazing the predictive link between KMCs and organizational effectivness. (Kumaresan and Swarooprani, 2015). Reisi et al (2013), investigated element of KM process capability and organizational effectivness and found through multivariate regression analysis that all elements of process capability has a positive and significant relationship to organizational effectivness (Ha, Lo and Wang, 2016).

A study from (2014) conducted by Jaradat and Maani, found that a strong relationship between KM infrastructure capability and preformance effectivness. They futher explain that the organization should establish knowledge directorates to discover and effecively transmit knowledge to the employees, with the main focus of improving creativeness and distictivness of the organization Moreover, Liu (2015), concluded in their research that KMC provides organizations with sustainable competitive

advantages, as the KMC are difficlut to imitate, thus the KMC are effective tools which enahnce organizational effectivness.

2.5.2 Outsourcing as a moderating variable

Many studies have examined the effects of outsourcing on various organizational variables. A number of studies has documented a wide range of benefits that emerges from outsourcing activities, however a significant body of research also outline the problems that can arise from such activities (Gibson and Wallace, 2012). However, one can conclude that the stream of research surrounding outsourcing lack conclusive results and consensus in components and measurements used.

The most common reason cited by firms for conducting in outsourcing activities, is the desire to decrease operational costs. The results on cost saving is highly unclear, and organizations frequently find that the savings are less then initially expected (Lewis, 2005). Moreover, as most firm have cost savings as the main focus initiating outsourcing activities, many undermine other strategic business goals, as the quality of products, services quality and knowledge management. Outsourcing especially affect the tacit knowledge of the organization, which is difficult to encode, utilize, and is embedded in the mind of individuals (Lewis, 2005). Gibson and Wallace (2012) also stress the diminishing of tacit knowledge when functions are outsourced, especially if the KM systems does not capture and disseminate such knowledge. Loss of skills, control and quality are some of the potential concerns, which might arise when a company decides to outsource (Gibson and Wallace, 2012).

Kenyou et al (2015) studied the affects of production outsourcing on operational performance. Through extensive examination of empirical data and previous research on relative topic across a vide variety of fields and industries, the study found negative correlation between production outsourcing and performance variables. In the research, performance was measured through components such as manufacturing cycle time, order lead-time, delivery, operating equipment effectiveness and customer loyalty. Drawing on resource-based view and quality management literature, the research found that production outsourcing has deleterious effects on operational performance. The study also found that production outsourcing inflicts significant reduction in operating equipment effectiveness and on-time delivery. Production outsourcing was also found to negatively affect customer loyalty (Kenyou et al 2015).

Some studies have found a positive affect of KM process on outsourcing performance. When firms initiate outsourcing processes, the presences of sound KM systems are important. An article by Blumenberg et al (2009), presents results which underscore the importance of knowledge sharing, and how high levels of sharing positively influence outsourcing performance. Variables of knowledge transfer was analysed through conduction of several cases studies on IT providers and banks. Furthermore the article stresses that there exist two dimensions of the transfer process for explicit knowledge, were one rarely achieves much attention from researchers. The content dimension, which examines mechanisms such as training and structure, has received much attention. However the sender-receiver dimension of the transfer-process, which studies explicit knowledge transfer, examines the interaction structures between the parties, receive less attention (Blumenberg et al 2009). This underscores the need to investigate the complex and dynamic relationship between knowledge management activities and outsourcing.

2.5.3 Firm size as a moderating variable

Firm size is an important factor in KM literature (Kremp and Mairesse, 2003). A majority of studies in the field of knowledge management and other emergent business philosophies focus the research on larger firms where, relevant capabilities and the equivalent amount of implementation resources is present. KM activities can be difficult to implement and as previously mentioned; KM activities often fail (Kremp and Mairesse, 2003). In their research Kremp and Mairesse (2003) found that almost four out of five firms with more then 2000 employees, declare that they have a knowledge sharing culture, while only one out of five with 20 to 49 employees said the same. Adopting a written knowledge management policy is also more frequent in larger firms. Furthermore the study underscores that smaller firms are more dependent on the expertise and know-how of its employees. Loss of employees may therefore impose grater difficulties to smaller firms (Kremp and Mairesse, 2003).

Zaied, Hussein and Hassan (2012), conducted a research which distiguhised between medium size firms and large firms. Higher values was achieved for both KM infrastructure capabilties and KM process capabilities for lager firms. The results indicate that larger organizations have better KMCs then smaller orgnaizations. On avarage the largest differences was found on KM process capabilities, were storing capability had the highest value. Technology had the highest difference in values

between larger and medium sized firms, related to KM infrastructure capability. Productivety was the variable of preformance which had the highest difference between the two size groups. An article by Uhlaner et al (2007) also emphasized the need for consistency in the research conducted on the link between KM and performance, and furthermore stresses the need to control for firm size.

2.6 The research model and hypothesis

From the previous analysis of past research and literature, some connection between knowledge management capabilities and organizational effectiveness seem evidential. There seems also to be some moderating effect inflicted by firm size and outsourcing on the relationships between organizational effectiveness and the KMC of the firm. The research model, which illustrates the relationships between the variables, is presented below.

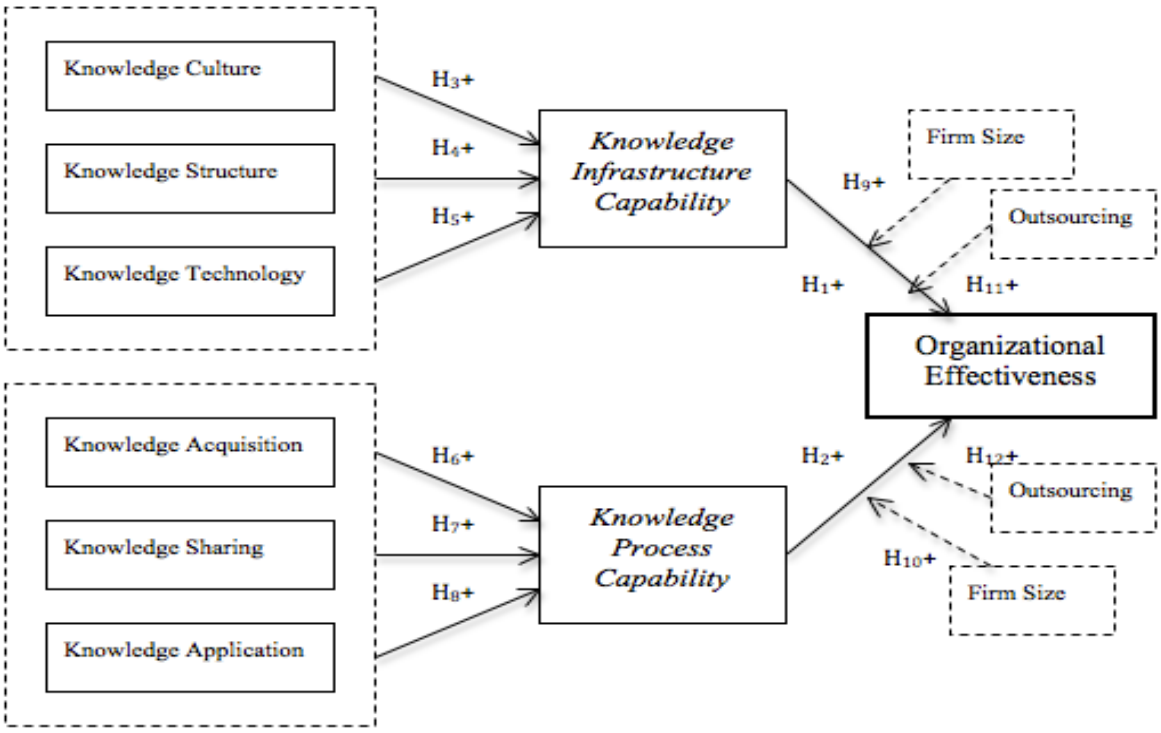

Figure 6: *The research model with hypothesised relationships*

The main relationships of the model are between KM infrastructure and KM process capabilities and organizational effectiveness. This model has two levels of dependent relationships. In the first level knowledge infrastructure and process capability impose predictive outcomes organizational effectiveness, and in the second level, the six independent variables have predictive effect on knowledge infrastructure and process. For this model, the main predictive variables (Infrastructure and process) are latent in

the model. The six independent variables have predictive outcomes on the dependent variables namely independent and process capability. Based on the research model presented above, this study will analyse the following hypotheses.

	Main relationships
H_1	*KM infrastructure capability positively affects organizational effectiveness.*
H_2	*KM process capability positively affects organizational effectiveness.*
	Explaining KM infrastructure capability
H_3	*Knowledge culture is important component of KM infrastructure capability.*
H_4	*Knowledge structure is important component of KM infrastructure capability.*
H_5	*Knowledge technology is important component of KM infrastructure capability.*
	Explaining KM process capability
H_6	*Knowledge acquisition is important component of KM process capability.*
H_7	*Knowledge utilization is important component of KM process capability.*
H_8	*Knowledge sharing is important component of KM process capability.*
	Moderating effects
H_9	*Firm size moderates the effect between KM infrastructure capability and organizational effectiveness.*
H_{10}	*Firm size moderates the effect between KM process capability and organizational effectiveness.*
H_{11}	*Outsourcing moderates the effect between KM infrastructure capability and organizational effectiveness.*
H_{12}	*Outsourcing moderates the effect between KM process capability and organizational effectiveness.*

Table 3: *The Hypotheses*

3.0 Context

The previous chapter explained the complexity of the construct of KMC. The following chapter defines the research context, which is the maritime cluster in M and R. Because the cluster includes a range of different types of firms, the chosen focus of the thesis is the maritime suppliers. Therefore, the study excludes shipping companies, fishing fleets, shipyards and support institutions[1]. To get full insight into the operation of the suppliers, this chapter will include an introduction to the maritime industry of Norway and region of M and R. First an introduction to the Norwegian maritime industry will be given, followed by a part on the cluster in M and R. Section three will provide information related specifically to the equipment suppliers. Last, threats and future perspectives of the cluster and the industry will be given.

It is of special interest to analyse knowledge capabilities of the equipment supplier now as the cluster of M and R are experiencing major changes and many firms are restructuring. Knowledge is an important organizational resource that can easily be lost. Especially tacit knowledge is lost in the process of outsourcing, downsizing, mergers and terminations, as 90 % of the knowledge that an organizational possess is embedded in the minds of people (Smith 2001; Wah, 1999; Bonner, 2000: Lee, 2000). Valuable knowledge is lost and swoalowed by new information. When employees leave the company, valueble knowledge, resources, skills and experiance leave with them. New jobs may be assigned to the employees who stay, and therefore accumulated knowledge might never be used (Smith, 2001).

3.1 The national industry of Norway

Despite having a small population, Norway is one of the world leaders in the maritime industry. Norwegian offshore environment is one of the most comprehensive in products, service and expertise. The maritime industry is also one of Norway's most global, innovative and provident industries. High employment rates and high value creation, makes the industry to an important contributor to the national economy. Furthermore, its innovative skills, provides a driving force for other national industries [2].

[1] The target segment for the interviews and the survey of this study is approximately 169 equipment suppliers to the maritime cluster.
[2] http://www.bluemaritimecluster.no/gce/the-cluster/

The maritime industry has also shaped Norway in relations to settlements and it has been especially important for the districts along the coastline. However the industry is highly international and has a large export share (The Norwegian Ministry of Trade, 2014). Even today 80 % of the people of Norway, live less then 10 kilometres from the coast. A long coastline and abundant supply of timber has traditionally as well as today made seafaring and the maritime industry very important in Norway. The country also possesses the second largest offshore fleet in the world, only second to the USA (GCE Blue Maritime, 2016).

To successfully analyse the industry, a relevant definition is needed. Size and influence of the industry will depend on the chosen definition. GCE Blue Maritime (2016) defines the national maritime industry as including:

"All businesses that own, operate, design, build, supply equipment or specialist services to all types of ships and other floating entities"

This definition is inline with the definition provided by The Norwegian Ministry of Trade (2014), which defines the industry to include firms that participate in:

"Designing, developing, building, supplying, maintaining, modifying, owning, operating and distributing vessels, equipment and specialized services to all types of vessels and floating units". The ministry also underscores that this definition includes firms, which have more, than 50 % of their turnover in the maritime industry, thus this studies will follow these directions.

The national industry employs approximately a hundred and ten thousand people, and has high levels of value creation. In 2014 the maritime industry's value creation was at NOK 188 billion. The industry is highly competitive in a global contexts and accounts for more the a third of Norway's export (excluding oil and gas). If broken down into regions, two clearly stand out as dominate in relations to value creation, Hordaland and Møre and Romsdal (GCE Blue Maritime, 2016). Figure 7 below show the substantial influence of the two regions to value creation of the industry. The figure also illustrates the changes to the regions value creation. However, maritime companies are found all along the coastline of Norway, from the south to Finnmark in the north. Some areas provide a concentration of firms that operates in the maritime industry, which can be described as geographical clusters. These clusters are mostly

located on the west and south coast of Norway (The Norwegian Industry of Trade, 2014).

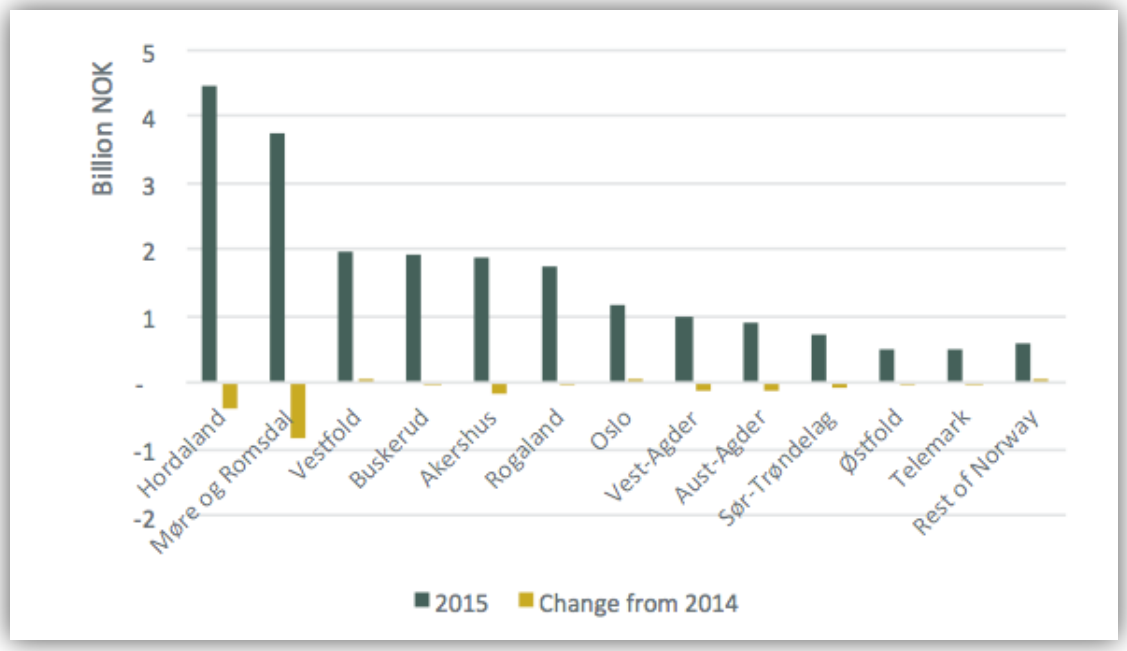

Figure 7: *Value creation in 2015, and relevant change form 2014 (GCE Blue Maritime, 2016).*

High growth in productivity is one of the reasons for the maritime companies international success. This entails that the companies succeed to produce more with fewer employees then their international competitors. The high rates of productivity have also resulted in higher wages, which in fact is twice the average salary of Norwegian companies as a whole. Two characteristics can explain why the industry has achieved such successes: it is knowledge-based and innovation-driven. Knowledge is acquired and shard through interaction between members of the cluster and their partners. The research project named *"A knowledge-based Norway"*, identified interaction between experience-based skills and research-based knowledge as the most important competitive advantages for the cluster (Maritime Equipment Suppliers, 2016).

3.2 Characteristics of the maritime cluster of M and R

A simple explanation of an industrial cluster is a geographical concentration of related companies and institutions, which jointly represent a value chain or operate in the same industry of technological area. International research conducted on clusters, conclude that they lead to higher employment, larger economic growth, higher salaries, increased productivity and higher rates of new businesses. Innovation that results in new technology and new products and services, are often a result of an industrial cluster. These research results have lead to recognitions from governments in industrial countries, that such clustering of related companies, can potentially give competitive advantage in a globalized economy. Because of the recognition, many countries have started to cultivate exciting clusters and contribute to their optimal development. An example of such an initiative is the *"Norwegian Innovation Cluster"* with the three different levels; *1. Arena, 2.Norwegian centre of Expertise (NCE) and 3. Global centre of Expertise (GCE)* (The Norwegian Ministry of Trade, 2014).

The Maritime cluster of M and R has been given the highest status as a Global centre of Expertise (GCE). With this status the cluster has received recognition for its strong contribution to Norwegian value creation. GCE is the top level of the Norwegian cluster program, and as stated by the Norwegian minister for Trade and Industry, Monica Mæland, it is *"the industry's Champions League"*. The GCE title is given to areas which represent world leading expertise (The Norwegian Ministry of Trade, 2014). The maritime cluster in Møre and Romsdal is a global leader *"- in design, construction, equipment and operation of advanced offshore vessels for the global oil and gas industry"(*GCE Blue Maritime, 2016). The cluster consists of 216 companies (GCE Blue Maritime, 2014; Møreforkning, 2014):

- ***20 shipping companies:*** which includes firms that own and operates vessels and floating units as, rigs, barges or production ships (GCE Blue Maritime, 2014).
- ***13 ship consultants:*** which includes service providers to the maritime industry, that offers design, insurance, brokerage, consulting, and classification of vessels (The Norwegian Ministry of trade, 2014).
- ***14 shipyards:*** constructs new vessel and maintain, repair and improves existing ships (GCE Blue Maritime, 2016).

- ***169 equipment suppliers:*** consists of specialised suppliers which provides a wide range of products to different types of vessels and floating units (GCE Blue Maritime, 2016).

Collectively, the companies generate a turnover of NOK 62 billion and provide a value added of NOK 19 billion. The value creation of the cluster equals to a fifth of the total value added for the national maritime industry. The net operating margin in 2014 was at 8%, however large declines in demand has resulted in margin of 0% in 2015 (GCE Blue Maritime, 2016). Collectively, the companies of the cluster employ more than 16 000 skilled workers. This makes it the largest contributor to employment in M and R (Excluding public administration) (GCE Blue Maritime, 2016). With its vast contribution to the region, the cluster is highly important for the municipally of M and R and to the country at large.

	2014	2015	Change	Change (%)
Shipping	17.8	16.4	-1.4	-8
Services	14.3	13.7	-0.7	-5
Equipment	16.8	15.7	-1.0	-6
Yards	21.0	15.7	-5.3	-25

Figure 8: *Change in turnover for the four segments form 2014 to 2015 (GCE Blue Maritime, 2016)*

The Figure above demonstrates the turnover of the different segments comprising the cluster. Shipyard is the largest segment of the cluster in terms of turnover in 2014, with a joint turnover of NOK 21 Billion. However, the segment has experienced large decline, which resulted in a decrease in turnover of 25 % in 2015. The joint turnover of this segment is now equivalent to the turnover of the equipment suppliers. Shipping companies is now the largest segment, however little separates the four. In terms of value creation, shipping companies accounts for much more then the other segments (figure9).

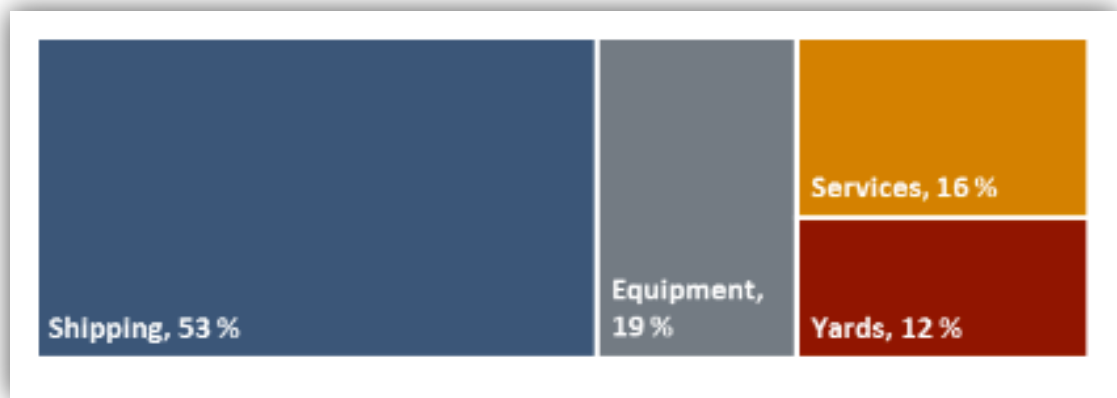

Figure 9: *Value creation for the four segments in % (GCE Blue Maritime, 2016)*

3.3 The Maritime equipment suppliers of Norway and M and R.

The Norwegian Ministry of trade define maritime equipment suppliers as companies, which produce and supply equipment to all types of vessels and floating constructs. Propulsion systems, cranes, ropes, winches, compressors, navigation equipment, are some of the wide range of products maritime equipment suppliers provide. Interior, telecommunication and electrical installation, may also be products companies under this definition can produce (The Norwegian Ministry of Trade, 2014). For a shorter definition of the equipment suppliers of M and R by Maritime Equipment suppliers, (2016) is presents the one below.

"Specialist equipment suppliers for ships and other floating entities"

As previously stated in this chapter Norway is home to a world leading cluster of maritime companies, among them world class maritime equipment suppliers. The companies provide high ranking shipping service globally, innovative ships as well as leading technological and financial services. In 2015 Norwegian equipment suppliers reached a joint turnover of NOK 76 billion, they had a value creation of NOK 21 billion and employed 20 000 skilled workers (Maritime Equipment Suppliers, 2016). From 2004 to 2008, the suppliers experienced massive growth, with a significant increase in turnover and profitability. However, after 2008, the suppliers have experienced stagnation in growth rates, and in 2015 the joint turnover fell by 5%. The equipment supplier of M and R reached a joint turnover of NOK 15,7 billion in 2015, which is a change of only 1 % from the year before (GCE Blue Maritime, 2016). Jointly the equipment suppliers employed approximately 8 540 skilled workers in

2014 (GCE Blue Maritime, 2014), which underscores their large contribution to the region.

Even if the companies of the maritime cluster are world-leading providers of equipment, the international competition is hard, illustrated by the fact that equivalent to 90% of turnover is obtained outside of Norway. Half of the companies' products and services are delivered to the global offshore market, which underscores the dependency they have on the development in the global economy. NOK 60 billion of the equipment supplier's goods and services are exported, which is equivalent to 8% of the national export of goods and services, excluding oil and gas (Maritime Equipment suppliers, 2016).

The turnover for 2016 is expected to fall by 12 %, as the equipment suppliers are highly dependent on the developments in the offshore market. Thus, the suppliers are strongly affected by falling demand for new offshore vessels. However 2017 is expected to be somewhat better then 2016, but it might still result in reduction in activities (Maritime Equipment Suppliers, 2016). While the short-term outlook propose reduction and downfall, the long-term tend predict growth opportunities. Aquaculture, offshore wind, maritime tourism and other maritime operation providers, presents some of the growth possibilities for the industry. Fisheries and traditional maritime markets seem also to be presenting future growth opportunities for the industry. In a survey Menon Economics conducted in 2016, 7 out of 10 respondents state that environmental technology is an important part of current production offering. Furthermore 62 % underscores that the firm has recently increased its focus on environmental technology (GCE Blue Maritime, 2016).

3.4 Change in demand conditions for the cluster and the Norwegian maritime industry

The cluster has experienced a decline in profits in the last years. Due to low oil prices the cluster has been forced to undertake changes and restructuring (Maritime Equipment Suppliers, 2016). Demand has changed both in volume and technology. Traditional offshore markets are being replaced with new areas as offshore wind, aquaculture and environmental technologies. However, the maritime cluster itself is optimistic in their ability to change and explain a new report that they are recognized for their adaptive abilities (Maritime Equipment Suppliers, 2016).

As stated both by the members of the maritime industry and the government of Norway, the solution to the clusters many challenges are to focus on innovation and green solutions. GCE Blue Maritime (2016) states that the change in demand both in volume and technology for maritime equipment has inflicted many challenges for the industry. The challenges have lead the industry away from traditional offshore market, but at the same time also lead it into new area like offshore wind, aquaculture and environmental technology. Furthermore the report underscores the adaptive ability of the Norwegian maritime companies. This is a valid reason why Norway still has one of the worlds leading centres for global maritime equipment producers.

Much of the worlds transport of good happen by sea, close to 90 percent. One of the largest challenges for the industry today is climate change, which has lead to strict demands on pollution and energy consumption. The industry needs to find solutions to a more effective utilization of energy (GCE Blue Maritime, 2016).

4.0 Methodology

As there exist limited research on both the KMC and how this framework fits in a Norwegian context, a mixed method approach has been utilized. With the combination of numerical objective information and subjective view, one can option deeper understanding of the knowledge management capabilities of the maritime equipment suppliers. The chapter will first discuss the research design chosen, followed by a review of the qualitative and quantitative methods used in the study. Lastly, the statistical approaches will be discussed together with reliability and validity of the research.

4.1 Research design

The research design is the system of choices made, which facilitates conduction of the study and retrieval of the right information in an orderly and effective manner. It is important to develop a design, which allows the researcher to effectively address the research questions, and hypothesis at hand (Hair et al, 2014). The most fundamental concern of this research is to study the relationships among variables, thus the design of the research must identify such relationships. Controlling or observing variance in the empirical data is also an important factor of the research design (Lee and Lings 2008). There are three main catagories of which most reseach can be undertaken; exploratory research, and two which are conclusive in nature, descriptive and causal research (Wilson, 2006). Exploratory research is conducted to inititate ideas and to determine the direction for any further research. If there is limited knowledge on the subject of interest, conducting exploratory reseach can provide insigth and help to develop detailed objectives for further reseach. Exploratory reseach may provide answars to descriptive questions, but does not give explanation to why surtain things are happaning (Wilson, 2006). For the conclusiv research apporach a causal design is chosen for this study. Causal research examines if one variable caues or determines the value of another (Wilson, 2006). However research designs are not mutually exclusive, and researchers often utilize a mix of features of several designs (Hair et al, 2014). In the study a mix of both exploratory and causal design is used, as the research seeks to examine relationships among variables in an estabilished framework, and provides new contextual features to the framework. The KMC framwork has been previosly investigated by several researchers, however moderating for firm size and outsouring is new for this study. Thus, this thesis is both seeking to

explain causal relationships among estabilished variables, as well as it is exploratory in the sens of introducting new variables to the established framwork.

4.2 Mixed method approach

When the research design has been chosen, the next step is to determine the method of data collection. There exist two primary methods of data collection, qualitative and quantitative. Qualitative research is conducted by using an unstructured approach with few carefully selected individuals. This research method is used to provide non-quantifiable insight. The findings are not statistically valid, and may not represent a larger population, however the method is more flexible and provides a deeper insight into the subject (Wilson, 2006). Quantitative research is statistical in nature and will commonly be undertaken through the use of computer software. It is a structural research approach, and conducted with a sample of the populations so that quantifiable insight may be produced (Wilson, 2006).

In this study both quantitative and qualitative methods where jointly integrated to provide an in-dept understanding of KMC in the context of the maritime cluster of Møre and Romsdal. Bryman (2006) outlines some of the benefits of using a mixed-method approach. Some of the benefits provided in his research were, *Triangulations (increased validity*); which means combining traditional research methods to triangulate findings, so that they might be mutually corroborated. *Offset*, indicates that both qualitative and quantitative research methods have strength and weaknesses, thus combining the two allows for the researcher to offset their weaknesses and build on their strengths. *Completeness* underscore that the researcher can obtain a more comprehensive insight to the area of interest, by combining the two methods. Through combinations of the two, the researcher can achieve a better *explanation* of the findings obtained form using the other method. One of the methods can also generate *unexpected results*, which through integrated the two methods, can be explained by employing the other. *Instrument development* is also a benefit of using both methods. By conducting qualitative research, better wording or more comprehensive answers to the questionnaire can be generated. A combination of the methods can also provide a better *sampling* to the research. With combining the two research approaches can also increase the *credibility* of the study. *Context*, refers to situations were qualitative research is conducted to give contextual understand, which then facilitates achieving externally valid results through quantitative research. Qualitative data can also be

used to *illustrate* quantitative findings or to supplement "dry" quantitative findings. The combination of the two methods may also improve the usefulness of the research, as it may increase the *utility* of the research to practitioners and others.

Since a joint utilization of the two methods can improve validity and credibility of the results, as well as explain unexpected results and give contextual understanding, this study employee a mixed method approach. The qualitative data was obtained from interviews with three maritime equipment suppliers, with variation in size. With the conduction of the interviews a deeper understanding of the research topic was obtained. Furthermore, the information gathered through the interview process provides guidelines for the quantitative part of the study. A questionnaire survey was developed and carried out for collecting the quantitative data. The qualitative data obtained form interviews, was transcribed and coded manually. The software programs SPSS and SmartPLS was used to conduct analysis of the data and to test the hypotheses.

4.3 Qualitative research

Qualitative interview or in-depth interviews is perhaps the most common method of conducting qualitative research (Lee and Lings, 2008). The interview is conducted face-to-face, and facilitates a flexible communication process (Wilson, 2006). With a semi-structured interview, one can obtain relevant in-depth information, as well as explore interesting angles, which might surface form the conversation (Lee and Lings, 2008). There are also three methods of conducting in-depth interviews, structured, semi-structures and unstructured (Wilson, 2006)

4.3.1 Semi structured interview

A semi-structured interview is a non-structured qualitative method, were the interviewer uses a guide with pre-established questions on the topic of interest (Bryman and Bell, 2011). With using a semi-structure approach to the interview, one can obtain a broader understanding of the interviewees' opinions and experiences, without influencing it by presuppositions, to the same degree as might occur through conducting a structured interview (Bryman and Bell, 2011). Such interviews commonly last between 30 minutes to one hour. Even with an established topic guide, the semi-structured interview method facilitates flexibility to follow up individual points form the interviewees answers (Lee and Lings, 2008). This thesis seeks to obtain valuable insight to the knowledge management capabilities of maritime

equipment suppliers in Møre and Romsdal, thus the in-depth interview is conducted with a semi-structured approach.

4.3.2 Candidates for the interview

The interviewees where selected in relations to a predetermined set of criteria, rather then statistical representativeness, hence this study uses a non-probability sampling method for the qualitative research. Qualitative research is time consuming, thus this type of research often involves a small sample size. There exists no exact recommendations for amount of respondents needed for qualitative data collection, however the amount of interviewees needed will depend on the scope of the study and the research questions at hand.

The 169 maritime equipment suppliers are the relevant population for this study. A list of the respective firms was provided by ÅKP[3], form the year 2015. Well-structured knowledge management processes and infrastructure is often found in larger organizations, thus the size of the firm was considered when selecting interview candidates. Base on turnover, firms below 100 million were not considered for the interviews. The remaining firms were divided into groups based on firm size, here considering both turnover and number of employees. One small, one medium size and one large, were selected: Rolls-Royce Marine AS, Acel AS and Furuno Norge AS. To retrieve relevant information and solid opinions on knowledge management, the interviewees were all in top-management positions.

4.3.3 Interview guide

The interviews were conducted to gain in-depth information of the knowledge management capabilities in the context of the maritime cluster. A well-developed interview guide is important to ensure the quality of the quantitative data, as well as ensure that the right information is obtained (Lee and Lings, 2008). The research of Gold et al (2001) provided a guidelines in developing the question, this to ensure higher validity to the qualitative data. To capture all the elements of the research model, the interview guide was divided into five sections. The first section contains basic background information of the interviewee. Thereafter the interview guide discloses information on the research subjects, with one section on knowledge

[3] ÅKP (Ålesund Knowledge Park) is a regional centre for innovation and business development. The organizational provides one of the most comprehensive incubator systems in Norway. Find more information on: http://www.aakp.no/aakp

management infrastructure capabilities, followed by a section depicting information on knowledge management process capabilities. The nest section entails information of the firm's organizational effectiveness. Lastly outsourcing in relations to the cluster was discussed. The interview guide is disclosed in appendix 1.

4.3.4 Qualitative data gathering

All the three interviews where conducted face-to-face in the head office of the firms, and they were all conducted in Norwegian, being the arterial language for all parties present, this was found to be most natural. Before meetings, all participants received a document containing the purpose and the agenda for the interview, as well as a short introduction to the questions. This was done because it was found to be important for the participants to be prepared for the interview. The agenda and the main purpose of the study was disused before the interview took place and all were informed that the interview would be recorded and that the answers would only be used for academic purposes. When recoding is used in an interview, this facilitates an easier flow in the conversation and better interaction between the parties present (Wilson 2006). The interviews lasted between 40-80 minutes. Transcripts of the recorded interview were produced. A transcript is defined as a written recording of answers to specific questions an interviewee provides in an interview setting. There are different ways of conducting a transcription, however this thesis utilize a method named "data sampling", thus only specific sections of the recording relevant to the thesis were used (Heir et al, 2014). All the transcripts of the interviews can be found in appendix 5, 6 and 7.

4.4 Quantitative research

The present study has used a questionnaire survey, this to effectively test the hypotheses and research questions at hand. By conducting quantitative research, answers, which can quantify specific behaviours and attributes, can be obtained. Moreover inference about the population of interest can be made (Wilson, 2006).

4.4.1 Sample selection

The sample selected, must be representative to the population of interest (Lee and Lings, 2008). There exist two main approaches to sampling; probability sampling and non-probability sampling. Every individual of the population has equal chance of being picked for the study when a probability sampling approach is being utilized. However when using non-probability sampling some members of the targeted

population is more or less likely to be selected than other members. This form of sampling may cause statistical problems, hence most social science research projects does not use this approach to sampling (Lee and Lings, 2008).

In line with most social science research, this study utilize a probability sampling approach, thus every member of the target population has equal chance of participating in the research. There are also different approaches to probability sampling. In this study simple probability sampling is utilized in this study. With this form of probability sampling, every member of the target population has the same information and the same chance of participation. Utilization of simple probability sampling, increase the chance that the information obtained from the data gathering process, correctly reflect the opinions and situation which the study seeks to observe. Moreover it increases the usability of the results and makes the results more reflective (Wilson, 2006).

4.4.2 Questionnaire design

In line with previous research on the topic of knowledge management and KMC, as well as on the basis of the qualitative data obtained from the preliminary interviews, a questionnaire survey was developed. Some modifications were made to the previously established questions in the research of Gold et al (2001), due to the expected limitations of firm size. Pervious research on KMC has been conducted on larger multinational enterprises, thus some changes was made to better fit the firm size of the equipment suppliers. The wording of the questions were thoroughly thought through, and modified so the questionnaire fit both small and large firms.

The questionnaire was divided into sections. The first section included descriptive data of the firm and included question as *number of employees, turnover in NOK, and change in turnover in percent*, ect. Thereafter fallowed a section with questions related to the KMC. The third section contained questions, which measures organizational effectiveness, followed by the last section on outsourcing. The questionnaire has a total of 11 questions 7 were open-ended questions while 4 were closed-ended questions. The 7 open-ended questions provided numerical information about the companies and included questions as turnover figures, outsourcing in percent, turnover change in percent ect. For measuring the KMC and organizational effectiveness, closed-ended questions where used, as the answering requires less

formality. In line with previous studies on the KMC provided by Gold et al (2001), the KMC were measured on a 7-point "Likert scale". In the questions related to the KMC of the firm, the respondents were asked to rate how well statements about the KMC's fit to describe the company, on a scale form 1 (strongly disagree) to 7 (Strongly agree). To avoid misunderstandings and language barriers, the survey was conducted in Norwegian. The full questionnaire in Norwegian is disclosed in appendix 2.

4.4.3 Data collection

The online software provider "SurveyMonkey"[4] was used to conduct the quantitative data collection. Through this software program I had access to descriptive statistics and statistical tools. The survey was distributed to all the maritime equipment suppliers located in Møre and Romsdal. Moreover, the questionnaire was directed at middle and top-level management. This target group was used in order to retrieve reliable and sound answers. To ensure the quality of the survey a pilot test was distributed to a small amount of respondents, thereafter the survey was sent by email to 169 respondents[5]. The email text provided a short introduction to the research, as well as the intended benefit for the cluster for participating in the research. It was also stated that the answers were to be confidential and only to be used for an academic purpose. Moreover, I expressed my sincere gratitude to all that took the time and effort to participate in the survey. 70 of the 169 companies provided a complete questionnaire, which in turn result in a 41%[6] respondent rate. The content of the e-mail distributed to all firms can be found in appendix 3. A reminder e-mail was also send to all participants which did not respond to the. The content of this e-mail is disclosed in appendix 4.

4.4.4 Operationalization of the variables of the research model

The variables of the research model are based on previous research conducted on KMC and academic literature of knowledge management. Previous research on the topic of KMC has received good results and thus the items used for the measurement

[4] "SurveyMonkey" is an online software provider, which can be used to conduct quantitative data collection. For more information: https://no.surveymonkey.com/

[5] A list of e-mail addresses to the managers of the equipment suppliers were developed.

[6] (70/169) X 100% = 41,4%

of the concepts have proven to be valuable. Moreover inputs form the qualitative part of the study and survey trials where used to enhance the quality of the questionnaire.

4.4.4.1The dependent variable: Organizational effectiveness

Organizational effectiveness serves as the dependent variable of this study. Previous research has identified the key contributions of KMC, which increase the effectiveness of the organization. The study provides two effectiveness indicators, effectiveness and value creation. Effectiveness is measured by key indicators of KMC outlined in previous research. The key contributions of KMC include, improved ability to innovate and rapid commercialization of products (Gold et al, 2001). The ability to anticipate crises and responsiveness to market change, serve as additional contribution of strong KMC (Gold et al, 2001) and is thus perceived as important in the context of the maritime cluster. The study measured effectiveness through the firms own evaluation of their ability to find new marked opportunities, expect market change and crisis, their ability to convert innovations to commercial products and adapt strategically goals to market change. Furthermore effectiveness was measured with open-end questions, which asked about contribution to revenue by innovations, change in market share and change in revenue. Table 4 outlines the items used in the survey, together with the proper explanation of the questions and the source.

Organizational effectiveness		
Questions/items	Explanation	Sources
Effectiveness		
How would you evaluate the company's ability to… - Find new market opportunities? - Expect market change and crisis? - Convert innovations to commercial products? - Adapt strategically goals in accordance with market and industry change?	It is believed that KMC relates to high organizational effectiveness. Thus increasing the knowledge capabilities firms will experience and increasing in effectiveness.	Gold et al (2001), Anderson (2009), Mehdibeigi et al (2016), Alaarj et al, (2016).
Approximately in percent how much of the company's revenue the last three years has been a result of innovations and new launches	Innovation is important outcome of knowledge management and an important factor to organizational effectiveness.	Gold et al. (2001), Anderson (2009),
In percent, what was the increase/decrease in the company's market share from last year?	Increase in market share is often related to well-established capabilities of the organization.	Gold et al (2001), Zaied, Hussein and Hassan (2012), Alaarj et al, (2016). Anderson (2009),
What was the change in the company's revenue from last year?	Revenue growth is important indicator of the advantages of the firm and the well being of the organization.	Gold et al (2001), Zaied, Hussein and Hassan (2012), Alaarj et al, (2016). Anderson (2009),

Table 4: *Items of organizational effectiveness*

4.4.4.2 KM infrastructure and process capability

Technological KM infrastructure, structural KM infrastructure and cultural KM infrastructure, serve as the predictive variables of KM infrastructure capability. Moreover KM acquisition process, KM application process and KM sharing process are the predictive variables of KM process capability. Both KM infrastructure capability and KM process capability are latent variables of the model, thus the study does not provide direct measurements of the variables. However the variables are measured by six independent variables, three each, which thereafter are measured by indicators (questions). This is inline with previous research on the model (Gold et al, 2001). The six independent variables are measure with 3-5 items (questions). Moreover a 7-point Likert-scale is used to measure the items of the KMCs. Table 5 and 6 below, presents the questions comprising the six KMCs, as well as explanation of variables and source.

Scale	Question/items	Explanation	Source
KM infrastructure capability			
Technological KM infrastructure	How do you evaluate the statements in relations to your company? The company possess technology which efficiently categorise and store knowledge The company have technology which facilitates cooperation between employees and facilitates learning The company has technology which streamlines the search for new knowledge The company possess technology which facilitates effective surveillance of partners and competitors	Technology withholds important elements of structural dimensions necessary to facilitate socialisation, which increase knowledge creation.	Anderson (2009), Gold et al (2001), Lee and Lee (2007), Bharadwaj et al (2015)
Structural KM infrastructure	The organization structure of the company facilitates for collection and development of new knowledge. The company's measure performance on effective knowledge acquisition The company has many strategically alliances	The structural variables describe the firm's rules, policies, procedures and processes.	Gold et al (2001), Anderson (2009), Bharadwaj et al (2015)
Cultural KM infrastructure	The company provides a sufficient amount of training programs and courses to the employees Employees are encourage to experiment and explore The company's strategic goals and vision is well communicated to the employees Management recognize the significance of knowledge to the company's success.	The culture is explained as the facilitator or barrier of effective KM. It is the combination of values, beliefs and behaviour of the organizational and facilitates the effectiveness of knowledge.	Gold et al (2001), Anderson (200), Allameh (2011), Bharadwaj et al (2015)

Table 5: *Items of KM Infrastructure Capability*

Scale	Questions/items	Explanation	Source
KM process capability			
KM acquisition process	The company has good processes for "benchmarking" performance indicators The company has good processes for collecting of knowledge on (customers, products, market, suppliers and competitors) The company use feedback to improve future projects.	KM acquisition process indicates how effectively the firm obtains knowledge.	Gold et al (2001), Anderson (2009), Bharadwaj et al (2015)
KM application process	The company has good processes to utilize knowledge acquired from experiment. The company has good processes to utilize knowledge to handle change in the competitive situation The company has good processes to utilize knowledge to create new products and solutions The company use knowledge to improve efficiency The company make knowledge accessible for the employees	Application variables helps to understand how well the organizations use knowledge of its possession.	Gold et al (2001), Anderson (2009), Bharadwaj et al (2015)
KM sharing process	The company facilitates knowledge sharing and interaction across departments and between employees Employees trust each other and communicate well The company provide incentives for sharing knowledge	The sharing process indicates how well the firm is able to distribute knowledge throughout the organization.	Gharakhani and Mousakhani (2012), Alaarj et al (2016), Chen and Fong (2012)

Table 6: *Items of KM Process Capability*

4.4.4.3 Outsourcing and firms size as moderating variables

Previous research has studied the relationships between KM infrastructure and process capability and organizational effectiveness, however firm size and outsourcing as moderating variables on the models variables has not received much

attention. Therefore, the operationalization of the moderating variables is based on previous research and related literature, as well as the results from the preliminary interviews of cluster members.

Firm size was measured by the item in the survey asking about number of employees of the firm. Large systems for knowledge management often follow larger firms. Implementing and effectively utilize knowledge management systems, might be both easier and more pressing for larger and multinational firms (Kremp and Mairesse, 2003). This study includes this variable to assess the effects of firm size and analyse perceived positive effect of size on the variables of the model. The moderating effect of size is expected to be higher in smaller firms, thus larger firms are expected to achieve greater values.

Outsourcing was measured through both production and knowledge tasks sourcing. The items measuring outsourcing in the survey were those inquiring about the outsourcing of production and knowledge tasks in percent. Through examining previous literature and research on the field of outsourcing, some relationship between outsourcing and organizational effectiveness is evidential, however the nature of the relationship has not reached a sound conclusion. Some researchers find positive relationship between the variables, while others conclude a negative relationship (Kenyou et al, 2015). Table 7 disclose the items operationalizing outsourcing, with explanations of their relevance and the origin of the items.

Moderating variable: Outsourcing		
Questions/items	Explanation	Source
Production outsourcing - *In percent, how much of the company's production is outsourced to international companies?*	Outsourcing production has been perceived as negatively effecting organisational tasks and performance	Kenyou et al. (2015), Gibson and Wallace (012).
Knowledge outsourcing - *In percent, how much of the company's knowledge tasks (Market research, R&D, coding ect) are executed international companies?*	Outsourcing has been found to have negative effect on the knowledge base of the organization.	Kenyou et al. (2015), Gibson and Wallace (2012).

Table 7: *Items of outsourcing*

4.4.5 Statistical analyses

This section describes the different statistical analyses used in this study. In order to analyze the quantitative data collected through the survey and to examine the knowledge management capabilities of the maritime industry located in Møre and Romsdal, the data software program SPSS and SmartPSL was used. In the next chapter the results will be presented. Through analysis of the results, accepting or rejection of the hypotheses will be assessed. The quantitative results will also be compared up against the results form the qualitative data gathered. The analysis of qualitative data in this study is conducted in three different steps. The analysis starts with descriptive statistics. Followed by data reduction processes through factor analysis, followed by hypotheses testing, which is conducted through structural equation modelling (SEM).

4.4.5.1 Descriptive statistics and examination of the data

Data examination is an important first step in any research, however the process is high time consuming. Through this process the researcher can evaluate the impact of missing data, identify outliers and test for the assumptions underlying multivariate techniques (Hair et al, 2014). Descriptive statistics provide basic information of the characteristics of the sample and helps in checking for violations of assumptions. (Pallant, 2010). If the there are violations of the statistical assumptions, may result in biases or non-significance. Such problems may mot be evidential, thus a result that is not true may be accepted (Hair at al, 2014). Some of the most common descriptive techniques are central tendency, which include mean scores, mode and median, and analysis of variability (Wilson, 2013).

Graphical examinations of the data can give both a univariate (shape of the distribution) and a bivariate (relationships among variables) profile of the data set. With the use of graphic techniques the researcher can be aided immeasurably in obtaining a good understanding of the characteristics of individual variables and the relationships between variables (Hair et al, 2014). Graphical techniques include histogram, boxplots, scatterplots and so forth.

Mean score portray the arithemetic average of the data, and is often the first measure of a descriptive examination. The mean score is the summated value divided on the number of valid cases present in the data set. The value of the data set, which is most

frequent, is the mode. This value can be used for any type of data; nominal, ordinal, interval and ration (Wilson, 2013). Unlike the mean score, the median value of the data set is not affected by extreme values. This measure of central tendency is calculated by arranging the values of the data set form a ascending or descending order, then locating and adding the two middle values and dividing them by two (Hair et al, 2014). Standard deviation is the most common used method of measuring validity. It is calculated by taking square root of the summated squared deviations form the mean, divided by the number of observations minus 1(Hair et al. 2014). This number represents the average distance, values of the data set have form the mean score. When the standard deviation is low, the sample is coherent (Wilson, 2013).

The final step in examining the data is testing for the assumptions underlying the statistical bases for multivariate analysis. Testing for compliance with an assumptions, deals with the foundation of making statistical inference and results, through the use of different techniques. *Normality* is the most fundamental assumption in multivariate analysis. Normality refers to the shape of the distribution for one individual metric variable. If there is large variations form normality, all statistical tests are invalid, as normality necessarily use F and t statistics. To measure the impact of the distribution of scores, skewness and kurtosis is frequently used (Hair et al, 2014). Kurtosis refers to the "peakness" of the distribution, compared to the normal distribution of the scores (Pallant, 2010). While kurtosis describes the height of the distribution, skewness measures the symmetry of the distribution. If there is unbalance in the distribution of the scores, there will be a shift to one side (left or right), thus the distribution is skewed. A positive skewness reflects a cluster of scores located to the left, while a negative skew denotes a cluster of scores located to the right (Hair et al, 2014).

4.4.5.2 Factor analysis

Factor analysis can be used to analyse the underlying relationships of a set of variables. Moreover a factor analysis can determine if the information can be summarized in to a more manageable set of factors or components, which thereafter can be further explored through deploying other multivariate techniques (Hair et al, 2014). There are two different approaches to factor analysis; confirmatory factor analysis or exploratory factor analysis. Exploratory factor analysis, explore the

interrelationship among a set of variables, while confirmatory factor analysis can be used in hypotheses testing or test theories which describe the underlying structure between variables (Pallant, 2010).

For this study a factor analysis will be used to summate the many variables, which collectively measure the KMCs, to a more manageable size of six variables. Organizational effectiveness and the outsourcing variables will also be summated to two main variables. Firms size is however only measured by one variable, and will thus remain as it is. There are two different approaches to factor analysis; exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). The two techniques are similar, but with EFA data is simply explored. With CFA one can confirm or reject the measurement theory. There are two different CFA is a multivariate statistical procedure, which is used to measure how well a sett of variables represent theoretical established constructs (Pallant, 2010). The CFA have some important assumption, as multivariate normality and model determinacy. Sample size and inter correlation between variables is the primary assumptions underlying a factor analysis. Fifty observations is the minimum sample size of a factor analysis (Pallant, 2010). The Bartlett's test of sphericity should reach statistical significance at P<.05, and the loading of each variable should be +/- .05 (Hair et al, 2014). Multicollinearity, measured with the Kaiser-Meyer-Olkin (KMO), gives indications of how well one variable is explained by the other variables of the analysis. Identifying interrelationships between variables is the primary role of factor analysis, thus some multicollinearity is relevant for the factor analysis.

4.4.5.3 Structural equation modelling (SEM)

Multiple regressions, factor analysis, discrimination analysis and other multivariate techniques all present powerful tools for analysing a wide range of managerial and theoretical questions. However they all share a common limitation, the limitation of analysing only a single relationship at a time. Researcher as in this study is often faced with interrelated questions. Structural equation modelling (SEM) is an extension of many multivariate techniques, most notably factor analysis and multiple regression. With SEM the researcher can examine many dependent relationships simultaneously. In this study as in many others, a hypothesized dependent variable

acts as independent variables in a subsequent dependence relationship (Hair et al, 2014).

SEM is a family of statistical models, which examines the relationships between multiple variables simultaneously. In this process SEM examines the structure or interrelationships between variables with many equations closely similar to a series of multiple regression equations. The equations in SEM describe all the relationships between *constructs* (the dependent and independent variables). Constructs are measured or observed through multiple variables, similar to variables representing a factor in a factor analysis, thus constructs as portrayed in the model, are unobservable or latent factors. Most multivariate techniques are either interdependence or dependence techniques, however SEM is a unique combination of both techniques. The foundation, which builds SEM, lies in two common multivariate techniques, factor analysis and multiple regression (Hair et al, 2014). The present research involves measuring latent constructs, thus the model include multiple variables, which jointly explain the construct.

4.5 Validity and reliability of the research

Before engaging in analyses of the research data and determine the results of the study, the validity and reliability of the research needs to be discussed. In the present study a triangulated research approach is utilized, which provides a deeper examination of the topic of the study. Moreover with triangulation of both qualitative and quantitative research methods, both validity and reliability of the research may be approved. (Hair et al, 2014). Using an SEM approach to measure the research model, might also improve the results. SEM techniques resolve measurement errors by using multiple measures of constructs. It also improves the statistical estimation of interrelationship between constructs, by taking in to account the relative measurement errors of the constructs (Hair et al, 2014).

4.5.1 Reliability

Reliability refers to the reliability of the data, what type of data used and how it is collected. Moreover reliability is linked to the methods researchers use to analyse the data collected (Johannessen, christoffersen and Tufte, 2011). What determines a good reliability of a research, is if repeated analysis, and generates the same result. However measurement errors is always a possibility in scientific research (Saunders et al, 2009). With the used of SEM errors in measurement may be reduce, thus

creating a more reliable result (Gold et al, 2001). The yielded result from an SEM analysis will take into account measurement errors.

It may however, be difficult to measure the reliability of qualitative data. Measurement errors related to qualitative data might include irrelevant notes or excluding important statements and facts. Bias is always an issue, which may result in false information, provided by the interviewee. To take and example, a person or a company, may want to be perceive as better than what they rely are (Sanders et al, 2009). Having a high reliability secure that the data used fit to answer the research questions at hand.

4.5.2 Validity

Validity is described to be the degree to which a measure accurately represents what it is intended to (Hair et al, 2014). In other words are we measuring what we intend to measure. This relates to the ability to find a connection between the construct one tyres to measure and data collected. (Johannessen, Christoffersen of Tufte, 2011). To increase the validity of the research starts with having thorough understanding of what is to be measured, and thereafter ensuring that the measurement is as accurate as possible (Hair et al, 2014). Internal and external validity are the two main types of validity. Internal validity is described as being able to produce accurate predictions of the causal relationships of the research model. While external validity is described as the degree or the ability to make generalization to a larger population. Thus for the quantitative part of the research external validity is most important. Reliability and validity is also connected to each other, which entails that high reliability indicates high validity (Hair et al, 2014).

In the qualitative part of the research both internal and external validity was tried ensured through utilizing accurate processes of gathering information an interpretation of that information. Selecting one type of industry, thereafter focusing o none specific area in Norway and also selecting one specific type of companies, increase the external validity of the qualitative part of the research. The companies where also divided into groups based in size based on numbers of employees and turnover figures, of the company (small, medium and large) and then one company form each group where selected for the interview. With this interviewee selection method, comparisons of similarities and differences between the companies can be

made. To ensure the validity of the theory used, all sources have been critically reviewed. Moreover well-known journals and authors with high citation rates are used.

Industry selection and more specifically respondent selection are important for external validity. It is important in qualitative research that the sample represents a homogenous group. This validates that the sample is a good representation of the population. For this study the respondent rate was at 41%, with 71 respondents (before screening and cleaning). Generalisations can be made to the larger populations, however this should be done with caution (Hair et al, 2014).

Content and construct validity is also important for the quality of the research (Hair et al, 2014). Content validity relates to have well the scales used in the research measure the research topic. Thus the items of the questionnaire should measure the constructs of the model (Hair et al, 2014). Content validity was assessed through pre-testing the questionnaire, however other measures of validity should be included. Construct validity relates to theoretical justifications of the items included in the survey (Wilson, 2006). All variables of the research model were measured with theoretically founded items. This increases the construct validity of the study. However one variable was measured by only one indicator (firm size), which can be criticised.

5.0 Analysis of the results

The following chapter present the results of both the qualitative and quantitative research conducted, as well as analysis of the results. First, the results for the qualitative will be presented, which is data from the preliminary interviews with Rolls-Royce Marine, ACEL AS and Furuno. The second section of this chapter discloses the statistical analysis of the quantitative data obtained for the industry survey.

5.1 Qualitative research

This section comprises the results of the qualitative research conducted. The information perceived to be most relevant for answering the research question and hypotheses of the study is subtracted from the data gathered from the interviews. Differences in firm size of the respondents are highly important for the research, as size is a moderating variable of the research model. A short introduction of the firms will be given.

5.1.1 Rolls-Royce Marine AS

Rolls-Royce Marine AS is a provider of world leading products and services in the marine sector. The company service the marine market with vessel designs and integrated systems to supply and support power as well as propulsion equipment. They are at the forefront of innovation and expertise in the marine sector. The company is world leading in integration of complex technologically complex systems for offshore industry, oil and gas, merchant and naval surface and submarine vessels[7]. Rolls-Royce provide their products and services through a large and, further expanding, global network of service facilities Rolls-Royce Marine AS has according to Proff.no, 1964 employees and turnover of 7, 7 Billion NOK. However, the result was close to minus 960 million NOK in 2015, which is more than 600 million NOK than in 2014 when the result where at minus 314 million NOK[8]. The company has experience devastating consequences of the decline in oil prices, which has resulted in massive cuts in costs and employees. The respondent from Rolls-Royce Marine AS was Jan Are Remme, the regional HR-manager.

[7] (https://www.rolls-royce.com/products-and-services/marine/product-finder.aspx#section-marine-[7]overview).

[8] https://www.proff.no/selskap/rolls-royce-marine-[8]as/%C3%A5lesund/skipsbyggerier-og-verft/Z0INI9IX/.

5.1.2 ACEL AS

ACEL AS is an electro provider for private, marine, construction and industrial actors. The company provide marine installations, engineering and marine service. ACEL has accumulated a strong technical competence in electrical installations on ships. The company's installation on newly build ships is largely conducted in local shipyards. ACEL is today a competent actor, which provides system solution for electro and automation. Quality, knowledge, competent employees and reliable delivery have made the company to a preferred provider of elector solutions.[9] ACEL had a turnover of MNOK 114 in 2015, and employee 94 people[10]. The respondent from ACEL was managing director, Klaus Kjerstad.

5.1.3 Furuno Norge AS

Furuno Norge AS was established in 1974 and is a subsidiary of a lager Japanese company, which employ 2800 people. The company is a sale and service company, which provides navigation, communication and seeking equipment to Norwegian, Russian, and Brazilian shipyard and ship-owners. Furuno Norge head office is located in Ålesund, with departments in Bergen and Oslo. The company has 36 employees, and 46 close dealers spread across the Norwegian coast [11]. Furuno Norge has according to proff.no a turnover of 215 million NOK, and a result of 14 million NOK. The company has had an upturn in turnover and result from the year before, and has surpassed the turnover from 2013[12]. The respondent form Furuno Norge was managing director Trond Strømmen.

[9] http://www.acel.no/
[10] https://www.proff.no/selskap/acel-as/fiskarstrand/skipsbyggerier-og-verft/IGCD9PF01HL/
[11] http://www.furuno.no/nb-NO/Om-Furuno.aspx
[12] https://www.proff.no/selskap/furuno-norge-as/%C3%A5lesund/skipsteknikk/PN481504511943/

5.1.4 Results form the interviews

Question 1: Do the company offer Training programs and courses to the employees?

Klaus Kjerstad at ACEL explain that the company provide some training courses to all employees, as well as curse for developing special skills. They also engage in external coursing, if there should be areas were the company does not possess sufficient expertise.

Furuno emphasises that they have internal training programs from all employees. In additions, all sales employees are sent on sales courses. All employees are put through the same training to make sure that the whole organisation use the same terminology and have the same understanding of how the company works. People in managing positions are sent to leadership courses. Moreover, the main company in Japan provide technical courses annually. The employees that participate in the technical courses run the same course for their colleges when they return home.

Rolls-Royce has a well established training program. The company provides many training programs to all employees in a range of different areas, mainly within technological areas. Rolls-Royce also provides courses, which is statutory by law, as in areas related to health and safety. Further, the company offers self-evolving or individual development for employees, especially to people in managing positions. Jan Are Remme argues that this is done because managers are suppose to functions for their employees. Rolls-Royce have an external partner, whom provide courses and training.

Question 2: How are employees encouraged to experiment and explore, so that new solutions and innovations may be created?

ACEL explain that creativity is always valued and the employees are encouraged to create new products themselves. However, most creative work is related to the contracts developed with customers. The company operates with a process of engineering to order (ETO)

Furuno Norge is a sales and service company for its geographical area, so by definition the company is a knowledge based company. Knowledge processes is a natural part of everyday work. The employees have great freedom to plan and control

their own workday. Employees of Furuno also work closely with their customers, and frequent customer visits are encouraged. When visiting customer the employees may try out the different equipment provided by Furuno. This experience helps the company understand the shortcomings of the products they supply. Furuno´s organisational structure is flat, and there should be little difference between management and other employees. *"We believe that this helps the employees to be creative and to be independent, which essentially benefit everyone"- Stats Strømmen*

Rolls-Royce states that experimentation and innovation is a vital part of the company's culture and values, thereafter sharing knowledge is just as important. Lean and HPC (High Performance Culture) are two important areas, which explain the main focuses of the Rolls-Royce culture. The two development areas both focus on innovation and experimentation, and target all employees. Moreover, the two programs are sought to increase curiosity and challenge boundaries, as well as inspire individual development and development in the company. Jan Are explains that in the maritime industry many companies have long histories and traditions, resulting in strong company structures that can be hard to challenge.

Question 3: How does the company encourage employees to collaborate with others and share knowledge?

ACEL state that the company develop a project team for every contract they receive from customers. Collaboration between employees is often related to the different projects. Teams are developed on the basis of the specification of the project. Employees form different departments are put together in teams and work in collaboration to successfully develop a good and innovative solution for the customer.

Furuno explain that collaboration and sharing knowledge is important. For the company, the most principal element of collaboration is having an open and informal environment. They believe that this type of culture is best for achieving knowledge sharing.

Rolls-Royce underscores that the strategic goals the company now develop have as their main focus to provide guidelines for how the company should grow into a new industrial area. Knowledge sharing is important for the organization, which often takes place in the classroom. The goal for the organization is to get knowledge

sharing as a natural part of the workday, thus this is reflected in company's incentive systems. Through HPC, in which all employees participate, developing a culture of experimentation and sharing is a vital part.

Question 4: Does the organization have many strategic alliances?

"We have a very steady group of customers, especially in the maritime sector" states Klaus Kjerstad at ACEL. The company has two relatively large customers from the maritime sector, which together counts for approximately 70-80 % of the company's turnover. We have a very dynamic and close relationship with these companies. The two companies do not have in-house employees working with electrical related tasks, which makes us their total elector partner. We maintain all their electrical related tasks as a part of this collaboration. Hence, these customers may be view as partners however not directly strategic alliances.

Furuno has close collaboration with both Norwegian and Canadian companies, in relation to product development. Furuno view these companies as strategic alliances and partners. Furuno also have close relationships with their 43 retailers along the Norwegian coast, in addition to some retailers in Russia. Some of these 43 companies can be characterised as strategic alliances. Through this collaboration the firms share knowledge and experiences.

Rolls-Royce have alliances on many different parts of the organization. They have external partners which conduct administrative tasks. The company states that it is important to underscore that they collaborate closely with their partners. An external partner also conducts recruitment, where one employee form this company is located at the Rolls-Royce head office. In additions, joint-ventures have been created, an acquisitions are often used.

Question 5: How is the organization structured to generate and create new knowledge?

Contracting is important for ACEL, thus following up customers are important. As the company work through contracting, a lot of the development work comes through the specifications in the contracts they receive. Specifications outlined in the contracts are interpreted and thereafter new and good solutions are ratified. The company does

not process a large development department; rather most development work is related to the different projects.

Furuno explain that the flat structure of the company helps to generate new knowledge. The structure and its small size help communication, thus providing a good platform for sharing knowledge. Furuno does not pay a lot of attention to sharing of knowledge. Rather knowledge sharing happens automatically through communication and daily interaction. As the company underlines, there are both benefits and problems related to this structure, especially related to knowledge storing and loss of employees.

Rolls-Royce is a British company which is has a long tradition. The Norwegian part of the company is a combination of different companies, which is founded on rich industrial traditions. The organizational structure of the company reflects its history. To create an organization, which facilitates knowledge sharing and innovation is important for the company. Having a flat structure organizational is one of the goals for the company.

Question 6: Does the organization have an internal it-systems for categorising and store knowledge regarding (Products, processes, markets, competitor ect).

Klaus Kjerstad for ACEL state that the company possess a document handling system. In this system project related documents are stored and organized. ACEL does also make use of an economics system, an ERP system, for handling economic related tasks.

Furuno possess IT-systems for storing and categorising knowledge related to products and services provided by the company. A CRM system is used to store knowledge about market developments and competitors. Furthermore, the CRM system is used to collect information as well as share knowledge internally.

Rolls-Royce state that they possess many internal systems for storing knowledge. *"My-learning"* is a personalized system, which store information collected form follow-up conversations with employees. Thereafter the program provides an individual development plan. The system also contains coursing information. E-learning systems are frequently used in the organization. The company provides many systems and platform for process development and product information. Jan-Are

underscores the importance of internal systems knowledge collection and storing. Collective policies and guidelines are important for an organization. Documenting product development is essential, especially when the future is unsteady.

Question 7: Does the organizations have an internal database for knowledge that all employees can access and use?

ACEL provide an internal database with information and knowledge for all employees. However some of the information related to specific projects are classified. Therefore only selected personnel will have access to the information in these documents. Such documents may for example be sales documents containing sensitive information. Furuno also provides an internal database where knowledge is collected and shared. Some of the product related information is also shared with dealers and customers. Such information may be related to performance, user benefits and customer experience. The internal databases are also open for all employees in Rolls-Royce. *"My-learning"* provides a customized platform for each employee.

All of the interview companies provide internal database which is open for all employees. The database are used to share and store knowledge, and thereby provide a database of collective knowledge.

Question 8: Does the organization have technology, which facilitates cooperation between employees and joint learning?

ACEL have an internal platform were employees of different departments can work together on projects or general tasks. The company utilize outlook and Skype as communication methods. Furuno has case proceeding systems, which provides knowledge sharing as an extended utilization of the system. The company does also possess a service handling systems and as well as previously stated a CRM system. These two systems do also facilitate knowledge sharing and collection. Furthermore the company underscores, the importance of informal communication and trust among employees. The company see this as principal for collaboration and innovation. Chat-systems that facilitate communication are frequently used in Rolls-Royce. Videoconference systems are important for face-to-face collaboration. Furthermore, internal databases provide platforms for collective learning and facilitates.

Question 9: In what way does the organization use technology in the search for new knowledge?

All of the companies explain that they use technology in the search for new knowledge. They all provide internal databases which can be used to collect past information that might be relevant in new projects. Internet platforms are used for general information in ACEL. Knowledge and previous experiences are provided in these systems. Due to the need of external information, participation at conferences is important for ACEL. Consultants are also used for important issues. Furuno states that technology is not often used in the search of new knowledge, however customer meeting and asking the right questions are the most important process for collecting valuable information. If conversations with customers or other important parties generate important finding, the company create a development project. Rolls-Royce state that they posses technology to facilitate knowledge acquisition. Both internal and external systems are used when search for new knowledge. Internet is used to gather new information and follow-up on market developments.

Question 10: Does the company use "Benchmarking" in the process of improving organizational effectiveness and performance?

ACEL does not specifically utilize benchmarking, however they benchmark against their own estimates and key-figures. Furuno collect information about competitors; how much they earn and how much they sell. The company states that they to some degree benchmark to increase effectiveness. Market share is of specific interest to the company, as well as specific sales information. Market prognoses and customer parameter of satisfaction are used to increase effectiveness. Rolls-Royce expresses that they used benchmarking to improve effectiveness and performance. The company also regularly conducts "employees opinion surveys", which is based on benchmarking. These surveys build on industry norms and practices of companies which they like to compare themselves with.

Company	YES	NO
ACEL		X
Furuno	X (to some degree)	
Rolls-Royce	X	

Table 8: *Benchmarking*

Question 11: What processes does the company have to collect knowledge about (customers, products, suppliers and competitors)?

ACEL collect information and feedback from customers, which are put in to internal systems. By doing so the information can be utilized later to improve products. The company follow market developments and competitor to stay ahead and not fall behind. However, the company does not process large process for regularly colleting knowledge.

Customer information is handle by the sales team at Furuno. This information is utilized to further develop and improve solutions and products of the company. They follow-up competitors collecting information of market shares and sales. Furuno also states that the company does not process large processes for collecting information.

Customer satisfaction is very important for Rolls-Royce, thus continuously increasing satisfaction is of focus for the company. The company utilize processes for logging feedback form customers and suppliers. Furthermore, suppliers are regularly analysed. All Rolls-Royce suppliers are credit and liability checked before purchases are undertaken. The company does also have processes for following-up the market. Rolls-Royce also evaluates the plans and strategies of their competitors.

Question 12: How does the company distribute new knowledge to employees?

In ACEL the main way of distributing knowledge to the employees is through training programs, which can take place both internally and externally. They also make use of fairs and seminars to provide new information to employees. Suppliers also hold courses on the equipment they provide. Furuno uses the CRM system and a service handling system to collect and distribute knowledge. In addition, training is an important part of knowledge sharing at Furuno. Jan Are Remme at Rolls-Royce explain that they use e-mail to distribute internal information every week. Classroom sessions are used for distributing knowledge of products and processes. This also relates to the large amount of courses the company provides. The courses are a large source of information and knowledge.

Question 13: What processes does the company have for using knowledge acquired form experience?

ACEL use prior knowledge obtained form experience and customer contact to improve current projects. The first step in each project is planning, which can consist of pricing and development plans. Thereafter engineering and product development Is conducted, which is followed by production. Furuno states that when a problem is detected with a product, an improvement project is developed. These projects are executed in collaboration with Norwegian and Canadian companies, and are usually very ad-hoc. The goal of these projects is to create new and improved version of the product. If however larger parts of the product need improving, the project is put forth to the company in Japan. Rolls-Royce has a system that categorizes and evaluates suggested improvements of important process of the firm. Feedback form customers are also evaluated through this system. The goal is to use the results form the evaluations to create improved solution and generate new knowledge.

Question 14: How does the company use knowledge to handle change in the market conditions?

ACEL states that possessing the right competence is important for the company's survival. The company need the right knowledge and information on both products and the market to be able to handle changes in the market.

To meet the changes which the maritime industry experience today, Furuno focus on new segments such as farming industry and shipping. How a company handles an ongoing crisis rely heavily on the knowledge the company posses, Trond Strømmen explains. Knowledge of market dynamics and possibilities, as well as purchasing processes and drivers of change is very important factors for handling market change. In addition in now re-focusing on previously important segments. Existing knowledge of these segments have therefore been important. Previously obtained knowledge of the customer base, product performance and product applications is now being used to achieve market sharing in these segments.

Jan-Are Remme at Rolls-Royce explain knowledge is very important for handling changes. Finding new market opportunities and segment will often be pressing when another segment declines. Having the right information of opportunities in other

segments is thus very important. The challenges are often related to the specific demand of the markets. Industry 4.0 is the next big change, which will damage new solutions and new areas of expertises. Rolls-Royce has doubled the investments in development and use considerable larger amount of resources on product development. Jan Are states that knowledge will be increasingly important for the up coming industrial changes.

Question 15: Which processes does the company have to used existing knowledge to create new products and solutions?

ACEL states that the company receive a lot of technical documents, which we use in the process of developing new solutions and products. Moreover ACEL participate at seminars and other additives where knowledge is exchanged. Surveillance of the market is also important. Furuno underscores that they are a knowledge base company and serves their geographical area, thus a lot of product creation is conducted in the companies main offices in Japan. However, when they participate in a development project they do so in collaboration with their Norwegian and Canadian partners. They have a more ad-hoc approach to development project, which indicated that such projects are initiated when problems are detected and market possibilities emerge. The company does also work with procedures and process plans/development plans, however much of this work is conducted when market opportunities emerge. Rolls-Royce underscores that information about the market and the demands of the market is necessary for crating new solutions. When large companies as Rolls-Royce find themselves in the situation of lacking the necessary knowledge, the solution is often to acquire this knowledge through buying to it form external actors.

Question 16: Does the company provide incentives for knowledge sharing?

ACEL and Furuno answered that they not directly award employees for knowledge sharing, however Furuno states that they indirectly reward employees for sharing knowledge effectively. Furuno further explain that they reward based on sales numbers and results of the company. The size of the bonus an employee receives is based on the base salary of that person, minus overtime. The company states that they perceive it as important that every employee receives rewards for improved sales numbers. Instead of using aggressive sales personnel to drive sales number up and commission, rewarding all employees is valued as a better motivator. Furthermore

Furuno explains that if every employee takes part in the firm's success and decrease, then motivating for joint cooperation to execute the important tasks of the company is easier, which include knowledge sharing. However ACEL explained that they reward based on the company's financial results alone.

Rolls-Royce answered that they reward employees based on knowledge sharing. The company has defined three important behaviours, which they want to possess. Delivering high quality is one of the emphasized behaviours, and imbedded in this behaviour is a specific focus on knowledge sharing and communication. Employees are directly measured on this behaviour and high scores on sharing will result in higher salaries and bonuses.

Company	YES	NO
ACEL		**X**
Furuno	**X (Somewhat)**	
Rolls-Royce	**X**	

Table 9: *Incentives*

Question 17: How does the company facilitate knowledge sharing and interaction across departments and between employees?

Joint communication systems, and internal IT-systems are used for sharing knowledge in ACEL. The company cooperates with other firms located in the north of Norway and in the Baltik region on project, thus communication between them and their partners are important. The different project teams does also communicate through regular project meetings, where employees form different departments work together.

Interaction between employees in Furuno is related to departments and functions. The departments have good interaction internally and employees with the same function work closely together despite the distance between different locations. Employees with the same function in the company work together on the same change processes and other company tasks. The company also facilitate face-to-face meeting, despite extra travelling costs. Meeting people face to face is view as important, thus videoconference is regularly used for communication and interaction between employees. Furuno also possess an internal phone company, which helps in the facilitation of interaction. Moreover Trond Strømmen states that Furuno will reinstall

a routine they regularly used before, which however have been forsaken as of late. Whenever the company released a new product, they would facilitate a meeting and assess the products and the changes made to it.

At Rolls-Royce regular department meetings provides a platform for communication. The different location does also facilitate regular meetings. Moreover regular Internet based meeting are facilitated for all managers. Managers do also participate in forums four times a year. At these forums important information about processes and change to the company is discussed. All departments do also provide their own forums for facilitating interaction and sharing of knowledge.

Question 18: Has the company launched considerable innovations in the last 3 years?

ACEL explain that most development and innovative work is executed through the different projects, which they execute on request and specifications provided by their customers. The company are currently working on a project, which has the expected result of a new product solution. The development work is conducted in-house and the whole process is conducted through internal processes.

The first sounder was launched in 1938, which at that point was a revelation and a grate innovation. The sounders that Furuno provides today, is based on the same technology. Nonetheless, due to extensive market changed and increasing quality demands, the product has received many improvements. Furuno has made considerable progress in markets related to fish finding equipment, navigation and communication, also the three last years.

Rolls-Royce underscore that the company is dependent on delivering new products and solutions to the market. Furthermore, the company continuously innovate on existing products.

Question 19: Is the company good at finding new marked opportunities?

Klaus Kjerstad at ACEL underscores that finding new marked opportunities is important for the survival of the company, and that being able to change is essential. The company has progressed even in declining markets, which indicate that they have a progressive approach to finding new markets. The company states that it has been a natural progression away from offshore and into new segments.

Furuno states that on a scale from 1-7, the company is relatively good and would place themselves at 5.5 or 6. However, entering new markets takes time and dedication. Fish farming is one market which Furuno is especially interested in today, which however can be quite a difficult to enter, if one not directly address salmon lice, argues Trond Strømmen. Furuno work a lot with plant security, thus the company experience difficulties with achieving attention. This has been harder that initially perceived. However, Furuno view themselves to be relatively good at finding new markets. Moreover, the company is quite good at maintaining market shares. Furuno is a relatively small company, however they are quite large at what they do, which give the opportunity to stick to their strategy while trying to succeed in new markets.

Rolls-Royce answered that they have an average score on find new market opportunities. Remme underscores that as a large company, changing processes and exiting products to match new markets, takes time. However the company is starting to obtain market position in other markets.

Question 20: How good is the company to predict change and crises?

ACEL explain that they participate at conferences where the future and trends of the marked is discussed. Furuno states that they are always analysing market developments to be in the for front of changes. They perceive themselves as relatively good at anticipating market change. The company has achieved good numbers throughout the current crisis, were the strategy of survival has been to invest their way out. Furuno has hired more employees the last couple of years, rather then reducing their staff. Employees have been moved to other function areas or departments, rather then being dismissed. Both ACEL and Furuno also underscore that their organizations

are small and flexible, which both perceive to have been beneficial in facing the current crisis.

"The difference between us (and other members of the cluster) is that we are flexible, thus we turn the firm fast around. Decision lines form the bottom to the top are short" – Klaus Kjerstad, ACEL

Rolls-Royce takes the example of the current crisis and explain that the company did anticipate some of the changes to the offshore market, which was evidential through the macro numbers. However the company, as everyone else, did not predict the major decrease in the oil price. Remme underscore that the people of the company, which deliver prognoses of the marked developments, delivers rather good predictions.

Question 21: Outsourcing

All respondents are unsure of the affects of outsourcing. They all explain that outsourcing can be good in some situations, both in the sense of saving costs and also utilization of knowledge. However flexibility may suffer under large-scale outsourcing, which may have affected members of the cluster.

ACEL explain that having tasks committed in-house is important for their organization, which give them the opportunity of being flexible. Klaus Kjerstad at ACEL also remarks that he has observed some members of the clusters taking back production tasks, which they have earlier outsourced. If the company work with long perspectives then outsourcing may pay off, however as soon as change is pressing, outsourcing becomes a problem. With production in China, just transportation may take two months.

Furuno states that production is often outsourced to external and international companies, something that might inflict both positive and negative effects. A company with large-scale production outsourcing might escape some of the costs related to declining capacity and receivables, due to having outsourced production. Furthermore, the company does not have to deal with closing factory and everything which entails in such processes. Nevertheless, negative effects of outsourcing might also occur, especially related to communication and knowledge transferring between

employees. The distances between workers might inflict shortcomings to products and loss of knowledge.

Rolls-Royce states that outsourcing is not new to the organization and has not contributed in a negative way to the performance of the firm. When the company decides to outsource they evaluate if this will affect the production the company's core products. However outsourcing should not be conducted in a large scale, especially not when the market is unsteady. Development departments and production should communicate well. Moreover loss of knowledge is always a risk and might be a consequence of outsourcing.

5.2 Quantitative results

In this part of the chapter the results from the quantitative data gathered through a questionnaire distributed to all the maritime equipment suppliers in M&R is analyzed. First, descriptive statistics of the firms participating in the survey will be analysed. Thereafter, factorial analysis of the parameters will be presented, followed by hypotheses testing and path model examination through the use of structural equation model (SEM). IBM statistical package for the social sciences (SPSS) and SmartPLS is jointly used to analyse the data and hypotheses testing.

5.2.1 Descriptive statistics

After conducting processes of screening and cleaning, the total sample size was 70[13], which gives a respondents rate of 41 %, thus the sample size is sufficient to be further used in multivariate analysis (Pallant, 2010). The program SmartPLS also provides the limitation of 100 respondents. During preliminary assessment of sample size, the conclusion of using SmartPLS despite restrictions on sample size in the program. The sample size is sufficient to conduct SEM analysis and quite high in comparison to the total amount of firms included in the sample. First the job titles of the respondents were assessed, with the following results as presented in figure 10

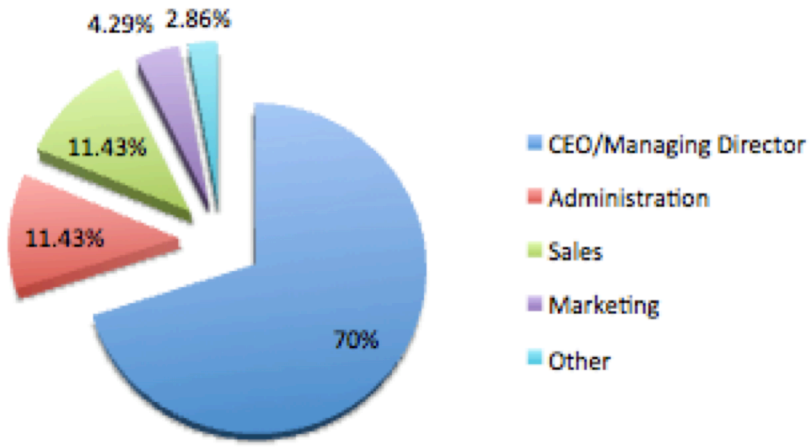

Figure 10: *Job title categories*

CEO's is the dominant group, with 70% of the respondents. In addition, 11,43 % of the respondents work in a sales department, 11,43 % work in administration and 4,29% in marketing. Almost 3 % of the respondents have other organizational

[13] $70/169 = 0.41X\ 100 = 41\%$

positions. CEO's were the main target group for the survey, which reflects the numbers presented above. With a majority of top-level management as respondents, higher reliability and qualified answers are provided.

Ålesund was the municipality with the highest rate of respondents. Figure11 discloses the municipalities with highest rate of participants. As showed in the figure Ålesund (32,86%), Molde (12,86%), Haram (8,57%), Ulstein (7,14%) and Herøy (7,14%) had the highest number of respondents.

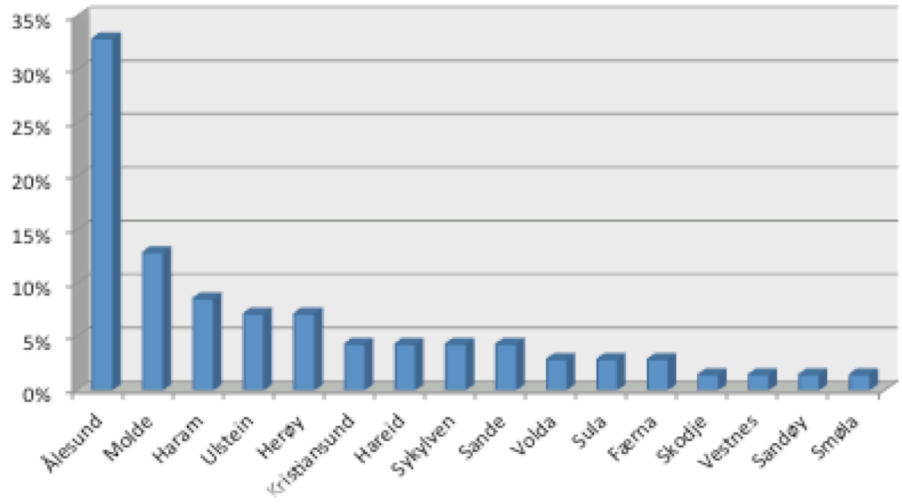

Figure 11: *Geographical distribution*

Turnover in 2015, and other important characteristics of the respondents are disclosed in table 10. These characteristics were measured through multiple continuous variables in the survey. Turnover, change in turnover, number of employees, change in market share and the two variables related to outsourcing are presented below.

Variable	N	Min	Max	Mean	Std.	Skew.	Kurt.
Turnover	70	2000000	7750000000	319898355,0	1271569630	5,655	31,371
Change in turnover	70	- 50	90	2,4057	22,19948	6,334	43,393
Number of employees	70	2	1650	70,4857	216,83887	5,655	31,371
Change in market share	70	-20,00	40,00	4,5286	13,16971	, 746	, 466
Outsourcing production	70	0	100	19,2429	24,11833	1,292	1,198
Outsourcing knowledge tasks	70	0	60	8,100	14,24745	1,829	2,655

Table 10: *Important characterisitics of the firms*

Average turnover of the participants of the survey was at NOK 319 million in 2015, however large variations exists with resulting in high standard deviation. Some firms have a very high turnover and others smaller, which indicated outliers to the sample. Thus skewness and kurtosis values are affected and suggest a rather peaked distribution, with clustering at low values. Because of the large variation in turnover numbers, the median provides a "better" measure. The median of the turnover was NOK 44 million. Change in turnover had a mean value of 2,21, which indicate a relative change in turnover for 2014 to 2015 at 2,21%.

Number of employee's range from 2 to 1650, with an average of 70 employees, which reflects that the cluster consists of many small and medium sized enterprises. Outsourcing activities was measured by percent of activities outsourced. Two types of activities were measured, production related activities and knowledge related activities. Average outsourcing of production activities were 19,24%, while outsourcing of knowledge activities were at 8,1% Indicating low/high levels of outsourcing.

The statistical analysis techniques in this thesis underline the assumption of a normally distributed dependent variable (Hair et al, 2014). Tests of normality were conducted on the dependent variable. Kolmogrov-Smirnov's test of normality was utilized, for testing the normality of the items comprising organizational

effectiveness. Results from the test is disclosed in appendix 8 A significant level of (>.05), indicate normality. The significance of all the items of the dependent variable reached a significance values below .05, which indicates violation of normality. Nonetheless, Pallent (2010) argues that obtaining a non-normal distribution is common in social sciences and organizational context. Therefore, even with a non-normal distribution of the dependent variable, the present statistical analyses are appropriate.

5.2.2 Factor analysis

In chapter 2 the different items comprising all the different constructs of the model, are presented. Since a theoretically driven approach is used for construct development, the appropriate analytical framework of measurement is confirmatory factor analysis (CFA). With CFA one can assess the efficacy of measurement among scale items and assess the consistency of a theoretical network (Gold et al, 2001). The expectation is that the theoretically developed scales will measure its associated factors and the systems of factors will represent the system of relationships.

5.2.2.1 Factor analysis 1: Knowledge culture

The following items was used to measure the knowledge culture:

C1: The Company provides an many training programs and courses to the employees

C2: Employees are encourage to experiment and explore

C3: The company's strategic goals and vision is well communicated to the employ yes

C4: Management recognize the significance of knowledge to the company's success

Table 11 show the Kaiser-Mayer Olkin Measure of sampling adequacy (KMO) and the Bartlett's test of sphericity, which in this case was significant. The KMO was .728 indicating correlation between the variables, which underscores the appropriateness of further using a factor analysis. Furthermore the analysis conclude with a one component solution were the Kaiser's criterion is meet at an eigenvalue of 1, explaining 63,2% of the total variance. According to Pallent (2010), the factor loading of all the variables should have a minimum value of .4, which is the case in this analysis. This indicates that a joint component solution of the variables success in measuring knowledge culture, thus the component may be retained for further analysis. All the results from the first factor analysis are presented in appendix 9A.

Items	Factor loadings
C1: The company provides an many training programs and courses to the employees	. 797
C2: Employees are encourage to experiment and explore	. 818
C3: The company's strategic goals and vision is well communicated to the employees	. 853
C4: Management recognize the significance of knowledge to the company's success	. 704
KMO: .728 Bartlett's test of Sphericity: P=, 000 Total variance explained: 63,2%	

Table 11: *Results form the factor analysis of Knowledge Culture*

5.2.2.2 Factor analysis 2: Knowledge Structure

To measure the variable Knowledge structure, the following items were used:

S1: The organization structure of the company facilitates for collection and development of new knowledge.

S2: The company's measure performance on effective knowledge acquisition

S3: The company has many strategically alliances

The construct knowledge structure was measured in the second analysis. As the first CFA both the KMO and the Bartlett's test indicate suitability of utilizing a factor analysis for assessing the scale. The KMO had a value of .698, while the Bartlett's test reached statistical significance at (P=.000). Furthermore the analysis conclude with a one component solution were the Kaiser's criterion is meet at an eigenvalue of 1, explaining 68 % of the total variance of construct knowledge structure. All factor loadings were above the suggested minimum of .4, which again indicate a collective component solution comprising all variables to further measure knowledge structure. All the results from the second factor analysis are presented in appendix 9B.

Items	Factor loadings
S1: The organization structure of the company facilitates for collection and development of new knowledge.	. 828
S2: The company's measure performance on effective knowledge acquisition.	. 829
S3: The company has many strategically alliances.	. 818
KMO: .698 Barlett´s test of Sphericity: P= .000 Total variance explained: 68,0%	

Table 12: *Results form the factor analysis of Knowledge Structure*

5.2.2.3 Factor analysis 3: Knowledge Technology

The following items comprise knowledge technology:

T1: The company possess technology which efficiently categorise and store knowledge

T2: The company have technology which facilitates cooperation between employees and facilitates learning

T3: The company has technology which streamlines the search for new knowledge

The KMO for the third CFA had a value of .765 and Bartlett's test was significant at P=.000, thus the data is suitable for conducing a factor and to further measure Knowledge Technology. One component had an eigenvalue of 1, thus a one-component solution is retained for further statistical analysis. The component explain 70,3 % % of the total variance of knowledge technology. From the component matrix disclosed in appendix 9C one can see that all factors has high loadings, thus collectively the items present a suitable measure of the concept.

Items	Factor loadings
T1: The company possess technology which efficiently categorise and store knowledge	. 882
T2: The company have technology which facilitates cooperation between employees and facilitates learning	. 842
T3: The company possess technology which facilitate creation of new knowledge	. 915
T4: The company has technology which streamlines the search for new knowledge	. 698
KMO: .765 Barlett´s test of Sphericity: P= .000 Total variance explained: 70,3%	

Table 13: *Results from the factor analysis of Knowledge Technology*

5.2.2.4 Factor analysis 4: Knowledge acquisition

The following items comprise knowledge acquisition:

AC1: The company has good processes for "benchmarking" of performance factors

AC2: The company has good processes for acquiring of knowledge on (customers, products, market, suppliers and competitors)

AC3: The company use feedback to improve future projects.

The analysis of the fourth CFA present a KMO of, 693 and the Bartlett's test was significant at P=.000, thus the analysis is suitable. Table 14 comprise the results form the analysis, and one can see that all items had sufficient loading. Moreover a one component solution is retained, where the component explain 69,1% of total variance of the concept knowledge acquisition. Results of the CFA are presented in appendix 9D.

Items	Factor loadings
AC1: **The company has good processes for "benchmarking" of performance factors**	.848
AC2: **The company has good processes for acquiring of knowledge on (customers, products, market, suppliers and competitors)**	.799
AC3: **The company use feedback to improve future projects.**	.845
KMO: .693 Barlett´s test of Sphericity: P= .000 Total variance explained: 69,1%	

Table 14: *Results form the factor analysis of Knowledge Acquisition*

5.2.2.5 Factor analysis 5: Knowledge application

The following items were used to measure the knowledge application.

AP1: The company has good processes to utilize knowledge obtained from experiment.

AP2: The company has good processes to utilize knowledge to handle change in the market

AP3: The company has good processes to utilize knowledge to create new products and solutions

AP4: The company use knowledge to improve efficiency

AP5: The company make knowledge accessible for employees

The results from CFA disclosed in appendix 9E, show a KMO of .858 and a significance level of P=.000, thus the analysis is suitable. All the items comprising knowledge utilization had a factor loading over the suggested minimum of .4. Furthermore the analysis conclude with a one component solution were the Kaiser's criterion is meet at an eigenvalue of 1, explaining 71,79% of the total variance. A one-component solution is retained for further analysis.

Items	Factor loadings
AP1: The company has good processes to utilize knowledge obtained from experiment.	.838
AP2: The company has good processes to utilize knowledge to handle change in the market	.844
AP3: The company has good processes to utilize knowledge to create new products and solutions	.857
AP4: The company use knowledge to improve efficiency	.829
AP5: The company make knowledge accessible for employees	.868
KMO: .858 Barlett´s test of Sphericity: P= Total variance explained: 71,79 %	

Table 15: *Results from the factor analysis of Knowledge Application*

5.2.2.6 Factor analysis 6: Knowledge sharing

The following items was used to measure the knowledge sharing:

SH1: The company facilitates for knowledge sharing and interaction across of the departments and between employees

SH2: Employees trust each other and communicate well

SH3: The company offers incentives for sharing knowledge

The result from the analysis of knowledge sharing show a KMO of .642 and a significant value of P=.000, thus a suitable factor analysis is presented and strong correlation between the items is detected. One component had an eigenvalue of above one, thus this result is retained for further analysis. Furthermore the solution explain 64,42% % of the total variance. Form table 16 it is evidential that all the items had a factor loading above the suggested minimum of .4. All the results from the first factor analysis are presented in appendix 9F.

Items	Factor loadings
***SH1*: The company facilitates for knowledge sharing and interaction across of the departments and between employees**	. 728
***SH2:* Employees trust each other and communicate well**	. 698
***SH3*: The company offers incentives for sharing knowledge**	. 506
KMO: .642 Barlett´s test of Sphericity: P= .000 Total variance explained: **64,42%**	

Table 16*: Results from the factor analysis of Knowledge Sharing*

5.2.2.7 Factor analysis 7: Organizational effectiveness

The following items were used to measure the dependent variable organizational effectiveness:

OE1: The companies' ability to effectively find new market opportunities

OE2: The companies' ability to effectively anticipate market change and crisis

OE3: The companies' ability to effectively convert innovation to commercial products

OE4: The companies' ability to effectively adapt strategic goals to match market developments

OE5: Innovation in percent of total production and service

OE6: Change in marker share from 2014 to 2015 in percent

OE7: Change in turnover in percent from 2014 to 2015

The factor analysis for the dependent variable organizational effectiveness resulted in a KMO, and the analysis was significant at P=.000, thus the analysis is appropriate and correlation between the items is found. Moreover two components had an eigenvalue above 1. A one component solution explain 60,8% of variance, while a two component solution explain 87,7% of variance. Due to theoretical consideration a one component solution. Some of variables are under the suggested minimum of .4. These variables are directly linked to effectiveness and not performance indications; therefore due to theoretical consideration all are retained for further analysis. The component does also have a good reliability with all variables retained. Table 17 summarize important results form the analysis, while appendix 9G disclose the SPSS output from the analysis.

Items	Factor loadings
OE1: The companies ability to find new market opportunities	.262
OE2: The companies ability to anticipate market change and crisis	.298
OE3: The companies ability to convert innovations commercial products	.358
OE4: The companies ability to adapt strategic goals match market developments	.231
OE5: Innovation percent of total products and services	.982
OE6: Change in market share form 2015 to 2016	.475
OE7: Change in turnover form 2015 to 2016	.977
KMO: Barlett´s test of Sphericity: P= .000 Total variance explained:	

Table 17: *Results from the factor analysis of Knowledge Organizational Effectiveness*

5.2.2.8 Factor analysis 8: Outsourcing

The following variables were used to measure the moderating variables, outsourcing:

O1: In percent, how much of the company's production is outsourced to international companies?

O2: In percent, how much of the company's knowledge tasks (Market research, R&D, coding ect) are executed international companies?

The factor analysis for the moderating variable Outsourcing had KMO of .50, and the analysis was significant at P=.000, which indicate that the analysis is appropriate and correlation between the variables is found. Furthermore, the analysis indicate a one component solution, were an eigenvalue of above 1 is achieved and 85,36 % of total variance are explained. The most relevant results form the analysis is disclosed in appendix 9H.

Items	Factor loadings
O1: In percent, how much of the company's production is outsourced to international companies?	.969
O2: In percent, how much of the company's knowledge tasks (Market research, R&D, coding ect) are executed international companies?	.524
KMO: Barlett´s test of Sphericity: P= .000 Total variance explained:	

Table 18: *Results from the factor analysis of Knowledge Outsourcing*

5.2.4 Reliability

After establishing that each item measure what it it's suppose to measure, internal consistency of the constructs were assessed. When utilizing measures of construct reliability one can assess how well the items measure the construct to which they belong. To assess the construct reliability of the items, the Cronbach´s alpha coefficient was used. From this analysis one can also measure if the reliability of the scale increase is items are deleted. Table 19 comprise the results from the analysis and shows the number of items retained for each scale. The SPSS output of all the reliability tests is disclosed in appendix 10 A-H.

Constructs	No. Of items	Cronbach´s Alpha
Culture	4	,804
Structure	3	,765
Technology	4	,856
Acquisition	3	,776
Application	5	,902
Sharing	3	,721
Organizational effectiveness	7	,851
Outsourcing	2	,742

Table 19: *Reliability tests*

The Cronbach´s alpha coefficient was used to test the internal consistency or the reliability of the scales. For knowledge culture the Cronbach´s alpha measured at .804, thus indicating a good internal consistency of the scale. Form the column "Alpha if item Deleted" one can see removal of any items will decrease the Cronbach´s Alpha value.

Structure had a Cronbach´s alpha of .765, which indicate good internal consistency. None of the variables can be deleted to increase the reliability of the scale, thus all are retained for further analysis. The Cronbach´s Alpha of knowledge technology was .856, all variables comprising the construct therefore show good internal consistency. By looking at the table named "Item-Total Statistic" evidentially the last variable "Tech capability to monitor market" show the lowest Cronbach´s Alpha value (.531), however the value is sufficient, and removal of the variable will not increase the value of the scale.

For knowledge acquisition the Cronbach´s Alpha was .776, thus the scale show good reliability. Removing variables will not increase the value, thus all are retained for further analysis. Knowledge application did also show a very high Cronbach´s Alpha value of .902, and again no variable can be removed to increase the value. For knowledge sharing the value was .721, thus there is internal consistency between the variables of the scale. The variable "Company provides incentives for sharing knowledge" show a somewhat individual value, and by removing this variable the Cronbach´s Alpha value will increase form .721 to .742. Removing the variable will therefore increase the values, but not to a large degree. Considering the low increase and the theoretical contribution of the variable, the scale is remained as is.

For organizational effectiveness the value was .851, thus the internal consistency is very good. In appendix 10G, the table "Item-Total Statistic" the variable "innovation percent of total production and service" show low individual Cronbach´s Alpha value. By further examination of the column labelled "Cronbach´s Alpha if item deleted", its evidential that by removing this variable the overall Alpha of the scale will not increase. The last scale analysed is outsourcing, which contains only two variables, the scale had an Alpha value of .742, which indicate good internal consistency.

5.2.5 Assessment of the structural models

To answer the research questions and assess the main relationships of the model, 2 or 4 path models was produced. Smart PLS confirmatory path analysis was used to assess the structural models. The first two models analyse the relationship between the sub-constructs of KM infrastructure and process, which relates to H3-H8. The first model relates to H3, H4 and H5, while the second relates to H6, H7 and H8. Thereafter the main relationships of the model will be investigated, which relates to H1 and H2. Hypotheses 1 and 2 establish the relationship between the capabilities and organizational effectiveness. Lastly the hypothesized relationships between the moderating variables and the main constructs of the model, will be analysed, respectively H9 to H12 will be tested.

5.2.5.1 The KMC´c and Organizational effectiveness

The first model analyse the system of relationships among the pre-established constructs of KM infrastructure capability, respectively knowledge culture, knowledge structure and knowledge technology. Results form estimation of the first model is presented in figure 12 below. Two of the sub-constructs of KM infrastructure were found to significantly measure the construct as their loadings were above .50. Knowledge Technology had a value of 0.402, thus under the .50 suggested minimum. Therefore H5 is discarded, while H3 and H4 is supported.

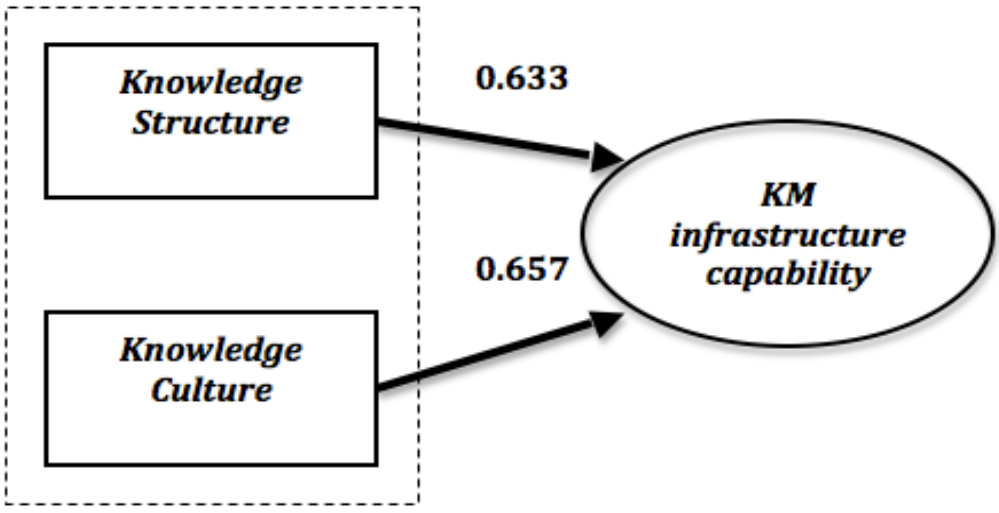

Figure 12*: Path model, KM Infrastructure capabilities*

The second model analysed the system of relationships among the pre-established constructs of KM Process capability, respectively knowledge acquisition, knowledge

application and knowledge sharing. Two of the constructs were non-significant as their loadings were inferior to .50. Conclusion to the result is that the construct Knowledge Application, successfully measure the KM process capability. Thus H8 is supported, while H7 and H9 is discarded.

Figure 13: *Path model, KM process capability*

A second round of analysis was run after removing the constructs that did not reach significance. Figure 12 and 13 present the second-order constructs with their respective sub-constructs that presented a loading over .50. Table 20 show the retained and removed sub-constructs.

Constructs	Round 1	Round 2
Knowledge culture	0.564	0.633
Knowledge structure	0.683	0.657
Knowledge technology	0.207	Removed
Knowledge acquisition	0.280	Removed
Knowledge application	0.529	0,973
Knowledge sharing	0.265	Removed

Table 20: *Results from the analysis of the capabilities*

The third model analysed is KM infrastructure capability and KM process capabilities effect on organizational effectiveness. The results form the analysis is presented in path model 3 (Figure 14). The model was estimated with the significant sub-constructs from round two in the past analysis, as predictors of the constructs: KM infrastructure and process capability. A partial least square (PLS) analysis was conducted to assess the strength of the relationships of the model. The standardised

regression weight of KM infrastructure capability measure 0.112 of organizational effectiveness, however the result are non-significant. Significance was assessed through bootstrapping procedure, which produces t-statistics for measuring significance. KM process capability shows high affects on organizational effectiveness and the results were significant. Form table 20 a good model fit is evidential, and the model was significant at P=0.000. The adjusted R-square of the model indicates that the capabilities explain 0.704 or 70,4% of the dependent variable. Concluding results indicate that by increasing knowledge management process capabilities by one unit, .748 increase in organizational effectiveness will occur.

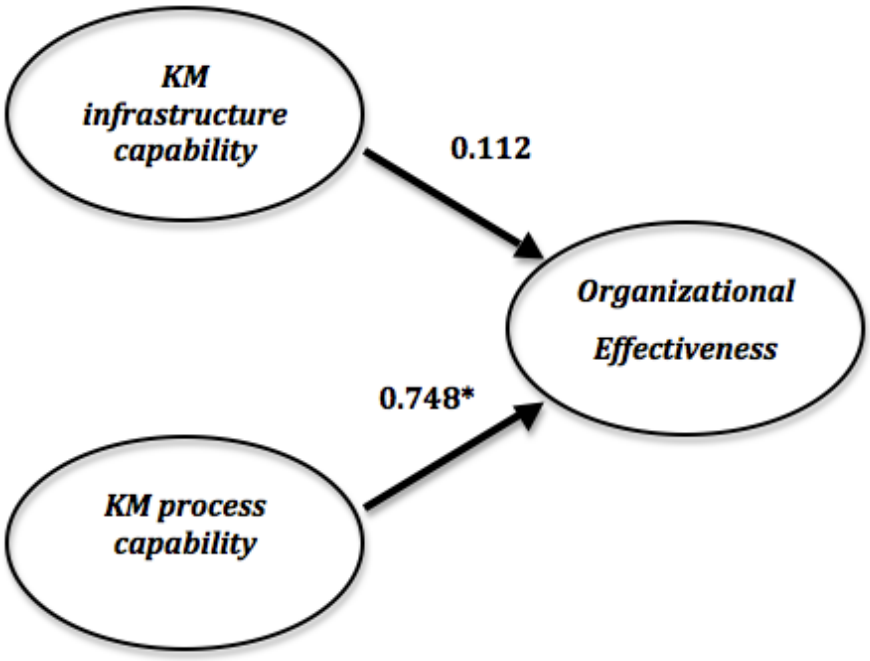

Figure 14: Path model, capabilities effect on organizational effectievness (One-tailed t-test =p<0.000)*

	Saturated Model	Estimated Model
SRMR	0.089	0.089
d_ULS	3.481	3.481
d_G	2.282	2.282
Chi-Square	633.883	633.883
NFI	0.643	0.643

Table 21: *Important findings form the analysis on the main relationships*

	R Square	R Square Adjustec
Effectivness_	0.712	0.704

Table 22*: R-Square of the model*

To validate the results from the structural model a multiple regression was conducted with summated scales in SPSS. The table below provide the most important results from the analysis. The regression model measures the direct link between the KMC´s and the dependent variable organizational effectiveness.

Model		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	-9,888	2,582		-3,830	,000		
	KnowledgeStructure	1,068	,762	,214	1,402	,166	,303	3,302
	KnowledgeTechnology	1,042	,770	,212	1,354	,181	,289	3,461
	KnowledgeCulture	-1,390	,651	-,268	-2,137	,037	,448	2,233
	KnowledgeAcquisition	-1,311	,749	-,279	-1,752	,085	,277	3,608
	KnowledgeApplication	3,739	,910	,690	4,108	,000	,250	4,001
	KnowledgeSharing	,515	,831	,094	,620	,537	,307	3,255

a. Dependent Variable: OrganizationalEffectiveness

Table 23: *Regression model of the reltionship between the KMC and Organizational Effectiveness*

By analysis table 20 it is evidential that the model does not suffer form multicollineaity, thus the VIF values and the Tolerance values does not exceed critical levels. The adjusted R-square is .513, which indicate that the KMC explain 51,3% of total variance of the dependent variable organizational effectiveness. Statistical significance is reached at P=.000 with an F-value of 13,135, which indicates a good model fit. The standardized residuals are analysed by producing a Normal P-P plot and Scatterplot, which is presented below. No major deviation form normality is detected.

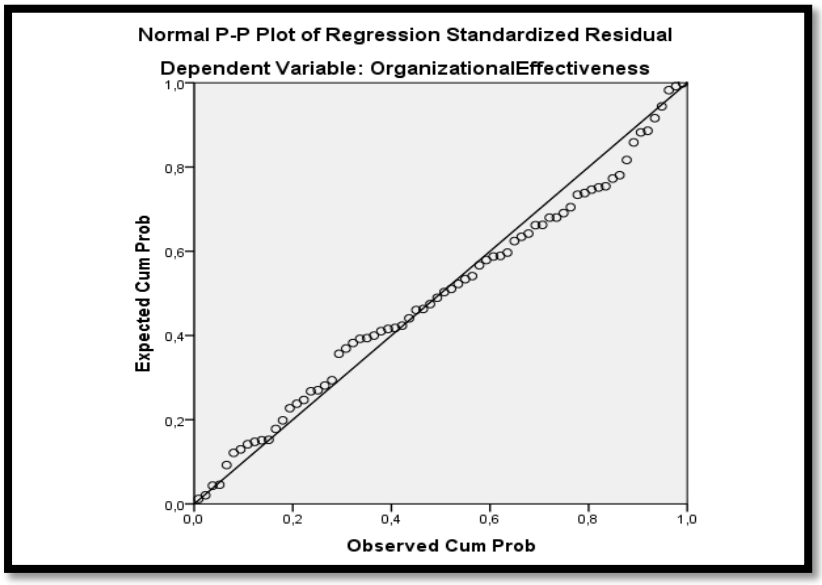

Figure 15*: Normal P-P plot*

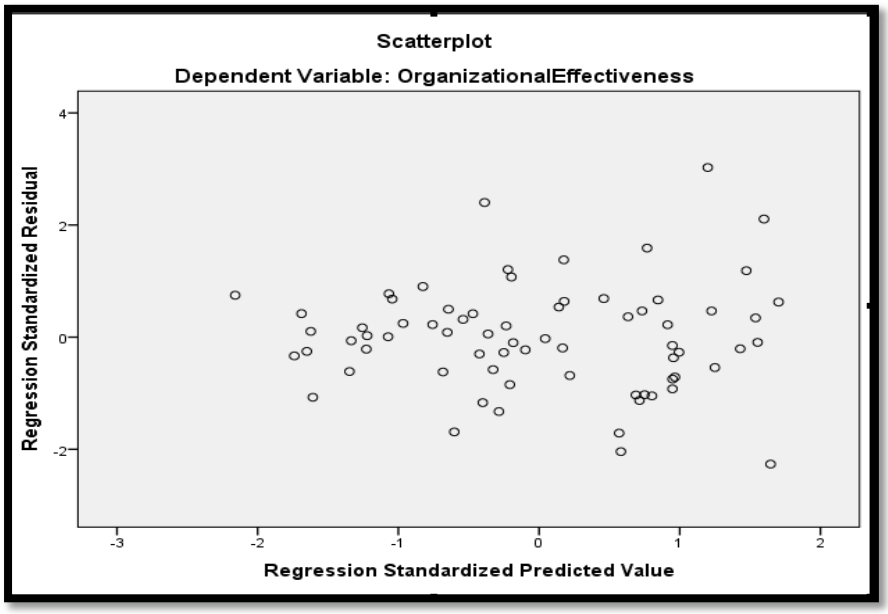

Figure 16*: Scatterplot*

By analysing the b-value (Beta) for each independent variable it's evidential that the variable Knowledge culture makes a strong and unique contribution to predict the dependent variable. The beta-value is .268 and statistical significance is reached at P<.05. The conclusion is that by increasing Knowledge culture by 1-unit, organizational effectiveness increase by .268. Furthermore, the variable Knowledge application has a significant relationship to the dependent variable and posses a beta-value of .690 indicating that 1-unit increase in the variable produce a 69.0% unit increase in organizational effectiveness. Knowledge structure, Knowledge

technology, Knowledge acquisition and Knowledge sharing did not reach statistical significant, therefore the variables does not effect organizational effectiveness.

5.2.5.1 Moderating effects of firm size and outsourcing

To test the moderating effect of firm size and outsourcing two path models were conducted in SmartPLS. The first model tested the effects between firm size and the two independent variables KM infrastructure capability and KM process capability. None of the moderation effects of firm size showed significant results. However moderation effect of outsourcing was found.

The second model measured the effects between outsourcing on the variables of the model. Moderation between KM process capacity and organizational effectiveness was not found. However the relationship between KM infrastructure capability and organizational effectiveness was to some degree modified by outsourcing. The adjusted R-square of the model was 0.728 which indicate that 72,8% of the dependent variables is explained by the model. Significance was reached at P=.000.

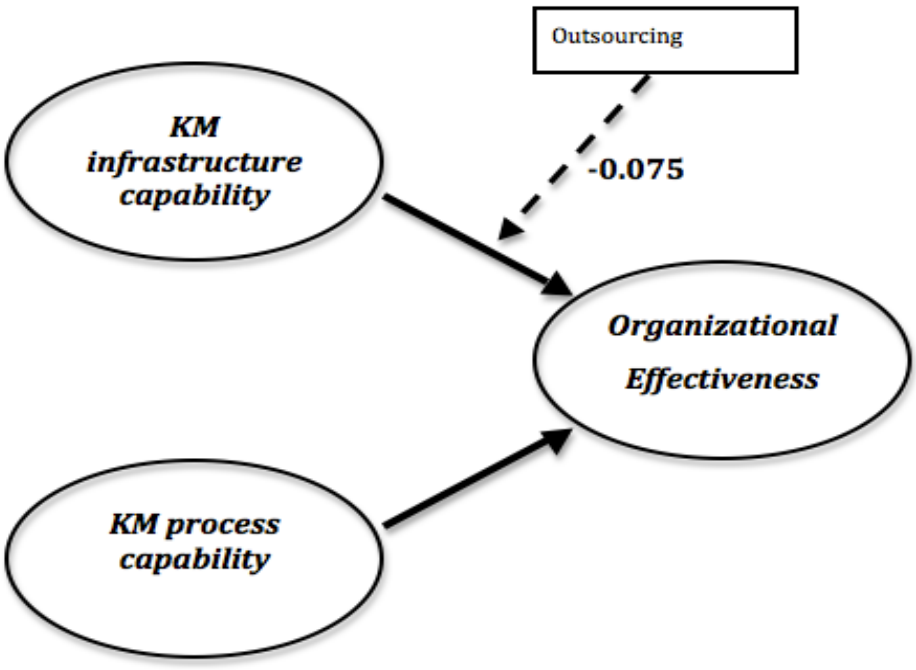

Figure 17: *Moderating effect of outsourcing*

	R Square	R Square Adjustec
Infra_	0.026	0.011
OE	0.744	0.728

Table 24: *R-Square of the model*

	Saturated Model	Estimated Model
SRMR	0.090	0.266
d_ULS	4.039	35.048
d_G	2.772	3.376
Chi-Square	749.690	823.013
NFI	0.608	0.569

Table 25: *Important result from path model of the moderating effects*

Moreover, by directly measuring outsourcing on the dependent variable (organizational effectiveness), a negative relationship was detected. This indicates that outsourcing inflict direct negative effects on organizational effectiveness. The R-Square of the model is 0.741 which means that the model explain 74,1% of the dependent variable. The Chi-square was 749.368, which indicates good model fit. Significance was reached at P=.000.

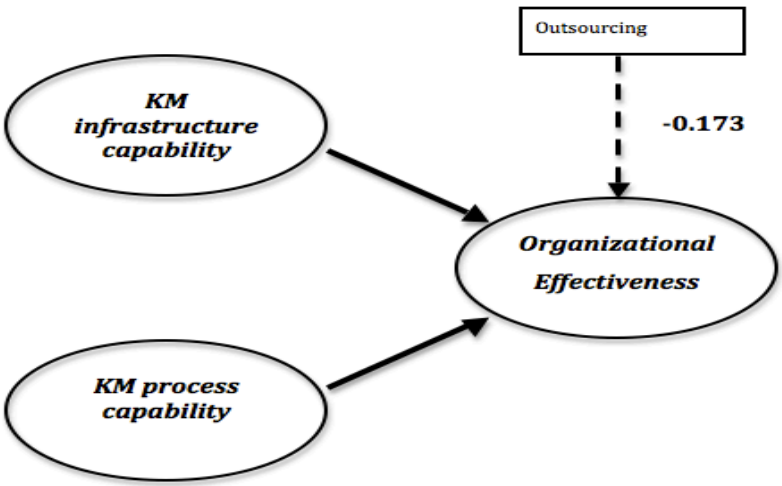

Figure 18*: Outsourcing effect on organizational effectiveness*

	R Square	R Square Adjustec
OE	0.741	0.729

Table 26: *R-square of the model*

	Saturated Model	Estimated Model
SRMR	0.090	0.090
d_ULS	4.043	4.043
d_G	2.774	2.774
Chi-Square	749.368	749.368
NFI	0.608	0.608

Table 27: *Important results from the path model of outsourcing and organizational effectiveness*

5.2.6 Summary of the quantitative analysis

Table 28 presents a summation of the results form the quantitative analysis. The hypotheses and research question of the thesis are presented with their relative results: supporter of discarded. The analysis identified that Knowledge culture and Knowledge Structure are significant and successfully explain KM infrastructure capability, thus H3 and H4 are supported. For KM process capability the sub-construct, Knowledge Application was found to be significant, thus H7 is supported. Hypotheses 1 were not supported in the analysis, however KM process capability showed significant results. This indicated that there are a positive relationship between the capability and organizational effectiveness. In relations to the moderating variable firm size, all of the hypotheses were discarded. However for outsourcing hypotheses H11 were supported, thus indicating that outsourcing negatively affects the relationships. Figure 19 gives the summation of the relationships of the model, which produced significant results.

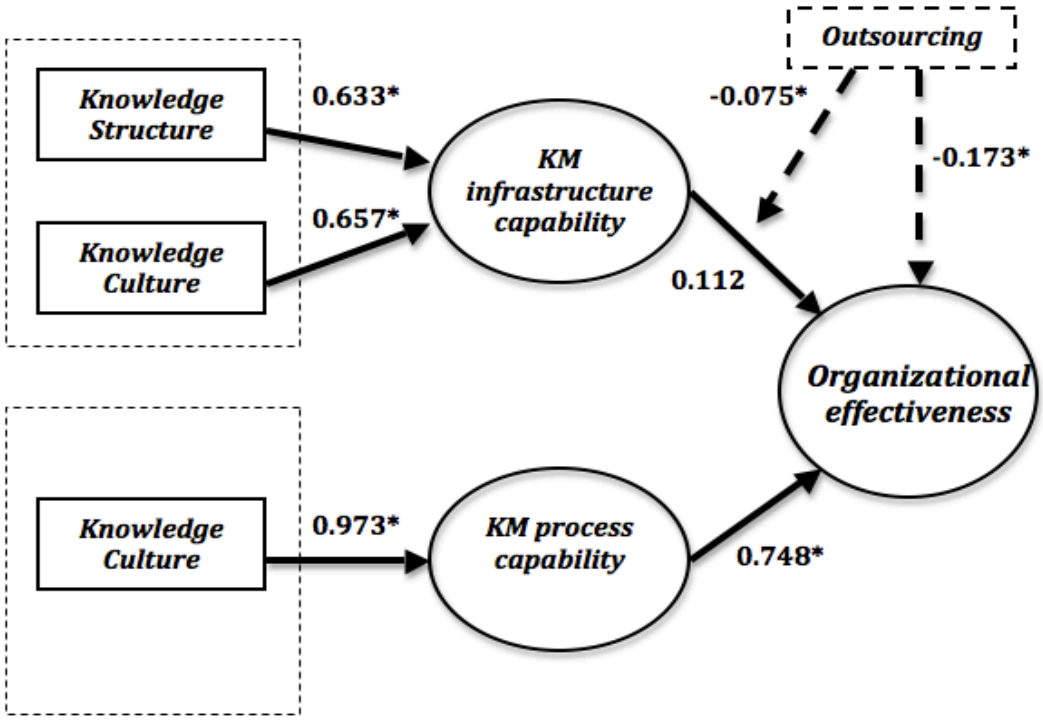

Figure 19: *The full structural model with significant relationship*

	Main relationships	
H_1	*Knowledge infrastructure capability positively affects organizational effectiveness.*	*Discarded*
H_2	*Knowledge process capability positively affects organizational effectiveness.*	*Supported*
	Important constructs of KM infrastructure capability	
H_3	*Knowledge culture is important component of KM infrastructure capability.*	*Supported*
H_4	*Knowledge structure is important component of KM infrastructure capability.*	*Supported*
H_5	*Knowledge technology is important component of KM infrastructure capability.*	*Discarded*
	Important constructs KM process capability	
H_6	*Knowledge acquisition is important component of KM process capability.*	*Discarded*
H_7	*Knowledge application is important component of KM process capability.*	*Supported*
H_8	*Knowledge sharing is important component of KM process capability.*	*Discarded*
	Moderating effects	
H_9	*Firm size moderates the effect between KM infrastructure capability and organizational effectiveness.*	*Discarded*
H_{10}	*Firm size moderates the effect between KM process capability and organizational effectiveness.*	*Discarded*
H_{11}	*Outsourcing moderates the effect between KM infrastructure capability and organizational effectiveness.*	*Supported*
H_{12}	*Outsourcing moderates the effect between KM process capability and organizational effectiveness.*	*Discarded*

Table 28: *Summated presentation of the hypotheses testing*

6.0 Discussion

This chapter will discuss the results presented in the previous chapter, which comprise both the qualitative and the quantitative results. The study aims to analyse the affects of KM capabilities on organizational effectiveness of the maritime equipment suppliers in Møre and Romsdal, which relates to research question 1. Moreover, this chapter will discuss the moderating effects of firm size and outsourcing, which relates to research question 2 and 3.

6.1 The effects of the KMC´s on organizational effectiveness (RQ1).

The KMCs were outline and tested on the basis of data obtained form the sample of 169 equipment suppliers, were 70 respondents participated in the study. Through a triangulated method approach, the study allowed for assessment of the validity of the scales used. Through preliminary interviews of three equipment suppliers of various sizes and areas of expertises, important findings were obtained, which outlined the questionnaire used in the quantitative research. The results from the preliminary interviews show that the established constructs of the research model thoroughly explain the dimensions. The data collected in a questionnaire survey was assessed through statistical methods in SPSS and Smart PLS software. To answer research question 1, 8 hypotheses were developed. The first two hypotheses assessed the relationship between the KMC´s and organizational effectiveness. Furthermore, six hypotheses measured the relationships between the sub-constructs and the main constructs respectively KM infrastructure and process capability (H3-H8).

For these six hypotheses H3, H4 and H7 were supported. Thus, Knowledge culture and Knowledge structure were found to be important components of KM infrastructure. Knowledge application was found to be an important construct of KM process capability. In addition, KM process capability was found to have a strong positive relationship to organizational effectiveness, indicating that increasing effort in such capabilities will result in increased organizational effectiveness.

The results were contradictive to the preliminary expectations as Knowledge technology, Knowledge acquisition and Knowledge sharing was not found to be significant constructs of KM infrastructure and KM process capability. KM infrastructure did not inflict significant increases in organizational effectiveness. Gold et al (2001) found significant relationship between all constructs of the model, thus

the obtained results form the presented research conflict these findings. Well-established knowledge management systems have been found to have high predictive effect on organizational effectiveness (Kumaresan and Swarooprani, 2015). Zaied, Hussain and Hassan (2012), found that all elements of the KMC had a strong statistical relationship with organizational effectiveness, with an R-square of 0,48. Jaradat and Maani (2014) focused their research KM infrastructure capability. The study found that KM infrastructure strongly predicts effectiveness of the firm. Furthermore their research emphasized the importance of transmitting knowledge to employees and underscored the vital focus on creativity and distinctiveness for the organizations. However the finding of this study are in line with other research finds, were culture have been found to be an important factor of KM infrastructure. Yang and Wan (2003) emphasizes culture as an important prediction of Infrastructure, which facilitated good KM processes. Galvis-Lista og Sánchez-Torres (2013), also emphasised the crucial role of KM process, and how application is one of the most important capability of any organization.

The result form this study indicate that KM process capabilities are more important for the success and effectiveness of the maritime equipment suppliers then KM infrastructure capabilities. Moreover, knowledge application was the variable, which produced largest effects on organizational effectiveness both when assessing the model in SPSS and through model assessment in SmartPLS.

The results indicted that by focusing KM efforts refining the processes of applying important knowledge, while increase the effectiveness and performance of the organization. Knowledge culture was outlined as an important variable in both models. Understanding the importance of knowledge as well as ratifying the knowledge culture will also have positive effect for the organization.

Large technological infrastructures might be relevant to find in larger organizations where the need to effectively spread and store knowledge is needed. The average firm in M and R is small or medium sized. Lack of significant effects of acquisitions processes and sharing process, might also be related to the average size of the equipment suppliers. Previous research has stated that KM research often is conducted on larger firms. Informality of sharing and acquisition might bring vital information to every part of the organization, without large processes. All of the

participants of the interview stated that informality is a vital part of sharing and distribution knowledge. Close and informal relationships with customers and important partners, contributed to acquiring information and knowledge, without involving large processes of the organization. These finding are also inline with statements of the clusters operations. Informality and close relationships between buyers and sellers generate a special environment for innovation and knowledge sharing (GCE, Blue Maritime, 2016).

6.2 Moderating effects of firm size (RQ2)

As the maritime cluster is comprised of many small and medium-sized firms (SMEs), and a few larger multinational enterprises (MNEs), with both Norwegian and other nationalities, firm size was an interesting variable to explore. The study formulated one question of in the questionnaire to capture the effect of size on the constructs in the study. Results show that the numbers of employees range from 1 to 1650 with and average of 70. Hypotheses H9 and H10, were created to assess if firm size positively moderate the relationships between KM infrastructure and process capability and organizational effectiveness.

Contradictive to the expected results, firm size show no significant magnifying effect on the relationships of the model. Previous studies on the KMCs have mainly been conducted on homogenous groups of larger firms. Firm size has been expected to contribute to the effects of KM activities, because of the amount of resources need for successfully implement such activities. Thus, size has been outlined as an important variable of KM success. However this research took a different approach of analysing the KMC on a group of firms largely consisting of SMEs. The research found little evidence that size plays a magnifying role between the KMCs and organizational effectiveness. A reason for these findings might be the innovative environment the cluster represents, with close connections and partnership. The members might benefit from joint efforts and R&D projects (GCE Blue Maritime, 2014). Smaller firms may also be better suited to rapidly changing market position and operating area to reflect market developments.

In addiction to the quantitative methods, three firms were selected for in-depth interviews, which were of various sizes. Rolls-Royce is the larges firm of the three with more then 400 employees located in M and R. The findings of the in-depth

interview suggest that KMC's are important for firms of all sizes. ACEL and Furuno have 94 and 41 employees, respectively. Furuno is the only firm of the three which present a positive result form 2015. The company had a profit margin of 6,79%[14] in 2015. From analysing the answers related to the KMC's it is evidential that knowledge is in focus and a vital part for all the three firms. Innovation is an important result of effective knowledge utilization, which highlights the effectiveness of the firm. All the three firms stated that they had ongoing innovative projects. Rolls-Royce underscores that innovation is an important part of the company's operations. ACEL stated that they through close contact with the customers operate on an engineering to order (ETO) bases. The company also have a larger innovative project now, which is developed at their headquarter in Ålesund. Furuno explain that they innovated on existing products and constantly develop improvement projects. Developing new solutions and products are also in focus. These results underscores that the KMC's are essential to firms of all sizes.

6.3 Moderating effects of outsourcing (RQ3)

The outsourcing variable was build up of both production sourcing and knowledge sourcing. Outsourcing in general has, as previously stated, been of great interest to researchers in late decades, as it becomes more and more common. Nevertheless, the literature on outsourcing has not reached a general conclusion on how outsourcing affects firms in their ability to increase effectiveness. Outsourcing activities has previously been found to result in less flexibility, communication difficulties, less knowledge exchange between employees and essentially decrease effectiveness (Gibson and Wallace, 2012). To measure the effects of outsourcing on the relationships of the model two hypotheses were formulated, H11 and H12. Through PLS analysis H11 were supported, thus indicating that the relationship between KM infrastructure capability and organizational effectiveness are somewhat moderated by outsourcing. However, no significant moderating effect was found on the relationship between KM process capability and organizational effectiveness. Moreover, as a contribution to the established relationships, outsourcing was measured directly on organizational effectiveness. The results show negative effects of outsourcing on effectiveness. These results are coherent with the findings where outsourcing is found

[14] 14 600 000/ 215 000 000 X 100% = 6,79%

to negatively effect knowledge management systems and effectiveness of the firm (Gibson and Wallace, 2012).

Outsourcing was also a specific question in the preliminary in-depth interviews with the three maritime equipment suppliers. All three stated that they perceived outsourcing to be both beneficial and harming, especially related to the situation of the market and the timeline of the activities. With longer timelines and a stabile market, outsourcing was perceived positively for the effectiveness of the firm. However, with the situation of the market today outsourcing was described to contribute negatively to effectiveness. Outsourcing will decrease flexibility and the ability to rapidly change the organization to reflect market developments. The respondents also especially expressed that knowledge related resources of the firm bears great risk of being influenced when outsourcing activities increase.

This study has contributed to the research of knowledge management by finding relationships between KM process capabilities and organizational effectiveness. Knowledge culture and knowledge structure are also established as important constructs of KM infrastructure, while through assessments in SPSS, knowledge culture was also found to directly increase effectiveness. Moreover, the study indicate that outsourcing negatively effect organizational effectiveness and also weakens the link between the KMC´s and effectiveness of the firms.

7.0 Implications and limitations

7.1 Managerial implications

Today's situation of the maritime cluster proposes an interesting context for the study. The ongoing knowledge exchange between different actors and institutions, which collectively build a strong cluster with a whole spectre of expertise, has a good competitive advantage in both a national and international context. However, the past years have been challenging for the cluster members. Results of the study show that Knowledge structure and culture are important contributors to KM infrastructure. Through statistical analysis in SPSS, Knowledge culture is found to increase organizational effectiveness. Knowledge process capabilities with specific benefits of knowledge application provided the largest impact on effectiveness. From these results several managerial implications can be draw.
First of all, knowledge management is time consuming and costly. Knowing which capabilities that lead to increased organizational effectiveness, increase precision of KM and decrease costs (Gold et al, 2001). Managers may focus on the areas, which truly lead to effectiveness and drop projects in areas, which have shown to have little effect on increased effectiveness. Moreover, managers can develop more accurate projects in KM, and thus access and utilize knowledge better.

Having a sound KM infrastructure will facilitate a sound KM process. Hence, managers should focus on creating a good knowledge culture. Providing an efficient amount of courses and training programs, which facilitate sharing and communication of important knowledge will create a better knowledge culture. Motivating employees to experiment and explore new solutions, through organizational programs and projects, will nurture innovation and creativity. Managers should also providing an organizational structure which focus on knowledge. The company should develop measurements which capture acquisition of knowledge. Activities of the organization should be coordinated across departments, and should focus on creating shared goals and objectives. Having strategic partnership in the industry and throughout important parts of the value chain, also provide a sound structure for knowledge activities.

Knowledge application was found to be the most important variable for increasing organizational effectiveness. KM focuses on explicating tacit knowledge and making it accessible employees of the organization. Thus, managers should make knowledge

accessible, and focus on spreading knowledge. Moreover, applying knowledge and effectively utilizing knowledge of the organization will drive performance and increase innovativeness. Managers need to assess and understand the knowledge of the organization and find creative ways of utilizing it. Utilizing knowledge to handle market change will also increase effectiveness, which is a very important finding to the cluster. In addition, providing a platform for coursing, where managers could oversee progress of each individual employee and their professional background might provide an overview of the knowledge base of the organization. Thus, enhancing the accuracy of knowledge application activities.

In relations to outsourcing, the firms of the cluster should be aware of the effects it might inflict on the knowledge related capabilities of the firms and organizational effectiveness. This research found that outsourcing inflicts negative effects on the relationship between KM infrastructure and organizational effectiveness. Moreover, effectiveness was also to directly decrease when outsourcing is high. Thus, managers should evaluate outsourcing and the effects it might have on the effectiveness of the organization, before undertaking in such activities. Previous research has also stated that having good KMC's might decrease the negative effects of outsourcing (e.g. Blumenberg et al,2009).

7.2 Policy implication

The maritime industry is important to the value creation of Norway. As a whole the industry accounts for 12 % of the GDP, and employ 110 000 people. (GCE Blue Maritime, 2016). As previously mentions the industry and the cluster, drive the innovative and economic growth forward. High employment rates, value creation and spillover to other industries, make the maritime industry to a large contribution to the economic state of the country. The industry serves as a facilitator and large contributor to the largest national industry, offshore oil and gas extraction. Therefore, the government should focus on creating a sound environment for the industry. The situation today calls for forward looking policies which facilitates future growth. Creativity and knowledge utilization should be in focus. New market opportunities and stimulation to change should be in focus when policies are created. Green and environmental solution has been outline as an important new market opportunity of the industry. Therefore policies should emphasis on simulating to creating

environmentally friendly solutions, which would provide a competitive advantage to the industry.

Knowledge application was found to be the most important contributor to success for the equipment suppliers. This underscores the need for possessing the right knowledge and find creative ways to effectively utilizing it. Thus, policies should focus on educating skilled knowledge workers and make them available to the industry. Policies should also stimulate to cooperation and forward thinking among the members of the cluster. Knowledge culture was also outlined as an important factor for the industry. Therefore creating policies and government initiatives should focus on creating a good culture of knowledge and innovation. The government should create a policy, which facilitates interaction between the industry and important institutions. Policies should build a culture of knowledge creation and sharing. Maritime21, is a national initiative of research and innovation in the maritime industry. This program states the importance of knowledge for the future success of the maritime industry. The program aims to assess the future value creation of the industry. MNOK 505 is the invested commitment provided by the government each year, which underscores high commitment to the project[15]. By conducting and promoting such projects, the government create a culture of knowledge and innovation. Arguably, future initiatives can also include more practical specifications of research affords and investments.

7.3 Limitations and further research

This research aims to analyse the effect of the KMC's on organizational effectiveness, and how this relationship is moderated by firm size and outsourcing. The findings of the study have both theoretical and practical contributions, however some limitations of the research should be discussed. The questionnaire used in the study consists of self-reporting items, thus the reliability of the study might be lessened. Interpretation of the question might vary between the respondents. Three preliminary interviews was also conducted with one respondent form each company. Information form other employees was not collected which might lead to response bias. This relates to the voicing of individual opinion, which is hard to verify and may not be inline with actual evidence. Leading questions was avoided, however there are a certain

[15]https://www.regjeringen.no/globalassets/upload/nhd/vedlegg/rapporter_2010/maritim21.pdf?id=2144977

probability that this might have occurred. The sample size also inflicts some limitations on the results of the quantitative analysis. After a demanding process of gathering answers, 70 equipment suppliers participated in the survey. This is a small sample size, however valuable information was gathered which presented a sufficient base for hypotheses testing. Even so, generalization should be done with caution.

Furthermore, in line with many emerging concepts of management, the constructs and theoretical foundation surrounding the content of knowledge and its distinct role on the organization are complex and hard to pin point. Many different perspectives may be applied when analysing the effects of knowledge; decision-making perspective (impact on individuals), domain perspective (insight into content), organizational perspective, market perspective (exchange between individual and organizational) (Gold et al, 2001). This study has utilized an organizational approach to knowledge management. Within the perspective of the organization, affects of capabilities have been demonstrated. A resource-based view of the firms has been utilized. This view recognizes the joint power of capital, capabilities and knowledge. The research model of the present study, comprise many different concepts, which all have been defined in various ways in previous research. These problems with definitions and overlapping explanations of the concept may negatively affect the research.

Future research on the cluster can include a measure of knowledge storing in the model. Previous research has found strong relationship between storing knowledge and organizational effectiveness (Zaied, Hussein and Hassan, 2012). Yang and Wan (2003) also provided a special focus on knowledge storing, and found that sharing an keeping knowledge inside the organization inflict high positive effects on organizational effectiveness. Galvis-Lista og Sánchez-Torres (2013), also outlined the importance of knowledge protection, and established it together with knowledge application, as the most important capabilities of any organization. For the context of the maritime cluster, the variable of storing knowledge would be an interesting relationship to explore. In the process of reorganization and downsizing, many firms' loose important employees, therefore loss of knowledge is expected. To see the effects of knowledge storing on organizational effectiveness in the context of maritime cluster would therefore be an interesting focus. Other important constructs of KM may also be included.

Furthermore, the framework may be put in to the context of other industries in Norway. Different subgroups within one industry can also be included. This will increase the sample size, and researcher can therefore also compare the groups in relations to the effects of the KMC's. Furthermore this study only provides cross-sectional data. Longitude research can be conducted to examine the effects of the KMC's on organizational effectiveness over time. In boarder terms, future research may also focus on unifying the many KM models and constructs which exist today.

8.0 Conclusion

The current crisis of the offshore industry represents a major challenge for maritime equipment suppliers in M and R. Signifying a key driver for demand within the cluster, offshore oil and gas extractors have been hit hard by the recent decline in the oil price. This has, in turn, led to a decrease in turnover for the members of the cluster. However, maritime suppliers in the region are shifting their focus to neighbouring industries. New areas of expertise in environmental friendly solutions have also presented economic opportunities for the cluster. Moreover, some firms have started to prepare for a new industrial change, which will increase the use of resources in R&D and innovation. Knowledge management will be crucial to the cluster facing coming challenges. The present study analysed the effects of KM capabilities on organizational effectiveness among maritime equipment suppliers in M and R. The moderating effects of firm's size and outsourcing on the relationships of the model was also investigated.

The results of the study show that Knowledge culture and Knowledge Structure are important constructs of KM infrastructure. Knowledge application is outlined as an important construct of KM process. By assessing the model in SPSS, both knowledge culture and knowledge application was found to significantly effect organizational effectiveness. Of the two, Knowledge application was found to have the strongest effect. Through path analysis with PLS, a strong significant relationship between KM process capability and organizational effectiveness was found. This implies that increased focus on KM process capabilities will improve organizational effectiveness. Outsourcing was found to have some moderating effect on the relationship between KM infrastructure and organizational effectiveness. Hence, high level of outsourcing will inflict negative effect on KM efforts and organizational effectiveness. By directly measuring the relationship between organizational effectiveness and outsourcing a negative relationship was validated. Surprisingly the findings showed that firm size did not significantly effect any of the relationships in the model.

In an economy with increasing dominance of knowledge resources, understanding the effects of knowledge efforts is crucial. KM programs are often costly and hard to execute, therefore precision of investment in such programs are important. The results of thesis provide important implications for both the cluster and the Norwegian government. By focusing their effort on the capabilities which has a proven positive

effect on organizational effectiveness, companies can achieve a reduction in costs and increase the effects of KM activities. Hence, it is of particular interest for the equipment suppliers in M and R to continuously refine processes of applying knowledge and furthermore, creating a culture which values knowledge and creativity. Knowledge- enhancing activities, such as in-house coursing and training programs, will create a sound knowledge culture and a collective understanding of the company's operations. Possessing the right processes of applying knowledge from past experiences and utilizing the knowledge pool of the organization will be beneficial to the cluster members. Together, these knowledge-enhancing initiatives will help the members of the cluster and the region of M and R to stay in the forefront of future developments. Consequently, government policies should focus on fostering an environment for creativity and experimentation, were knowledge is the essential driving force.

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Appendices

Appendix 1: Interview-guide

Dato:

Navn:

Firm:

Stillig:

Kunnskaps infrastruktur kapabiliteter	
Kultur	
1.	Tilbyr dere opplæringsprogrammer og kurs til deres ansatte?
2.	Er ansatte er oppfordret til å eksperimenter og utforske, slik at nye løsninger og oppfinnelser kan skapes?
3.	Hvordan oppfordres ansatte til å samhandle med andre og dele kunnskap?
Struktur	
1.	Har organisasjonen mange strategiske allianser?
2.	Hvordan er bedriften strukturert for å oppdage og skape ny kunnskap?
Teknologi	
1.	Har organisasjonen et internt it-system for å kategorisere og lagre kunnskaps (produkter, prosesser, market, konkurrenter)?
2.	Har organisasjonen en intern database for kunnskap som alle ansatte har tilgang til og hvordan benyttes det?
3.	Har dere teknologi som fasiliteter samarbeid mellom ansatte og felles læring?
4.	På hvilken måte bruker dere teknologi i søk etter ny kunnskap?

Kunnskaps prosess kapabiliteter	
Tilegnelse	
1.	Bruker dere ”Benchmarking” i forbedring av selskapets effektivitet og

	prestasjon?
2.	Hvilke prosesser har dere for å innhente kunnskap om kunder, produkter, leverandører og konkurrenter?
3.	Hvordan distribuerer dere ny kunnskap til ansatte?
Applikasjon	
1.	Hvilke prosesser har dere for å bruke kunnskap opparbeidet fra erfaringer og "prøve og feil" prosesser?
2.	Hvordan bruke dere kunnskap for å takle forandringer i konkurransesituasjonen?
3.	Hvilke prosesser har dere for bruke kunnskap til å skape nye produkter og løsninger?
Dele	
1.	Hvordan belønner dere ansatte for deling av kunnskap?
2.	Hvordan fasiliteter dere kunnskapsdeling og interaksjon på tvers av avdelinger/mellom ansatte?

Organisasjonseffektivitet
1. Har bedriften lansert betydelige innovasjoner i siste 3 årene ?
2. Er bedriften god på å finne markeds muligheter?
3. Hvor god er bedriften på å forutse endringer og kriser?

1. Hvordan tror du trenden med outsourcing av kunnskapsprosesser og produksjon har påvirket klyngens evne til å håndtere krisen den nå står i?

2. Er det noe du vil legge til eller utdype?

Appendix 2: Questionnaire from SurveyMonkey.net

Kunnskapsledelse og dynamiske kapabiliteter til maritime utstyrsleverandører i Møre og Romsdal

1. I hvilken kommune hører selskapet til?

2. Hvor mange ansatte har selskapet?

Antall ansatte i Møre og Romsdal.

3. I hvilken avdeling er du ansatt?

- ◯ Adm.dir/Daglig leder
- ◯ Administrasjon
- ◯ Salg

4. Hva var bedriftens omsettning i 2015?

Fyll inn beløpet i NOK

5. Sammenlignet med året før, hva var omsetningsendringen i prosent?

Anvend -/+ avhengig av om endringen representerer nedgang/økning (f.eks. +30).

6. Hvordan vil du evaluere påstandene i forhold til din bedrift:

Rageres fra 1 (Svært uenig) til 7 (Svært enig)

	1-Svært uenig	2	3	4	5	6	7-Svært enig
Bedriften besitter teknologi som effektivt kategoriser og lagre kunnskap?	◯	◯	◯	◯	◯	◯	◯
Bedriften har teknologi som tilrettlegger for samarbeid mellom ansatte og fasiliteter læring?	◯	◯	◯	◯	◯	◯	◯
Bedriften har teknologi som effektiviserer søk etter ny kunnskap?	◯	◯	◯	◯	◯	◯	◯
Bedriften besitter teknologi som tilrettelegger for effektiv overvåkning av partnere og konkurrenter?	◯	◯	◯	◯	◯	◯	◯

Bedriften har en organisasjonsstruktur som tilrettelegger for innhenting og utvikling av ny kunnskap?	○	○	○	○	○	○	○
Bedriften måler prestasjon på effektiv kunnskaps tilegnelse?	○	○	○	○	○	○	○
Bedriften har mange strategiske allianser?	○	○	○	○	○	○	○
Bedriften tilbyr mange opplæringsprogrammer og kurs til de ansatte?	○	○	○	○	○	○	○
Ansatte er oppfordret til å eksperimentere og utforske?	○	○	○	○	○	○	○
Bedriftens strategiske mål og visjon er godt kommunisert til de ansatte?	○	○	○	○	○	○	○

Ledelsen anerkjenner betydningen av kunnskap for bedriftens suksess?	○	○	○	○	○	○	○
Bedriften har gode prosesser for "benchmarking" av prestasjons faktorer?	○	○	○	○	○	○	○
Bedriften har gode prosesser for innhenting av kunnskap om (kunder, produkter, market, leverandører og konkurrenter)?	○	○	○	○	○	○	○
Bedriften anvender tilbakemeldinger for å forbedre fremtidige prosjekter?	○	○	○	○	○	○	○
Bedriften har gode prosesser for å anvende kunnskap opparbeidet fra erfaringer?	○	○	○	○	○	○	○

Bedriften gjør kunnskap lett tilgjengelig for ansatte?	◯	◯	◯	◯	◯	◯	◯
Bedriften har gode prosesser for å anvende kunnskap til å skape nye produkter og løsninger?	◯	◯	◯	◯	◯	◯	◯
Bedriften bruker kunnskap til å forbedre effektiviteten?	◯	◯	◯	◯	◯	◯	◯
Bedriften anvender kunnskap effektivt for å takle endringer i konkuransesituasjonen?	◯	◯	◯	◯	◯	◯	◯
Bedriften tilrettelegger for kunnskapsdeling og interaksjon på tvers av avdelinger/mellom ansatte?	◯	◯	◯	◯	◯	◯	◯
Ansatte har tillit til hverandre og kommuniserer godt?	◯	◯	◯	◯	◯	◯	◯
Bedriften tilbyr insentiver for deling av kunnskap?	◯	◯	◯	◯	◯	◯	◯

7. Hvordan vil du vurdere selskapets evne til å:

Rangeres fra 1 (Svært dårlig) til 7 (Svært god)

	1- Svært dårlig	2	3	4	5	6	7- Svært god
Finne nye markedsmuligheter?	◯	◯	◯	◯	◯	◯	◯
Forutse markedsendringer og kriser?	◯	◯	◯	◯	◯	◯	◯
Konvertere innovasjoner til kommersielle produkter?	◯	◯	◯	◯	◯	◯	◯
Tilpasse strategiske mål i samsvar med markeds- og industriendringer?	◯	◯	◯	◯	◯	◯	◯

8. Anslagsvis, hvor stor prosentandel av bedriftens omsetning de siste tre årene har vært et resultat av innovasjoner og nylanseringer?

Gyldige vender er fra 0 til 100. Det er ikke tillat med desimaler eller tegn.

9. I prosent, hva var selskapets økning/nedgang i markedsandel fra 2014 til 2015?

Gyldige vender er fra 0 til 100, benytt +/- for å illustrere nedgang eller økning (f.eks. -20).

10. Anslagsvis, i prosent hvor mye av bedriftens produksjon er outsourcet/ utkontraktert til internasjonale aktører?

Gyldig verder er fra 0 til 100.

11. Anslagsvis, i prosent hvor mye av bedriftens kunnskapsoppgaver (markeds undersøkelser, kundehåndtering, R&D osv) er utført av internasjonale aktører?

Gyldig verder er fra 0 til 100.

Ferdig

Appendix 3: Mail questionnaire

Hei.

Jeg studere ved NTNU i Ålesund og avslutter nå en mastergrad i internasjonal business og markedsføring. I forbindelse med min masteravhandling om kunnskapsledelse i den maritime klyngen i Møre og Romsdal, har jeg utarbeidet en spørreundersøkelse. Kunnskaps er i dag anerkjent som den viktigste organisasjons resursen. Gjennom denne undersøkelsen vil jeg forsøke å måle hvilke faktorer som er viktigst i håndteringen av kunnskap og hvordan kunnskapsledelse kan øke organisasjons effektiviteten. Videre vil jeg også se på hvordan kunnskapsledelse kan hjelpe bedrifter i håndteringen av kriser og usikkerheter i markedet. Spørreundersøkelsen gjennomførers på maks 10 minutter. Jeg setter stor pris på din deltagelse. Alle svar vil bli behandlet med konfidensielt og undersøkelsen vil bare bli brukt til et akademisk formål.

Link til undersøkelsen

Skulle det være noen spørsmål angående spørreundersøkelsen, ta gjerne kontakt på e-mail ingrid_rosk@hotmail.com eller tlf 98613493

Med Vennlig Hilsen

Ingrid Marie Nordøy

NTNU i Ålesund

Appendix 4: Reminder e-mail

Hei igjen!
Dette er en påminnelse, om å delta på spørreundersøkelsen som kartlegger kunnskapsledelses kapabiliteter i den maritime klyngen. Spørreundersøkelsen gjennomføres på 5-8 minutter. Jeg setter stor pris på din deltagelse.

Jeg avslutter nå min mastergrad ved NTNU i Ålesund. I forbindelse med min mastergradsavhandling gjennomfører jeg en spørreundersøkelse om kunnskapsledelse og dynamiske kapabiliteter til maritime utstyrsleverandører. Undersøkelsen kun bli brukt til et akademisk formål og alle svar vil bli behandlet konfidensielt. Om du allerede har svart på undersøkelsen kan du se bort i fra denne e-mailen.

Om du har spørsmål om spørreundersøkelsen, ta gjerne kontakt på
telefon: 986 13 493
eller e-mail: ingrid_rosk@hotmail.com

På forhånd takk !

Med Vennlig Hilsen
Ingrid Marie Nordøy
NTNU i Ålesund

Appendix 5: Transcript of the interview with ACEL AS

Dato: 17.02.17

Navn: Klaus Kjærstad

Bedrift: ACEL AS

Stilling: Daglig leder/ direktør

Her ved dette kontoret har vi vår egen design avdeling, samt planlegger vi, engineerer, bygger og levere produkter til våre kunder. Vi har alle ledd.

1. ***Tilbyr dere opplæringsprogrammer og kurs til deres ansatte?***

Vi har en del faste kurs, også har vi det som går på spesialkompetanse. Det som vi ikke kan tilby av kurs, søker vi utenfor og sender ansatte på kurs som tilbys på det som måtte trenges.

2. ***Er ansatte er oppfordret til å eksperimenter og utforske, slik at nye løsninger og oppfinnelser kan skapes?***

Ja der er alltids rom for kreativitet, hvor ansatte kan utvikle ting selv, men i all hovedsak går det på kontraktene som vi har. Vi har mange kontrakter som er "Engineering to order".

3. ***Hvordan oppfordres ansatte til å samhandle med andre og dele kunnskap?***

Bedriften er veldig prosjekt orientert, og vi kjører mange prosjekter, derfor blir det mye samhandling mellom ansatte innenfor disse prosjektene. Derfor har vi egne grupperinger av produksjonsansatte og ingeniører, som settes sammen i team, som derav jobber med et prosjekt sammen.

4. ***Har organisasjonen mange strategiske allianser?***

Vi har kundegrupper som er veldig stabile, spesielt på maritim sektor hvor vi har to relativt store kunder som står for om lag 70-80 % av omsetningen vår. Vi jobber veldig dynamisk med disse og vi er deres fullskala elektropartner. Ettersom de ikke har ansatte som jobber med elektor selv, ivaretar vi alle elektro-oppgaver som en del av det tette samarbeidet.

5. ***Hvordan er bedriften strukturert for å oppdage og skape ny kunnskap?***

Vårt arbeid føres veldig mye av kontraktene og forespørsler som vi mottar. Vi følger opp markedet og nye ting som skjer det. Det ligge jo gjerne føringer i spesifikasjonene som vi mottar tilknyttet kontraktene som vi får. Mye av arbeidet går på å tolke de og komme med nye og gode løsninger ut i fra det. Vi har derfor en veldig stor utviklingsavdeling her på huset, som jobber med nyskapende produkter tilknytte kontrakt spesifikasjonen. Stort sett er utviklingsarbeidet og arbeidet generelt prosjektrelatert. Organisasjon er derfor strukturert etter disse oppgavene, samt er vi veldig fleksible. Vi har korte linjer mellom topp og bunn og god interaksjon.

6. ***Har organisasjonen et internt it-system for å kategorisere og lagre kunnskaps (produkter, prosesser, market, konkurrenter)?***

Ja vi har eget dokument håndtering system som lagrer og kategorisere kunnskap relatert til prosjekter og produkt. Deretter har vi også et eget økonomisystem: ERP system. Disse to systemene blir brukt til å lagre kunnskap, samt innenhet kunnskap ved behov. Dokumentene ligger kategorisert etter prosjekt, slik at det er lett og hente opp kunnskap igjen.

7. ***Har organisasjonen en intern database for kunnskap som alle ansatte har tilgang til og hvordan benyttes det?***

Ja, de systemene og databasene som vi har er åpen for alle. Kunnskap er kategorisert etter prosjekt og informasjon er lett tigjengelig. Inne i systemet er det linker til dokumentene som vi har, disse er også gradert, slik at ikke alle har tilgangen til sensitiv informasjon tilknyttet prosjektene. Salgsdokument er eksempel på informasjon som er gradert. Eller har alle mulighet til å søke og hente ut kunnskap fra tidligere prosjekter.

8. ***Har dere teknologi som fasiliteter samarbeid mellom ansatte og felles læring?***

Vi kjører alt på felles databaser, prosess databaser som flere kan jobbe sammen på samtidig. Vi bruker også outlook og skype en del for kommunikasjon.

9. ***På hvilken måte bruker dere teknologi i søk etter ny kunnskap?***

Det er et litt vanskelig spørsmål å svare på. Generelt tror jeg ikke vi bruker teknologi mye i søken etter ny kunnskap. Selvsagt bruker vi internett og annen informasjon som

er tilgjengelig. Vi følger med på utviklingen som skjer gjennom media og andre instanser. Hvis det er spesiell ting, tilsetter vi gjerne en konsulent for å utforske det, samt er også medlem av ÅKP, hvor vi gjennom dette samarbeidet deltar på en del konferanser.

10. ***Bruker dere "Benchmarking" i forbedring av selskapets effektivitet og prestasjon?***

Ikke annet enn av vi benchmarker produksjon. Vi lager kalkyler og benchmarker mot kalkylene våre deretter bruker vi erfarings tall. Ellers har vi ingen faste partene vi benchmarker oss opp mot. Benchmarking prosessene går gjerne mer på sammenligning av oss selv.

11. ***Hvilke prosesser har dere for å innhente kunnskap om kunder, produkter, leverandører og konkurrenter?***

Vi har vell instrukser på at vi skal innhente et vist antall tilbakemelding fra kunder. Denne prosessen er litt mer uformell ettersom vi har tett samarbeid med våre kunder. Den beste tilbakemeldingen er vell at vi får de samme kundene tilbake gang etter gang. Markedet følger vi med på gjennom konsulenter eller ved åpen informasjon. Leverandørene våre samarbeider vi også tett opp mot og informasjon deles lett.

12. ***Hvordan distribuerer dere ny kunnskap til ansatte?***

Mye skjer gjennom opplæring , både gjennom interne kurs og eksterne kurs. Deretter er vi med på messer og seminar, som for eksempel de som arrangeres ved NTNU. Det er gjerne leverandører som kommer til oss for å holde interne kurs på sine produkter.

13. ***Hvilke prosesser har dere for å bruke kunnskap opparbeidet fra erfaringer og "prøve og feil" prosesser?***

Det bruker vi inn i nye prosjekter, slik at man forbedrer og effektiviserer disse prosessene. Første ledd i et prosjekt er planlegging hvor prising og tilbudsdokumenter blir produsert, samt en føring for veien videre blir samfattet. Deretter går det ned til neste ledd som er enginering, hvor produktet blir skapt. Deretter går produktet inn i produksjon. Det skjer en del erfaringsoverføring mellom et prosjekt til det neste, slik at vi overfører kunnskap og erfaringer som vi har tilegnet oss gjennom utviklings prosjektene.

14. ***Hvordan bruke dere kunnskap for å takle forandringer i konkurransesituasjonen?***

Vi er nød til å ha den nødvendige kompetansen til å i det hele tatt være konkurransedyktig. Vi må jo ha kunnskap om både produkter og markeder som vi jobber innenfor. Vi er veldig omstillingsdyktige, fordi vi er en relativet liten fleksibel organisasjon. Vi hiver oss fort rundt. For eksempel nå med nedgangen i offshore, som utgjorde en vesentlig del av bedriftens omsetning, her var vi rask på å omstille. Bedriften kom seg raskt inn i nye segmenter og nye markedsområder.

15. ***Hvilke prosesser har dere for bruke kunnskap til å skape nye produkter og løsninger?***

Mye av vårt arbeid er prosjekt relater, derfor en mye av erfaringsutvekslingen tilknyttet de ulike prosjektene. Deretter er markedsoppfølging viktig. Vi deltar gjerne på seminar og kurs for å innhente ny kunnskap om bransjen vi er i. Gjennom prosjektene for vi også tilsendt mange tekniske dokumenter som er relatert til nyskapende løsninger.

16. ***Hvordan belønner dere ansatte for deling av kunnskap?***

Nei det har vi ikke. Det er mer resultat basert og totalt på selskapet gjennom bonusordninger, men ikke direkte på kunnskapsdeling.

17. ***Hvordan fasiliteter dere kunnskapsdeling og interaksjon på tvers av avdelinger/mellom ansatte?***

Vi bruker felles systemer for kommunikasjon. Vi har jo et selskap i Baltik og et i nord, men vi jobber jo hele tiden inn mot det som vi har her. I prosjekt går det gjennom prosjektmøter, der ansatte på innkjøp, enginering, produksjon osv, har felles møter for oppfølging av prosjektene. Teamene settes sammen etter hva som er behov for i prosjektet, men det er ofte en blanding av forskjellige ansatte ved forskjellige avdelinger.

18. ***Har dere lansert noen betydelige innovasjoner de ste årene?***

Som sakt så jobber vi mye med prosjekt. Fortiden så jobber vi med prosjekt nummer to på utvikling. Selv om vi ikke er så tunge på utvikling av store nyskapinger, går mye

av arbeidet på forbeding av eksisterende produkter og tilretteleggelse etter kundens behov. Dette går på hvordan type bedrift vi er, vi er en produksjons bedrift. Akkurat nå jobber vi med utvikling av et nytt type produkt som vi har stående her på huset. Produktet er i test fasen nå.

19. Er bedriften god på å finne markeds muligheter?

Ja det vil jeg påstå. For å overleve må man være god på det. Vi omstiller oss lett og er fleksible.

20. Hvor god er bedriften på å forutse markedsendringer og kriser?

Denne krisen vi står i nå, kom vell ganske overraskede på oss som på alle andre. Vi får vell med oss det som skjer som resten av markedet. Vi drar på konferanser hvor de spår fremtidig utvikling og ser på nye trender og slikt, men utover det har vi ikke så mye å fare med. Det som er forskjellen på oss, så er vi en fleksibel organisasjon som kan hive oss fort rundt og det er korte beslutningslinjer fra toppen til bunn. Vi har en veldig flat organisasjon struktur, noe som er godt når det kommer endringer. Da er det lett og snu det.

21. Hvordan tror du trenden med outsourcing av kunnskapsprosesser og produksjon har påvirket klyngens evne til å håndtere krisen den nå står i ?

Jeg tror outsourcing kan ha både gode å dårlige sider ved seg. Vi ser jo en del bedrifter som har outsourcet produksjon, som nå er i prosessen med å ta det tilbake igjen. Det er ikke fleksibelt nok. Med et langt perspektiv kan kanskje outsourcing har gode sider ved seg, men på kort sikt er det ikke fleksibelt. Her i bedriften ser vi det som viktig å ha det meste in-house, noe som gjør at vi kan endre oss mye raskere og reagere raskt på endringer. Skal du for eksempel produsere noe i Kina, tar det gjerdene to måneder bare å få utstyret hit.

22. Noe du vil legge til?

Nei, ikke egentlig.

Appendix 6: Transcript of the interview with Furuno Norge AS

Dato: 17.02.17

Navn: Trond Strømmen

Bedrift: Furuno Norge AS

Stilling: Dagelig leder/direktør

1. ***Tilbyr dere opplæringsprogrammer og kurs til deres ansatte?***

Ja det gjør vi. Ny ansatte går igjennom Furunoakademiet. Vi sender alle selgerne våre på salgs kurs. Det er ikke så ofte vi velger å ansatte nye, men når vi gjøre det så sender vi de på slike kurs slik at alle får samme terminologi og forståelsen av måten vi arbeider på. Vi har også sendt noen på lederutviklingskurs. Tekniske kurs utføres ved Furuno i Japan. Deretter kjører de som har vært på tekniske kurs opplæring på sine kolleger når de kommer hjem.

2. ***Er ansatte er oppfordret til å eksperimenter og utforske, slik at nye løsninger og oppfinnelser kan skapes?***

Vi har ikke noen program for det, men siden vi er et salgs og service selskap for vårt grafiske område, derfor er vi per definisjon en kunnskapsbedrift. Det er jo neste bare det vi holder på med, slik at jeg tror det er rett å si at dette er en naturlig del av vår hverdag. Vårt utvilkings arbeid skjer ofte i samsvar med direkte kunde kontakt. Gjennom kundemøter får våre ansatte prøvd produktene våre og forhørt seg med kunder om bruk og funksjonalitet. Eventuelle feil og mangler kartlegges, deretter utarbeides forbedringsprosjekter

Bedriften har en veldig flat struktur. Kommer det en fremmed inn i selskapet vårt på en helt venelig dag, skal det være veldig vanskelig å se hvem som er sjef, tekniker eller selger osv. Vi skal være en slik type bedrift. Ansatte har stor frihet i arbeidshverdagen sin. Jeg tenker at dette skaper veldig ansvarlige arbeidere som er motivert til å utforske og skape.

3. ***Hvordan oppfordres ansatte til å samhandle med andre og dele kunnskap?***

Å oppfordre til samhandling og kunnskapsdeling er viktig. Jeg tror at dette skjer ganske automatisk her. Vi har en flat struktur og vi jobber tett sammen. Å ha et åpent og uformelt miljø er viktig for oss.

4. ***Har organisasjonen mange strategiske allianser?***

Vi har noen produkter som vi utvikler i samarbeid med andre Norske og Canadiske selskap. Disse kan vi karakterisere som strategiske allianser. På forhandler siden, har vi 43 forhandlere langs hele norskekysten og i Russland. Noen av disse er vi så nær at vi kan karakterisere de som strategiske allianser. Vi jobber for å driver hverandre fremover. Noen av forhandlerne jobber vi svært tett opp mot og kunnskapsdelig er en naturlig del av disse samarbeidende. Dette gjør at vi har strategiske allianser både på produkt og utviklingssiden og på markeds og service siden.

5. ***Hvordan er bedriften strukturert for å oppdage og skape ny kunnskap?***

Vi er en relativt liten bedrift og vi har en flat struktur, derfor jobber alle ansatte tett sammen. Det gjør nok også at vi ikke er så bevist på eller har stort fokus på kunnskaps deling, fordi det skjer av seg selv. Det er nok både fordeler og ulemper med det.

6. ***Har organisasjonen et internt it-system for å kategorisere og lagre kunnskaps (produkter, prosesser, market, konkurrenter)?***

Som sakt så er vi en kunnskapsbedrift, så det kan være vanskelig å skille på hva som er kunnskap og hva som ikke er det. Men vi har IT- systemer både for å lagre og kategorisere produktkunnskaps. Det er jo produkter og tjeneseter vi lever av. Alle i selskapet har tilgang til dette systemet og deler av det, deler vi også med forhandlerne våre. Vi bruker et CRM system for å lagre kunnskap om marked og konkurrenter. Dette systemet bruker vi får å samle informasjon om markeder og dele kunnskap med hverandre.

7. ***Har organisasjonen en intern database for kunnskap som alle ansatte har tilgang til og hvordan benyttes det?***

Ja alle har tilgang og mulighet til å benytte seg av disse systemene. Deler av produkt informasjonen er også tilgjengelig for forhandlerne våre. Spesifikasjoner og ytelse, bruksfordeler og kundeerfaringer er informasjon som vi deler med våre forhandlere

og kunder. Vi mener også at vi har en god nettside som tilrettelegger for deling av kunnskap med markedet og kunder.

8. ***Har dere teknologi som fasiliteter samarbeid mellom ansatte og felles læring?***

Bedriften har saksbehandling systemer som har kunnskapsdeling som en del av det, samt har vi de systemene som jeg har tidligere nevnt. Deretter har vi også et servicehåndtering system i tillegg til CRM systemet som kommer fra samme leverandør, som også er en from for kunnskaps deler og samler. Vi er en liten bedrift dermed er vår kommunikasjon mellom hverandre er uformell. Vi sitter tett og kan lett kommunisere med hverandre. Furuno er opptatt av at ansatte er tilgjengelig og tilstede. I små organisasjoner tror jeg at dette er en viktig del av kunnskapsdeling. Vi har tre kontor i Norge og vi er beviste på at avstand kan skape problemer for kommunikasjon, selv om man bare flytter seg over parkeringsplassen. Så vi prøver og involvere hverandre på videochat/ videomøte for å se ansiktene til hverandre mest mulig. Det er en mye bedre måte og kommunisere med hverandre på enn telefon.

9. ***På hvilken måte bruker dere teknologi i søk etter ny kunnskap?***

Vi er beviste på at det viktigste middelet for å generer kunnskaps er å stille kloke spørsmål til våre kunder. Bedriften har en huskeregel for når vi skal møte kunder, 1. husk og ha med seg selv 2. Notatblokk 3. Pen. Hvis vi gjøre det og stiller kloke spørsmål, får vi greier på veldig mye og det gjelder om du skal møte kunder, eller snakke med konkurrenter eller med tredje parter. Det er en god måte å samle kunnskap, informasjon og forståelse på. Det teknologiske aspektet er litt vanskelig. Hvis disse samtale blir noe mer, eksempelvis et utviklingsprosjekt, vil dette blir lagt inn i et system. SRM systemet til å samle å dele kunnskap om det som skjer i markedet. Om jeg leser i avisa eller hører om diverse problemstillinger, så deler vi dette videre.

10. ***Bruker dere "Benchmarking" i forbedring av selskapets effektivitet og prestasjon?***

Til en hvis grad. Vi ser litt på hva konkurrentene våre gjøre, hvor mye tjener de, hvor mye de selger. Deretter følger vi veldig mye med markedsandeler og hvem som selger hva til hvem. I alle fall på enkle tingene gjøre vi det, men ikke direkte på

kunnskapsprosesser og andre vanskelige parameter å få grep på. Vi har ingen bestemte selskap som vi benchmarker med, men vi følger nøye med konkurrenter og selvfølgelig kunder.

11. ***Hvilke prosesser har dere for å innhente kunnskap om kunder, produkter, leverandører og konkurrenter?***

Det gjør vi når vi har behov for det. Informasjon om kunder er det spesielt salgsteamet og serviceteamet samler inn når vi har kontakt med kundene. Mye av kunnskaps innhentingen skjer i kontakt med kunder og leverandører, samt våre partnere langs kysten av Norge.

12. ***Hvordan distribuerer dere ny kunnskap til ansatte?***

Vi bruker et CRM system og et servicehåndtering system, som både samler og distribuere kunnskap. Det er ikke et eget system for distribusjon av kunnskap, men det er en viktig side av det.

13. ***Hvilke prosesser har dere for å bruke kunnskap opparbeidet fra erfaringer og "prøve og feil" prosesser?***

I utviklings prosessene, som vi ofte gjør i samarbeid med norske og canadiske selskaps, er veldig ad-hoc preget. Hvis vi skal gjøre forbedringer, lager vi et forbedringsprosjekt av det og lager en ny versjon software eller ny versjon hardware. Når det gjelder de store delene av produkt, rapporterer vi våre ønsker til Japan, slik at de kan gjøre endringer og forbedringer på produktene. Vi har kanskje ikke like mange direkte prosesser for bruk av kunnskap, slik som man gjerne finner i stor selskap. I store selskap er det også veldig nødvendig med prosesser og vi mindre selskap har nok mye å lære fra de store selskapene.

14. ***Hvordan bruke dere kunnskap for å takle forandringer i konkurransesituasjonen?***

Måten som vi har håndtert dagens krise er å forsøke å arbeide oss opp nye marked, fiskeri, skipsfart og oppdrett spesielt. Siden vi er en kunnskapsbedrift er det vanskelig å skille, for det er alt vi holder på med.

Dette går mye på hvor god er vi på kunnskap i de markeder som vi jobber i. Du må hele tiden se etter endringer og muligheten i markedet. Kunnskap om kjøpsbeslutninger og endringsdrivere er også veldig viktige faktorer. Kunnskap om disse tingene er kanskje det som er verktøyene for å håndtere krisesituasjonen. Det store er også å være tindlig nok med å skjønne det og se hva som skjer, og begynne å jobbe med det før det skjer.

Nå som offshore markedet er i endring og nedskjæring, er det andre marked som har blitt gjeldende. Dette har skjedd veldig naturlig. Vi har alltids jobbet med fiskeri og dette markedet er fundamentalt viktig for Furuno. Det er der vi kommer ifra. Furuno utviklet det første fiskeleitings ekkoloddet i 1938, så dette markedet er svært viktig for bedriften og kommer nok til å fortsette å være det fremover. Markedet innenfor fiskeri har også blitt bedre og bedre, det er mye penger og utskiftnings takten er høy. Så det har på en måte vokst forholdsvis på seg selv, men så har vi vært flinke til å lansere produkt som matcher behov og vi er flinke på å beholde og ta markedsandeler. Fiskeoppdrett er nytt for oss og der har vi utviklet noen nye produkt for å matche det markedet og det begynner og hjelpe selv om det går veldig tregt, fordi det er nye produkt på nye markeder. Så har vi arbeid en del med kyst fart (ferger, og transport ect., dette er litt enklere ettersom det er nye produkt og et merket som vi ikke egentlig ikke jobber så hardt imot. Så her er det markeds siden som er det nye i det. Detter går på at vi kan produktene og bruken av det vi kan også mye om markedet også. Det er en stund siden vi har jobbet på dettet markedet, så her må vi bruke eksisterende kunnskap for å jobbe oss inn igjen. Slik jobber vi også med andre markeder hvor det kanskje har vært en stund siden vi har jobbet aktivt med, da bruker vi kunnskap vi har til å jobbe opp markedsandeler og fotfeste i markedet igjen. For eksempel på små fiskefartøy. Det er jo 6000 fiskefartøy i Norge, 5500 av de er små. Vi har kanskje fokusert på de større båtene, og dermed ikke jobbet med stort fokus på de små. Her jobber vi dermed nå med å få markedsandeler. Her bruker vi dermed kunnskap om produkt, ytelse, bruksområder, kundekretser osv, for å arbeide oss inn igjen på markedet.

15. Hvilke prosesser har dere for bruke kunnskap til å skape nye produkter og løsninger?

Igjen de produktene som vi lager i vårt Norske selskap skjer ofte i smarbeid med våre partnere med våre partnere. For eksempel nå jobber vi med å lage en ny versjon av et produkt fordi vi ser at vi har både et problem og en mulighet. Vi har en prosedyre på hvordan dette skal foregår, men det foregår veldig mye fordi vi ser at nå er det en åpning.

16. Hvordan belønner dere ansatte for deling av kunnskap?

Nei, ikke egentlig, nei men ja. Vi har et belønningssystem i selskapet som er slik at vi setter av en prosentandel av salget vært, årets salg X en prosent sats , også pluss resultat før finans X en prosent sats. Disse to blir en bonus pot som vi deler på alle ansatte i selskapet. Vi ganger dette med en brøk der vi setter den ansattes basislønn opp på brøken og summen av basislønnen under brøken, slik at bonusen utbetalt står i forhold til lønn uten overtid. Derfor tenker vi at alle får ta del i både oppturer og i nedturer. Det tenker vi at tar vare på både kunnskapsdeling, samarbeidet, salgsengasjementet og alle sider vi trenger i bedriften. Det er et langt mindre aggressivt belønningssystem enn for eksempel provisjon, som mange bruker for å virkelig få selgere til å yte. Men vi tenker at det ikke hjelper å ansatte de mest aggressive selgerne, hvis ikke resten av selskapet henger med. Hvis det bare er selgerne som blir belønnet av slag og ikke de som skal støtte dette i installasjon eller de som skal pakke det, mister de motivasjonen. Men hvis alle får ta del i selskapets sukssee så blir det mye lettere å få med alle på alle de viktige tingene i selskapet og det inkludere også kunnskapsdeling.

17. Hvordan fasiliteter dere kunnskapsdeling og interaksjon på tvers av avdelinger/mellom ansatte?

Det er nok litt avdeligs eller funksjons relatert. Selgerne samarbeider forholdsvis relativt bra. Selgere i Ålesund og i Bergen kan ofte jobbe med de samme tingene, det samme gjelder service ansatte. De er ofte med på de samme forbedrings prosessene. Det er en reise kostnad i mellom, men vi prøves å samles av og til. Vi prøver å bruke en video løsning og har vår egen videoløsning. Vi driver et eget telefonselskap å.

Vi hadde en rutine før, som vi har tenkt på å ta opp igjen. Hver gang vi lansere nye produkt så skal vi ha en gjenomgang for alle i selskapet. Her kan vi gå igjennom hva som er nytt med produktet, hva som er forbedret, ytelse, hvordan skal vi selge det. Det

er en veldig viktig ting som vi har glem litt av i det siste, så det er min belønning etter å ha brukt litt tid på denne oppgave.

18. Har dere lansert noen betydelige innovasjoner de ste årene?

Det første fiske ekkoloddet vi lanserte i 1938 var et gjennombrudd. Ekko loddene vi har i dag er basert på akkurat det samme. Basis teknologien var lagd i 1938 og brukes fortsatt i dagens produkter, men det er klart det har skjedd mye siden den gang og vi har veldig store framskritt de siste tre årene både på fiskeleiting, navigasjon og kommunikasjon. Men på vanelige tall av innovasjon, så helt klart.

19. Er bedriften god på å finne markeds muligheter?

På en skala fra 1-7, 5.5-6. Vi er relativt gode Det tar som regel lang tid å komme inn i nye marked. For eksempel i oppdrett, det er vanskelig å komme inn på markedet, hvis du ikke direkte adresserer lakselus. Å løse problemet med lakselus koster mellom 4-6 kr mer kilo, så det er et veldig viktig problem for alle som deriver med opprett. Så de som finner ei løsning på det, har virkelig gjort det gode. Vi som holder på med andre ting, er det vanskeligere. Det vi holder på med dreier seg mye om sikkerhet og anlegg med fokus på sikkerhet, vi opplever at det er mye vanskeligere å komme frem i køen å få oppmerksomhet. Det har vært tyngre en det vi hadde trodd også. Men å finne markedet tror er vi gode på, så er vi relativt gode på å få og holde på markedsandel og å holde ut. Vi er ikke et stor selskap, men vi er relativt store på det vi gjøre og vi har gjort det relativt bra også så vi har muligheten til å holde på til vi lykkes.

20. Hvor god er bedriften på å forutse markedsendringer og kriser?

Vi er veldig obs på hva som skjer og holder alltid utkikk. Så vi tror vi er relativt gode på å forutse markedsendringer og god på bruk av prosesseringskapasitet. Vi har klart oss godt gjennom krisen som har vært, vi har en fremgangsmåte med å prøve å investere oss ut av det. Så vi ansetter folk i stede for å si opp, vi prøver heller å re-lokalisere/ hva de jobber med og skape volum på andre plasser. Vi vet ikke hvor godt vi lykkes med det, men så lang har det godt bra. basis produktene er relativt lite. Noen av selgeren jobber med nye kunder, mens andre jobber med å styrke kundeforholdene til eksisterende kunder, det samme gjelder på service siden. Vi prøver å skaper mer etter markeds aktivitet også.

21. Hvordan tror du trenden med outsourcing av kunnskapsprosesser og produksjon har påvirket klyngens evne til å håndtere krisen den nå står i ?

På produksjon er veldig mye outsourcet, noen som kan virke både positivt og negativt. Det kan være positivt slik situasjonen som er nå ettersom det ikke er bedriftene selv som må håndtere bortgangen av kapasitet utnyttelsen, man trenger ikke å legge ned fabrikker og ta på seg at så medfører i en slik prosess. Så ser man slik på det er det kanskje en fordel.

Kommunikasjonen mellom ansatte ute og inne blir selvfølgelig dårligere og dette er veldig problematisk. Før i tiden var det slik at ingeniører satt med tegneblokken og planla det som skulle utvikles, deretter tok seg en tur på verkstedet og pratet med noen, fikk litt hjelp og gikk tilbake. Dette har vi mistet og det er klart at det er en kjempe ulempe. Uansette hvilke prosesser man har få å håndter slike ting, vil det aldri bli det samme som å kunne gå inn på et kontor for a snakke med en person for å løse en situasjon. Eller at man kan ta seg en runde i produksjonen med tegneblokken for å utvikle nye ting. Dette er noe verdifullt som vi har mistet.

22. Noe du vil legge til?

Gjennom dette vi har gått gjennom, ser jeg at vi er preget av at vi er en liten bedrift. Vi har prosedyrer og prosesser for ting som vi kan se på, spesielt knyttet til mor selskapet i Japan. Uansett i jobbhverdagen, er den dagelige samhandlingen viktigere. Deretter ser vi prosedyrer og prosesser. Detter er nok motsatt fra store selskap som gjerne begynner i andre enden.

Så selskap er mer fleksibel og kan endre seg raskere. Fordelen med store selskap er at når de først har satt igjen endringsprosessene er det nesten ingenting som kan stoppe de. Om de vi lansere nye produkter vil de mest sannsynelig klare å gjennomføre det. Store selskap har en investeringskapital som er mye større og en stor kunnskapsbase. Det er fordeler og ulemper på begge sider.

Appendix 7: Transcript of the interview with Rolls-Royce

Dato: 07.03.17

Navn: Jan Are Remmen

Bedrift: Rolls-Royce

Stilling: HR direktør

1. ***Tilbyr dere opplæringsprogrammer og kurs til deres ansatte?***

Som i de fleste store selskap, så har Rolls-Royce et relativt godt utbygd opplærings apparat. Så ja vi tilbyr mange opplæringsprogram og kurs for våre ansatte, på et veldig brett område. Vi har kurs som bygger videre på viktig fagkompetanse, hvor veldig mye er rettet inn mot de tekniske fagområdene. Deretter tilbyr vi også en god del kurs som er lov pålagt, som for eksempel på HMS siden. Vi har også kurs som går på utvikling av individet, for eksempel på ledelse og coaching. Vi har en ekstern partner som vi bruker til å drive dette her i stor grad.

2. ***Er ansatte er oppfordret til å eksperimenter og utforske, slik at nye løsninger og oppfinnelser kan skapes?***

Hvis vi går inn i verdisette til selskapet og ideene rundt egenskapene ved kulturen, så er det å eksperimenter og utforske et viktig. Lean har vært et viktig tema i Rolls-Royce en stund, som har en del av dette i seg. Vi har en del plakater hengende i alle kontor, som forklare noe av det som er viktig for oss, som HPC (high preformance culture). En del av hoveddelen til dette, understøtter det å være nysgjerrig og det å utforske og, samtidig å utvikle seg som individ og som selskap. Om man lykkes er et annet spørsmål. Dette selskapet er tuftet på en lang og gammel tradisjon, og er nok relativt fast i sin struktur. Industri 4.0 er også av stor interesse nå i markedet og for Rolls-Royce. Marine 4.0 er utviklet på bakgrunn av dette, som signaliserer den nye tiden, som forklare digitalisering og automatisering. Det er klart dette er innovasjon på høyt plan. Og hvis vi ikke lykkes med det du spør om her, vil vi slite med denne forandringen.

3. ***Hvordan oppfordres ansatte til å samhandle med andre og dele kunnskap?***

Som jeg var litt inn på, det kan alltids være en avstand mellom det man ønsker å være og det man er. Det er ingen tvil om at man ser på de strategiske målene som dette selskapet har satt for hvordan vi skal vokse inn i en ny tid, så har man vektlagt det med kunnskap deling.

I slike perioder skal dette skje i klasserommet. Ideen er å få dette integrert som en naturlig del av det dagelig arbeid og igjen i belønnings systemer våre er dette reflektert. Alle være 2000 ansatte i Norge har vært igjennom HPC opplæring og litt mer omfattende for de som er ansette i leder posisjoner, fordi det er forventet at de skal være litt agenter og pådrivere. I denne programmet ligger det at vi skal få på plass en kultur som er utforskende og utviklende i alle ledd, og igjen dele den kunnskapen. Dette er en målsetting, det er noe vi ønsker, men det tar tid. Så oppfordringen er der, om alle tar den kan sikkert diskuteres.

4. ***Har organisasjonen mange strategiske allianser?***

Svaret et nok igjen ja, men om dette er i stor eller lite omfang kommer litt ann på hva vi sammenligner med. For det første så på lærings administrasjon, der har vi en partner. Lønn er outsourcet, der har vi en partner. Det er viktig å si at dette er partnere, hvilket beskriver at vi jobber nærer og er nærmere på hverandre. Vi jobber mot samme mål. Det skal ikke være et kunde leverandør forhold, det er viktig å påpeke. På rekruttering samarbeider vi med Aleksanxer man solution, det vil si at vi har en ansatt fra Alexander man Solution sittende her i og sammen med oss. Det er et partnerskap, det vil si at når vi skal ut og rekrutter så er det de som gjennomfør denne prosessen. På den mer rene fortetnings siden, har vi en del Joint Ventures, som et strekt eksempel på det. Det blir nok ofte brukt ved oppkjøp. Så tror jeg nok at historisk har Rolls-Royce vært opptatt av og eie eller ha kontrollen enn å være en son 50-50 eier. På innovasjons siden er vi helt avhengig av det, fordi det kommer en del nye kapabilitets krav inn. Så om det er mange eller få, kan sikket diskuteres. Rolls – Royce har hatt en tilbøyelighet på å ha kontroll, og er ikke den som er mest glad i å inngå i joint ventures. Så både og, midt på 3 kanskje.

5. ***Hvordan er bedriften strukturert for å oppdage og skape ny kunnskap?***

Rolls-Royce som det engelske selskapet det er og den norske delen av selskapet som er sammensatt av ærverdige bedrifter, er tuftet på rike industri tradisjoner. Her omkring har innovasjon av praktiske løsning vært opphave til veldig mange. Om selskapet har en struktur for å skape kunnskap er jeg ikke så sikker på. Jeg tror du er inne på det som er viktig for oss, særlig i denne tiden vi er inne i nå. For skal vi oss lykkes med denne 4.0 satsningen, så må vi bli betydelig flinkere på å skape et miljø for ide rikdom og innovasjon. Vi må bli flinkere på å fange dette automatisk. Per i dag er vi mer avhengig av enkelt individer, det er viktig å ha de rette personer og løfte de frem. Så kan man spørre om man på en klok måte organisere seg på en bedre måte for å generere innovasjon mer naturlig. Etter den siste omorganiseringen av rolls-royce etablerte vi en egen fortetningsområde, "digital systems", som skal fange det meste av innovasjon og utviklingsarbeidet. Dette er et eksempel på at da samler man det som tidligere har vært fragmenterte miljø. Dette kan være et eksempel på at vi beveger oss i ei retting mot mer innovativt fokus.

Målsettingen til Rolls-Royce har i lang tid vært å gjøre bedriften relativt flat, men den er nok enda gangske hierarkisk. Man tenker ofte at, skal man skal få et innovativt miljø til å fungere må strukturen være flat og informasjon må flyte fritt.Dette er nok tilfellet i våre produksjons lokaler på Logva, men hvis du ser på organisasjonskartet til Rolls-Royce så er ikke bedriftsstrukturen flat. Jeg tror heller ikke det hadde fungert helt heller. Det har litt med at vi i Rolls-Royce finn vi helle spennet, fra produksjon til prosjektutvikling og i prosjektene er nok strukturen flat. I Norske sammenhenger er nok avstandene mellom topp og bunn relativt kort, sammenlignet med andre land.

6. ***Har organisasjonen et internt it-system for å kategorisere og lagre kunnskaps (produkter, prosesser, market, konkurrenter)?***

Ja, veldig mange, nesten for mange. For det første har vi et system for registrering, kategorisering og lagring av opplæring og oppfølging av hver ansatt. Systemet heter "My learning" Her kan hver ansatt gå inn å se og gjennomføre kurs. Gjennomføres kursene ikke vil det komme opp varsel. Vi har også fått ett nytt datalagrings system som går på kunnskaps styring. Det man finner der er oppfølgingssamtaler og annen oppfølging. Programmet skapes individuelle utviklings planer av denne informasjonen. Mye av opplæringen er i dag internett basert og går på e-lerning som

er veldig effektivt. Utover det har vi systemer for på produkt og prosess siden. På prosess har vi veldig mange systemer.

Det er veldig viktig dette med å fange opp kunnskap og ha policies felles for alle. Å dokumenter kunnskap og skrive den ned slik at når man mister ansatte er kunnskapen enda tilgjengelig. Skal man sette ut produksjonen er dokumentasjon og spesifikasjoner veldig viktig. Det man oppdager etter hvert er at man har i mange år produsert produkter, men det eksistere bare veldig vage beskrivelser. Det ser jo reimelig likt ut det som kommer ut, poenget er at kunnskapen sitter i hode på de fagarbeiderne som jobber med det. Dette er nok kurant i stabil tid, men er du i en situasjon der du mister veldig mange ansatte, da har du et problem. Vedlikehold av dokumentert kunnskap er også viktig, slik at det ikke blir utdatert.

7. ***Har organisasjonen en intern database for kunnskap som alle ansatte har tilgang til og hvordan benyttes det?***

Ja, my-learning og disse systemer, men her kan man ikke se andre enn seg selv. My-learning har både kurskatalogen samt din egen profil på utførte kurset. Deltar man da på kurs blir dette automatisk logget, deretter om du tar noe på fritiden kan du logge dette selv.

8. ***Har dere teknologi som fasiliteter samarbeid mellom ansatte og felles læring?***

Vi har et internt chat-system. Med dette systemet kan vi snakke og ha videochat med hverandre. I tillegg bruker vi web-ex, dette funger også veldig bra til kommunikasjon og kontakt. Slike løsninger har også nedskjert reisekostnader. Systemene i seg selv fungere veldig bra. Utfordringen er å få ansatte til å bruke disse systemene. Intern databaser fasiliteter også kunnskaps deling og interaksjon.

9. ***På hvilken måte bruker dere teknologi i søk etter ny kunnskap?***

Vi har teknologi som skal fasilitere kunnskaps søk. Teknologien er tilstede men hvordan vi bruker den varligere. Både interne systemer samt eksterne brukes i søken av ny kunnskap. Internett er mye brukt til å finne mye informasjon. Hvordan de akkurat bruker teknologi i søk etter ny kunnskap på produkt og utviklings ´siden er jeg litt usikker på. Vi operere jo også innenfor mange forskjellige typer lovverk derfor

har vi databaser som lagrer viktig informasjon rundt dette. Vi kjøpe tjenester fra en del eksterne aktører. Disse kan vi også chatte med om vi har problemer. Det alle meste foregår jo på en datamaskin.

10. ***Bruker dere "Benchmarking" i forbedring av selskapets effektivitet og prestasjon?***

Ja, det gjør vi. Vi gjennomfører også regelmessig det vi kaller "employee opinion survey" og det er baser på benchmarking, både bransjenormer og selskap som vi liker å sammenligne oss med. Ideen er å bygge på resultatet her og utvikle og effektivisere organisasjonen. Vi ha en partner som hjelper oss med dette. Denne partneren som vi bruker har gjort dette også for andre selskap. På bakgrunn av dette skaper de "benchmarks"

11. ***Hvilke prosesser har dere for å innhente kunnskap om kunder, produkter, leverandører og konkurrenter?***

Vi er veldig opptatt av å øke kundetilfredsheten, og der er egne prosesser for å logge tilbakemeldinger. Både klager og positive tilbakemeldinger blir loggført og prosessert. Når det gjelder leverandører til Rolls-Royce, eksisterer det tilsvarende prosesser. Det er et relativt stort apparat som er satt i gang for å følge opp leverandører. I første omgang omhandler dette å finne ut om vi kan stole på leverandøren, blant annet så blir de kredittskjekket. Vi har også et apparat som følger med markedet og konkurransesituasjon. Slik som de fleste andre store selskap, gjør vi analyse av våre konkurrenters planer, strategier og økonomi.

12. ***Hvordan distribuerer dere ny kunnskap til ansatte?***

Vi bruker veldig ofte mail, hvor vi sender ut intern informasjon hver uke. Noen plasser bruker vi også oppslagstavler. Når vi gjøre endringer i vilkår, setter vi opp seanser i hele organisasjonen for å informere om det. Når det gjelder produkt og produksjons prosesser så kjører vi gjerne klasseroms undervisning på dette. Dette er relatert seg til kurs vi har og kurs er en stor kilde til informasjon. Web-ex og e-lerning gjennom My-learning bruker vi også til distribusjon av kunnskap. Gjennom My-learning kan vi også sette opp virtuell klasseromsundervisning.

13. ***Hvilke prosesser har dere for å bruke kunnskap opparbeidet fra erfaringer og "prøve og feil" prosesser?***

Vi har et eget system som håndterer forbedringsforslag og tilbakemeldinger. Dette systemet tar også for seg HMS rapportering om ulykker eller andre ting som kan ha skjedd. Målet er at dette skal nå frem og bli tatt videre i en ny kunnskap og en ny løsning. Enten i bedre sikkerhet eller bedre produkt. Dette er et forbedring og kvalitet sikrings system.

14. ***Hvordan bruke dere kunnskap for å takle forandringer i konkurransesituasjonen?***

Vi er i en endringsprosess nå. Både kunde og produkt siden er i stor forandring. Vi har nære kontakter her i klyngen. Det er ofte at sluttkunden har meninger og føringer på utvikling av løsninger. Når det kommer slike store forandringer vill kunnskap om andre marked bli viktig. Fiskeri og vindkraft gir andre muligheter og nye markeder. På elektro siden som vi har i Bergenegins , har landbaserte løsninger blitt viktig. Når vi så pilene ned på offshore siden da jobber man hard å komme inn på andre områder. Offshore sto for mer en 70% av omsetningen. Dilemmaet med raske forandringer et at man over mange år har vært spisset inn mot de kravene som har vært for offshore. Disse kravene er store og er neste for store for andre industrier og derfor for dyre. Nye produkter blir viktig framover, samt endringene mot industry 4.0. Det som har skjedd i Rolls-Royce er at vi har doblet satsningen på utvikling så vi bruker betydelig større midler på produkt utvikling. Kunnskap spiller en veldig stor rolle i dette. Jeg tror ny kunnskap er viktig fremover og at bedriftene må gjennom et kunnskaps skifte nå fremover.

15. ***Hvilke prosesser har dere for bruke kunnskap til å skape nye produkter og løsninger?***

For å utvikle nye produkter for et nytt market, er det viktigste at man har kunnskap om markedet og de spesifikasjons kravene som er nødvendig. Det som mange store bedrifter gjøre når de ikke har kunnskapen innen hus, er å kjøpere den kunnskapen som de trenger. Slik tilegner bedriften seg kunnskap og erfaringer som er nødvendig i det markedet. Eller så rekrutterer vi inn den kunnskapen man har behov for. For Rolls-Royce fremover så kommer digitale løsninger til å være veldig viktig for

bedriften. På dette området må vi rekruttere inn fordi vi ikke har denne kompetansen i stor nok grad innen hus. Noen får også utdanning gjennom selskapet slik at vi kan få den kompetansen som vi ønsker.

16. Hvordan belønner dere ansatte for deling av kunnskap?

Ja vi belønner ansatte for kunnskapsdeling. Vi har blant annet definert tre adferden som vi ønsker å være god på. Den ene går på å levere god kvalitet, samt som en del av dette adferdstrekket har vi helt spesifikt tatt inn dette med dele og kommunikasjon. Poenget med dette er at hvis du scorer høyt på dette, skal du normalt få en høyere uttelling på lønnsvurderinger eller bonuser.

17. Hvordan fasiliteter dere kunnskapsdeling og interaksjon på tvers av avdelinger/mellom ansatte?

Vi har regelmessige møter som går på avdelingsnivå, samt ha vi møter som går på lokasjons nivå. Vi har også regelmessige Web-ex'er som holdes av presidenten for Marine. Disse er spesielt rettet mot lederne i bedriften. Fire ganger i året kjører vi også et leder forum for alle som har presonalansvar. Disse forumene fokuserer på alt som er viktig for en person med personal ansvar, alt fra det å være en god leder til prosesser og endringer innenfor selskapet. Alle avdelingene har sine egne forumer hvor interaksjon skjer. Vi har også informasjon blader og annen nedskreven informasjon.

18. Har dere lansert noen betydelige innovasjoner de ste årene?

Ja det har vi. Vi er helt avhengig av å levere nye produkter. I tillegg har vi innovasjoner på eksiterende produkter. Dette hadde vært krise om vi ikke hadde levert innovasjoner. Vi har en veldig bre produkt portefølje og sannsyneligheten for at du må føre en innovasjon på et av disse fortløpende er stor.

19. Er bedriften god på å finne markeds muligheter?

Det er vanskelig å svare på om man er god eller dårlig. Jeg tror vi ligger litt på tre på dette. Vi er en sto bedrift derfor tar omstilling lengre tid. For å komme inn på et marked eller endre produkter til å reflektere et market tar lang tid. Vi har for eksempel tatt opp en del marked i fiskeri. Dette markedet har vært stille en del år, men de har det bedre nå med en lav olje pris og lave renter.

20. Hvor god er bedriften på å forutse markedsendringer og kriser?

Vi var ikke veldig god på å forutse den endringen som skjedde her, men det var ingen andre heller. Det var slik at vi begynte å ta grep allerede i 2009 for den nedturen som kom. Dette så man i makro tallene, det som ingen forutså var det som skjedde med oljeprisen. De som levere prognoser levere relativt gode prognoser, men det var igjen som så dette fallet. Våre konkurrenter som har klart seg bedre enn oss, var ikke så offshore fokuserte som vi er. De hadde en litt annen portefølje og da klarer man å manøvrere seg litt lettere.

21. Hvordan tror du trenden med outsourcing av kunnskapsprosesser og produksjon har påvirket klyngens evne til å håndtere krisen den nå står i ?

Ourtsourcing av produksjon er ikke noe nytt. Rolls-Royce startet med dette allerede på tidlig 90-tallet. Jeg kan ikke se at dette har påvirket våre evne til å håndtere situasjonen nå. Hvis du begynner prosessen med outsourcing når situasjonen er slik den er i dag, er ikke dette noe som hjelper på håndteringer. I vårt tilfelle vurderer vi nødvendigheten av å produsere selv, eller om det er mulighet for å sette det ut. Vi har definerte kjerne produkter som vi skal produsere selv, deretter er det "hyllevarer" som andre håndterer. Det burde helt klart være korte linjer mellom utvikling og produksjon, så i det perspektivet kan outsourcing være negativt, men da må man også outsource store deler av produksjonen. At kunnskapen forsvinner ut av selskapet er ei reel problemstilling og er alltids en trussel.

22. Er det noe du vil legge til?

Nei, egentlig så er det ikke det.

Appendix 8: Test of normality for the dependent variable

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Change in turnover in % from 2014 to 2015	,129	70	,006	,940	70	,002
Innovations percent of total products and services	,157	70	,000	,932	70	,001
Change in market share from 2014 to 2015	,206	70	,000	,936	70	,001
Effectively find new marketoportunities	,182	70	,000	,906	70	,000
Effectively anticipate market change and crisis	,206	70	,000	,923	70	,000
Effectively convert innovations to commercial products	,174	70	,000	,919	70	,000
Effectively adapt strategic goals to match market	,224	70	,000	,892	70	,000

a. Lilliefors Significance Correction

Appendix 9: Factor analysis and reliability test

9A: Knowledge culture

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		,728
Bartlett's Test of Sphericity	Approx. Chi-Square	91,530
	df	6
	Sig.	,000

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2,528	63,196	63,196	2,528	63,196	63,196
2	,706	17,642	80,838			
3	,449	11,230	92,068			
4	,317	7,932	100,000			

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component 1
Capability to provide sufficient training	,797
Capability to motivate exploration and experimentation	,818
Capability to communicate company goals and vision	,853
Management recognize importance of knowledge	,704

Extraction Method: Principal Component Analysis.

Communalities

	Initial	Extraction
Capability to provide sufficient training	1,000	,635
Capability to motivate exploration and experimentation	1,000	,669
Capability to communicate company goals and vision	1,000	,728
Management recognize importance of knowledge	1,000	,496

Extraction Method: Principal Component Analysis.

9B: Knowledge structure

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		,698
Bartlett's Test of Sphericity	Approx. Chi-Square	50,965
	df	3
	Sig.	,000

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2,042	68,062	68,062	2,042	68,062	68,062
2	,493	16,424	84,486			
3	,465	15,514	100,000			

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component 1
Structural capability to create new knowledge	,828
Company measure preformance on effective knowledge acquisition	,829
Do the company have many strategic alliances	,818

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

Communalities

	Initial	Extraction
Structural capability to create new knowledge	1,000	,685
Company measure preformance on effective knowledge acquisition	1,000	,688
Do the company have many strategic alliances	1,000	,669

Extraction Method: Principal Component Analysis.

9C: Knowledge technology

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		,765
Bartlett's Test of Sphericity	Approx. Chi-Square	141,488
	df	6
	Sig.	,000

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2,812	70,311	70,311	2,812	70,311	70,311
2	,637	15,936	86,248			
3	,367	9,181	95,429			
4	,183	4,571	100,000			

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component 1
Tech capability to store and categorize	,882
Tech capability to collaborate and learn	,842
Tech capability to create new knowledge	,915
Tech capability to monitor market	,698

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

Communalities

	Initial	Extraction
Tech capability to store and categorize	1,000	,778
Tech capability to collaborate and learn	1,000	,710
Tech capability to create new knowledge	1,000	,838
Tech capability to monitor market	1,000	,487

Extraction Method: Principal Component Analysis.

9D: Knowledge acquisition

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		,693
Bartlett's Test of Sphericity	Approx. Chi-Square	55,274
	df	3
	Sig.	,000

Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2,072	69,053	69,053	2,072	69,053	69,053
2	,523	17,448	86,501			
3	,405	13,499	100,000			

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component 1
Capability to use benchmarking	,848
Capability to collect valuable knowledge	,799
Capability to utilize feedback	,845

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

Communalities

	Initial	Extraction
Capability to use benchmarking	1,000	,719
Capability to collect valuable knowledge	1,000	,638
Capability to utilize feedback	1,000	,714

Extraction Method: Principal Component Analysis.

9E: Knowledge application

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		,858
Bartlett's Test of Sphericity	Approx. Chi-Square	205,494
	df	10
	Sig.	,000

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3,590	71,799	71,799	3,590	71,799	71,799
2	,538	10,761	82,560			
3	,333	6,651	89,212			
4	,314	6,271	95,482			
5	,226	4,518	100,000			

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component 1
Capability to utilze knowledge obtained from experience	,838
Capability to make knowledge accessable	,868
Capability to apply knowledge to create new products	,857
Capability to apply knowledge to increase effectivety	,829
Capability to apply knowledge to handle change	,844

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

Communalities

	Initial	Extraction
Capability to utilze knowledge obtained from experience	1,000	,702
Capability to make knowledge accessable	1,000	,753
Capability to apply knowledge to create new products	1,000	,735
Capability to apply knowledge to increase effectivety	1,000	,687
Capability to apply knowledge to handle change	1,000	,713

Extraction Method: Principal Component Analysis.

9F: Knowledge sharing

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		,642
Bartlett's Test of Sphericity	Approx. Chi-Square	44,716
	df	3
	Sig.	,000

Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1,933	64,424	64,424	1,933	64,424	64,424
2	,671	22,368	86,793			
3	,396	13,207	100,000			

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component 1
Capability to facilitate sharing and interaction	,853
Capability to facilitate trust and good communication	,836
Company provides incentives for sharing knowledge	,712

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

Communalities

	Initial	Extraction
Capability to facilitate sharing and interaction	1,000	,728
Capability to facilitate trust and good communication	1,000	,698
Company provides incentives for sharing knowledge	1,000	,506

Extraction Method: Principal Component Analysis.

9G: Organizational effectiveness

KMO and Bartlett's Test[a]

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		,819
Bartlett's Test of Sphericity	Approx. Chi-Square	221,376
	df	21
	Sig.	,000

a. Based on correlations

Total Variance Explained

Component	Initial Eigenvalues[a]			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings[b]
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	569,912	60,809	60,809	2,246	32,080	32,080	2,164
2	252,518	26,944	87,753	1,319	18,848	50,928	2,214
	110,319	11,771	99,524				
	3,024	,323	99,847				
	,667	,071	99,918				
	,480	,051	99,969				
	,289	,031	100,000				

Extraction Method: Principal Component Analysis.

a. When analyzing a covariance matrix, the initial eigenvalues are the same across the raw and rescaled solution.

b. When components are correlated, sums of squared loadings cannot be added to obtain a total variance.

Component Matrix[a]

	Component 1	Component 2
Change in turnover in % from 2014 to 2015	,964	-,219
Change in market share from 2014 to 2015	,664	,130
Effectively anticipate market change and crisis	,488	,245
Effectively find new marketoportunities	,454	,237
Effectively adapt strategic goals to match market	,402	,263
Innovations percent of total products and services	,361	,923
Effectively convert innovations to commercial products	,375	,467

Extraction Method: Principal Component Analysis.

a. 2 components extracted.

Communalities

	Initial	Extraction
Innovations percent of total products and services	1,000	,982
Change in market share from 2014 to 2015	1,000	,457
Effectively find new marketoportunities	1,000	,262
Effectively anticipate market change and crisis	1,000	,298
Effectively convert innovations to commercial products	1,000	,358
Effectively adapt strategic goals to match market	1,000	,231
Change in turnover in % from 2014 to 2015	1,000	,977

Extraction Method: Principal Component Analysis.

9H: Outsourcing

KMO and Bartlett's Test[a]

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		,500
Bartlett's Test of Sphericity	Approx. Chi-Square	28,934
	df	1
	Sig.	,000

a. Based on correlations

Total Variance Explained

Component	Initial Eigenvalues[a]			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	669,863	85,367	85,367	1,493	74,642	74,642
	114,821	14,633	100,000			

Extraction Method: Principal Component Analysis.

a. When analyzing a covariance matrix, the initial eigenvalues are the same across the raw and rescaled solution.

Component Matrix[a]

	Component 1
Percent of production outsourced	,984
Percent of knowledge tasks ourtsourced	,724

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

Communalities

	Initial	Extraction
Percent of production outsourced	1,000	,969
Percent of knowledge tasks ourtsourced	1,000	,524

Extraction Method: Principal Component Analysis.

Appendix 10: Reliability test

10A: Knowledge culture

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,798	,804	4

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Capability to provide sufficient training	15,6000	10,243	,626	,465	,752
Capability to motivate exploration and experimentation	14,9286	11,604	,660	,441	,721
Capability to communicate company goals and vision	14,9143	12,051	,702	,510	,705
Management recognize importance of knowledge	14,2143	14,664	,497	,332	,799

10B: Knowledge structure

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,760	,765	3

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Structural capability to create new knowledge	8,1857	6,646	,602	,362	,673
Company measure preformance on effective knowledge acquisition	9,1571	5,236	,603	,365	,677
Do the company have many strategic alliances	8,3714	6,440	,586	,345	,685

10C: Knowledge technology

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,853	,856	4

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Tech capability to store and categorize	12,6571	12,924	,749	,678	,789
Tech capability to collaborate and learn	12,6286	13,657	,700	,515	,811
Tech capability to create new knowledge	13,0571	12,200	,818	,712	,758
Tech capability to monitor market	13,5143	14,051	,531	,324	,884

10D: Knowledge Acquisition

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,776	,776	3

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Capability to use benchmarking	9,4143	6,391	,638	,413	,667
Capability to collect valuable knowledge	8,7857	7,562	,566	,320	,746
Capability to utilize feedback	8,4857	6,630	,634	,408	,671

10E: Knowledge Application

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,901	,902	5

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Capability to utilze knowledge obtained from experience	19,6000	19,055	,745	,617	,881
Capability to make knowledge accessable	19,7143	17,975	,786	,665	,872
Capability to apply knowledge to create new products	19,7000	18,735	,768	,595	,876
Capability to apply knowledge to increase effectivety	19,4000	20,446	,730	,563	,885
Capability to apply knowledge to handle change	19,5286	18,630	,747	,586	,880

10F: Knowledge sharing

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,683	,721	3

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Capability to facilitate sharing and interaction	9,3143	5,262	,575	,403	,497
Capability to facilitate trust and good communication	8,6143	6,240	,557	,381	,565
Company provides incentives for sharing knowledge	10,4714	4,195	,441	,195	,742

10G: Organizational effectiveness

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,510	,851	7

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Change in market share from 2014 to 2015	45,8914	1041,914	,528	,338	,320
Innovations percent of total products and services	26,3914	1097,771	,280	,314	,465
Effectively find new marketoportunities	45,2057	1618,851	,536	,663	,506
Effectively anticipate market change and crisis	45,7629	1604,698	,571	,582	,500
Effectively convert innovations to commercial products	45,8486	1600,396	,538	,623	,499
Effectively adapt strategic goals to match market	45,4057	1611,591	,509	,656	,503
Change in turnover in % from 2014 to 2015	48,0143	684,478	,419	,362	,421

10H: Outsourcing

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,682	,742	2

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Percent of production outsourced	8,1000	202,990	,590	,349	.
Percent of knowledge tasks ourtsourced	19,2429	581,694	,590	,349	.

Appendix 11: SPSS codebook

Variable	SPSS Variable Name	Code
Municipality	Municipal	1=Molde, 2=Ålesund, 3=Kristiansund, 4= Vanylven, 5= Sande, 6= Herøy, 7= Ulstein, 8= Hareid, 9=Volda, 10= Ørsta, 11= Ørskog, 12=Nordal, 13=Stranda, 14=Stordal, 15= Sykkylven, 16=Skjodje, 17=Sula, 18=Giske, 19=Haram, 20=Vestnes, 21= Rauma, 22=Nesset, 23=Midsund, 24=Sandøy, 25=Aukra, 26=Aune, 27= Smøla, 28=Halsa, 29=Færna, 30=Eide, 31=Averøy, 32=Gjemnes, 33=Tingvoll, 34=Sunndal, 35=Surnadal, 36=Ringdal
Number of Employees (in Møre and Romsdal)	Employees	Nr of Employee
Employment (Department)	Department	1= CEO, 2= Administration, 3= Sales, 4= Marketing, 5= Other
Firms turnover in 2015	Turnover	Turnover in NOK
Change in firms turnover in % from 2014 to 2015	Changeinturnover	Change in turnover form previous year in percent
Knowledge Technology		
The company's technological capability to effectively categorizes and store knowledge	Techcatstore	1=Strongly disagree, 2= disagree, 3= some disagree, 4= neither disagree/nor agreed, 5= Somewhat agreed, 6= agreed, 7= Strongly agree

The company's technological capability to facilitate collaboration between employees and learning	Techollablearn	11=Strongly disagree, 2= disagree, 3= some disagree, 4= neither disagree/nor agreed, 5= Somewhat agreed, 6= agreed, 7= Strongly agree
The company's technological capability to effectively search new knowledge	Technewknowledge	1=Strongly disagree, 2= disagree, 3= some disagree, 4= neither disagree/nor agreed, 5= Somewhat agreed, 6= agreed, 7= Strongly agree
The company's capability to effectively monitor the market and competitors	Tech	1=Strongly disagree, 2= disagree, 3= some disagree, 4= neither disagree/nor agreed, 5= Somewhat agreed, 6= agreed, 7= Strongly agree
Knowledge Structure		
The company's s structural capability to collect and develop new knowledge	Strucnew	1=Strongly disagree, 2= disagree, 3= some disagree, 4= neither disagree/nor agreed, 5= Somewhat agreed, 6= agreed, 7= Strongly agree
The company measure performance on how effectively they acquire knowledge	Strucpref	1=Strongly disagree, 2= disagree, 3= some disagree, 4= neither disagree/nor agreed, 5= Somewhat agreed, 6= agreed, 7= Strongly agree
The company have many strategic alliances.	Strategicalalliances	11=Strongly disagree, 2= disagree, 3= some disagree, 4= neither disagree/nor agreed, 5= Somewhat agreed, 6= agreed, 7= Strongly agree
Knowledge Culture		
The company provides a suitable amount of courses and training programs to their	Training	1=Strongly disagree, 2= disagree, 3= some disagree, 4= neither disagree/nor agreed, 5= Somewhat agreed, 6= agreed, 7= Strongly

employees.		agree
The companies capability to motivate for experimentation and exploration	ExperimentExplor	1=Strongly disagree, 2= disagree, 3= some disagree, 4= neither disagree/nor agreed, 5= Somewhat agreed, 6= agreed, 7= Strongly agree
The companies capability to communicate the companies strategic goals and vision	GoalsVision	1=Strongly disagree, 2= disagree, 3= some disagree, 4= neither disagree/nor agreed, 5= Somewhat agreed, 6= agreed, 7= Strongly agree
Managements recognize the importance of knowledge	Recognition	1=Strongly disagree, 2= disagree, 3= some disagree, 4= neither disagree/nor agreed, 5= Somewhat agreed, 6= agreed, 7= Strongly agree
Knowledge Acquisition		
The companies capability to use benchmarking to increase effectiveness	Benchmark	1=Strongly disagree, 2= disagree, 3= some disagree, 4= neither disagree/nor agreed, 5= Somewhat agreed, 6= agreed, 7= Strongly agree
The company's capability to collect valuable knowledge about important players in the market	Collectknow	11=Strongly disagree, 2= disagree, 3= some disagree, 4= neither disagree/nor agreed, 5= Somewhat agreed, 6= agreed, 7= Strongly agree
The company's capability to utilize feedback to improve future projects	Feedback	1=Strongly disagree, 2= disagree, 3= some disagree, 4= neither disagree/nor agreed, 5= Somewhat agreed, 6= agreed, 7= Strongly agree
Knowledge Application		
The company's capability to apply knowledge obtained	Applyexperience	1=Strongly disagree, 2= disagree, 3= some disagree, 4= neither disagree/nor agreed, 5=

form experience		Somewhat agreed, 6= agreed, 7= Strongly agree
The company's capability to apply knowledge to handle change in the competitive environment	Applychange	11=Strongly disagree, 2= disagree, 3= some disagree, 4= neither disagree/nor agreed, 5= Somewhat agreed, 6= agreed, 7= Strongly agree
The company's capability to apply knowledge to generate new products and solutions	Applynew	1=Strongly disagree, 2= disagree, 3= some disagree, 4= neither disagree/nor agreed, 5= Somewhat agreed, 6= agreed, 7= Strongly agree
The company's capability to utilize knowledge to improve effectiveness	Applyeffect	1=Strongly disagree, 2= disagree, 3= some disagree, 4= neither disagree/nor agreed, 5= Somewhat agreed, 6= agreed, 7= Strongly agree
The company's capability to make knowledge accessible for all employees.	Accessible	1=Strongly disagree, 2= disagree, 3= some disagree, 4= neither disagree/nor agreed, 5= Somewhat agreed, 6= agreed, 7= Strongly agree
Knowledge Sharing		
The company's capability to facilitate knowledge sharing and interaction between employees and across departments	Shareinteract	11=Strongly disagree, 2= disagree, 3= some disagree, 4= neither disagree/nor agreed, 5= Somewhat agreed, 6= agreed, 7= Strongly agree
The company's capability to facilitate interrelationships and trust between employees and good communication	Sharetrust	1=Strongly disagree, 2= disagree, 3= some disagree, 4= neither disagree/nor agreed, 5= Somewhat agreed, 6= agreed, 7= Strongly agree
The company provides	Shareincentives	11=Strongly disagree, 2= disagree, 3= some

incentives for sharing knowledge		disagree, 4= neither disagree/nor agreed, 5= Somewhat agreed, 6= agreed, 7= Strongly agree
Organizational effectiveness		
The company's ability to find new market opportunities	OEmarketop	1=Strongly disagree, 2= disagree, 3= some disagree, 4= neither disagree/nor agreed, 5= Somewhat agreed, 6= agreed, 7= Strongly agree
How well does the company anticipate market change and crisis	OEchangecrisis	1=Strongly disagree, 2= disagree, 3= some disagree, 4= neither disagree/nor agreed, 5= Somewhat agreed, 6= agreed, 7= Strongly agree
The company effectively convert innovations to commercial products	OEconvert	1=Strongly disagree, 2= disagree, 3= some disagree, 4= neither disagree/nor agreed, 5= Somewhat agreed, 6= agreed, 7= Strongly agree
The company's ability to adapt strategic goals to match market change	OEadapt	1=Strongly disagree, 2= disagree, 3= some disagree, 4= neither disagree/nor agreed, 5= Somewhat agreed, 6= agreed, 7= Strongly agree
New Launches and innovations	Innovation	Percent for total product and services
Increase/ decrease in market share from 2015 to 2015	Marketshare	Change in market share measured in percent form 2014 to 2015
How much of the company's production is outsourced to international companies	Outsourcepro	Percent of production executed by international companies

How much of the company's knowledge tasks is outsourced to international companies	Outsourceknow	Percent of knowledge activities executed by international companies